

Centre No.					
Candidate No.					

Paper Reference					
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Surname	Initial(s)
Signature	

Paper Reference(s)

4400/3H

**London Examinations IGCSE
Mathematics**

Paper 3H

Higher Tier

Monday 10 May 2004 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

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4	
5	
6	
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8	
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Total	

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.

The paper reference is shown at the top of this page. Check that you have the correct question paper. Answer **ALL** the questions in the spaces provided in this question paper. Show all the steps in any calculations.

Information for Candidates

There are 20 pages in this question paper. All blank pages are indicated. The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. (2). You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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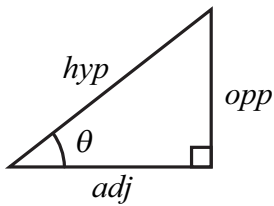
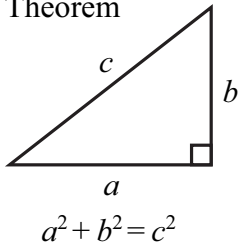
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Turn over



**IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER**

Pythagoras' Theorem

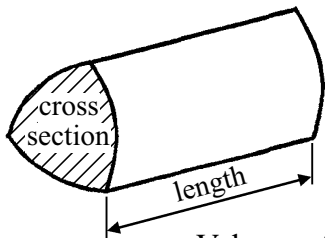


adj = hyp \times cos θ
opp = hyp \times sin θ
opp = adj \times tan θ

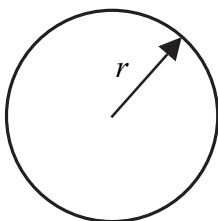
or $\sin \theta = \frac{\text{opp}}{\text{hyp}}$

$\cos \theta = \frac{\text{adj}}{\text{hyp}}$

$\tan \theta = \frac{\text{opp}}{\text{adj}}$

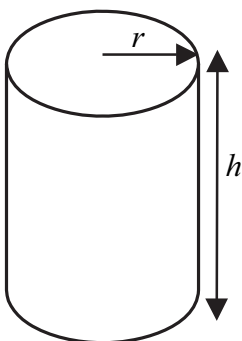


Volume of prism = area of cross section \times length



Circumference of circle = $2\pi r$

Area of circle = πr^2

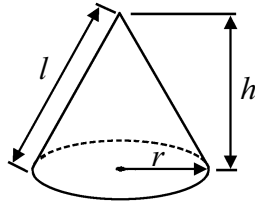


Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi r h$

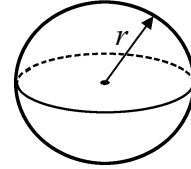
Volume of cone = $\frac{1}{3} \pi r^2 h$

Curved surface area of cone = $\pi r l$

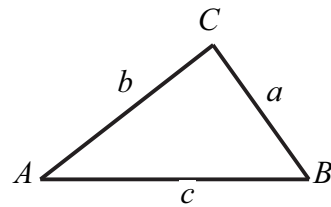


Volume of sphere = $\frac{4}{3} \pi r^3$

Surface area of sphere = $4\pi r^2$



In any triangle ABC

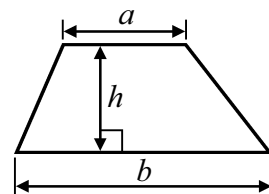


Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2} ab \sin C$

Area of a trapezium = $\frac{1}{2} (a + b) h$



The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Answer ALL TWENTY questions.

Leave
blank

Write your answers in the spaces provided.

You must write down all stages in your working.

1. In July 2002, the population of Egypt was 69 million.
By July 2003, the population of Egypt had increased by 2%.

Work out the population of Egypt in July 2003.

..... million

Q1

(Total 3 marks)

2. (a) Expand $3(2t + 1)$

.....
(1)

- (b) Expand and simplify $(x + 5)(x - 3)$

.....
(2)

- (c) Factorise $10p - 15q$

.....
(1)

- (d) Factorise $n^2 + 4n$

.....
(1)

Q2

(Total 5 marks)

3.

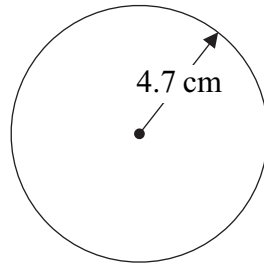


Diagram **NOT**
accurately drawn

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A circle has a radius of 4.7 cm.

- (a) Work out the area of the circle.
Give your answer correct to 3 significant figures.

..... cm²
(2)

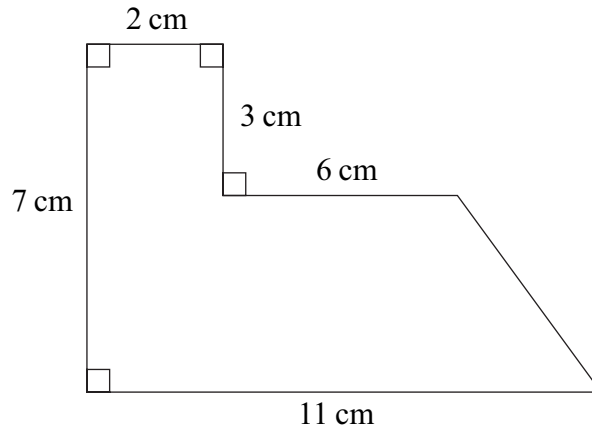


Diagram **NOT**
accurately drawn

The diagram shows a shape.

- (b) Work out the area of the shape.

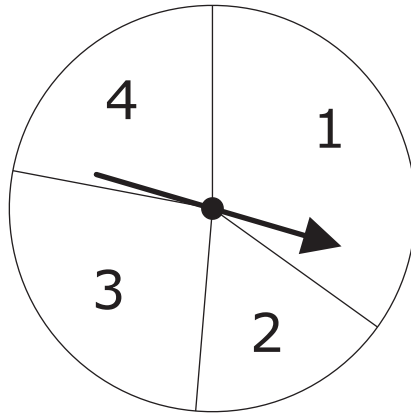
..... cm²
(4)

Q3

(Total 6 marks)

4. The diagram shows a pointer which spins about the centre of a fixed disc.

*Leave
blank*



When the pointer is spun, it stops on one of the numbers 1, 2, 3 or 4.
The probability that it will stop on one of the numbers 1 to 3 is given in the table.

Number	1	2	3	4
Probability	0.35	0.16	0.27	

Magda is going to spin the pointer once.

- (a) Work out the probability that the pointer will stop on 4.

.....
(2)

- (b) Work out the probability that the pointer will stop on 1 or 3.

.....
(2)

Omar is going to spin the pointer 75 times.

- (c) Work out an estimate for the number of times the pointer will stop on 2.

.....
(2)

Q4

(Total 6 marks)

5. (a) Express 200 as the product of its prime factors.

*Leave
blank*

.....
(2)

(b) Work out the Lowest Common Multiple of 75 and 200.

.....
(2)

Q5

(Total 4 marks)

6. Two points, A and B , are plotted on a centimetre grid.
 A has coordinates $(2, 1)$ and B has coordinates $(8, 5)$.

(a) Work out the coordinates of the midpoint of the line joining A and B .

(..... ,)
(2)

(b) Use Pythagoras' Theorem to work out the length of AB .
Give your answer correct to 3 significant figures.

..... cm
(4)

Q6

(Total 6 marks)

7. $A = \{1, 2, 3, 4\}$
 $B = \{1, 3, 5\}$

Leave blank

(a) List the members of the set

(i) $A \cap B$,

(ii) $A \cup B$.

.....

(2)

(b) Explain clearly the meaning of $3 \in A$.

.....
(1)

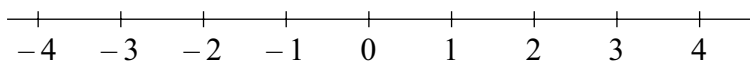
Q7

(Total 3 marks)

8. (i) Solve the inequality $3x + 7 > 1$

.....

(ii) On the number line, represent the solution to part (i).



Q8

(Total 4 marks)

9. The grouped frequency table gives information about the distance each of 150 people travel to work.

Leave blank

Distance travelled (d km)	Frequency
$0 < d \leq 5$	34
$5 < d \leq 10$	48
$10 < d \leq 15$	26
$15 < d \leq 20$	18
$20 < d \leq 25$	16
$25 < d \leq 30$	8

- (a) Work out what percentage of the 150 people travel more than 20 km to work.

..... %
(2)

- (b) Work out an estimate for the mean distance travelled to work by the people.

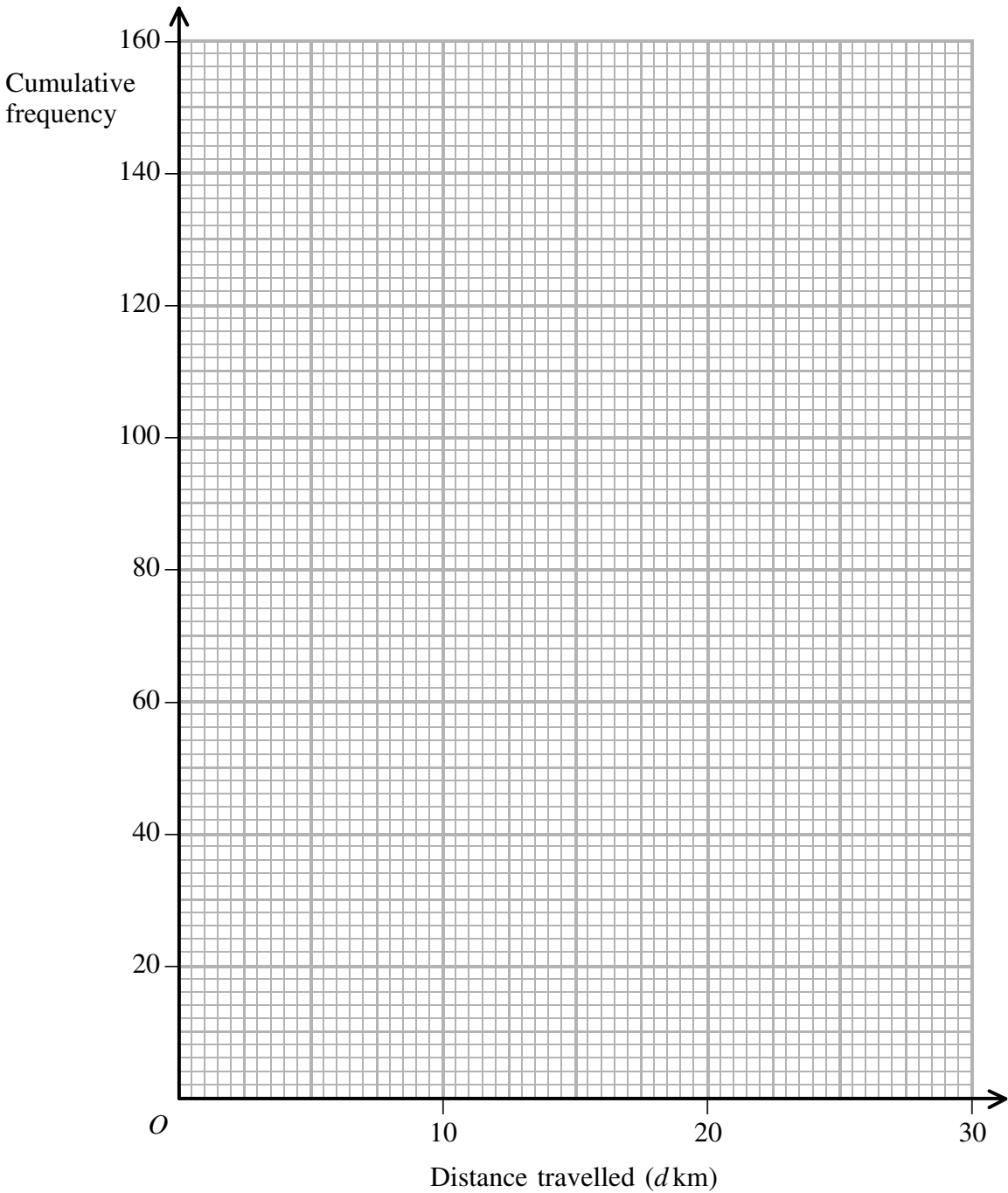
..... km
(4)

- (c) Complete the cumulative frequency table.

Distance travelled (d km)	Cumulative frequency
$0 < d \leq 5$	
$0 < d \leq 10$	
$0 < d \leq 15$	
$0 < d \leq 20$	
$0 < d \leq 25$	
$0 < d \leq 30$	

(1)

Leave blank



(d) On the grid, draw a cumulative frequency graph for your table. (2)

(e) Use your graph to find an estimate for the median of the distance travelled to work by the people.
Show your method clearly.

..... km
(2)

Q9

(Total 11 marks)

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10.

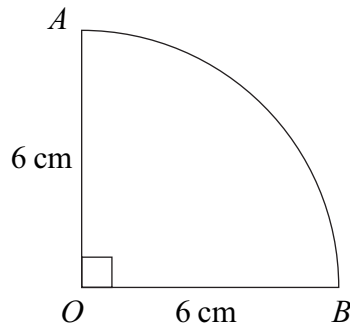


Diagram **NOT** accurately drawn

Leave blank

The diagram shows a shape.
 AB is an arc of a circle, centre O .
 Angle $AOB = 90^\circ$.
 $OA = OB = 6$ cm.

Calculate the perimeter of the shape.
 Give your answer correct to 3 significant figures.

..... cm

Q10

(Total 4 marks)

11. The distance between the Earth and the Sun is 150 000 000 km.

(a) Write the number 150 000 000 in standard form.

.....

(1)

The distance between Neptune and the Sun is 30 times greater than the distance between the Earth and the Sun.

(b) Calculate the distance between Neptune and the Sun.
 Give your answer in standard form.

..... km
(2)

Q11

(Total 3 marks)

12. (a) Find the gradient of the line with equation $3x - 4y = 15$

Leave
blank

.....
(3)

(b) Work out the coordinates of the point of intersection of the line with equation $3x - 4y = 15$ and the line with equation $5x + 6y = 6$

(.....,)
(4)

Q12

(Total 7 marks)

13. A body is moving in a straight line which passes through a fixed point O .
The displacement, s metres, of the body from O at time t seconds is given by

$$s = t^3 + 4t^2 - 5t$$

(a) Find an expression for the velocity, v m/s, at time t seconds.

$v =$
(2)

(b) Find the acceleration after 2 seconds.

..... m/s^2
(2)

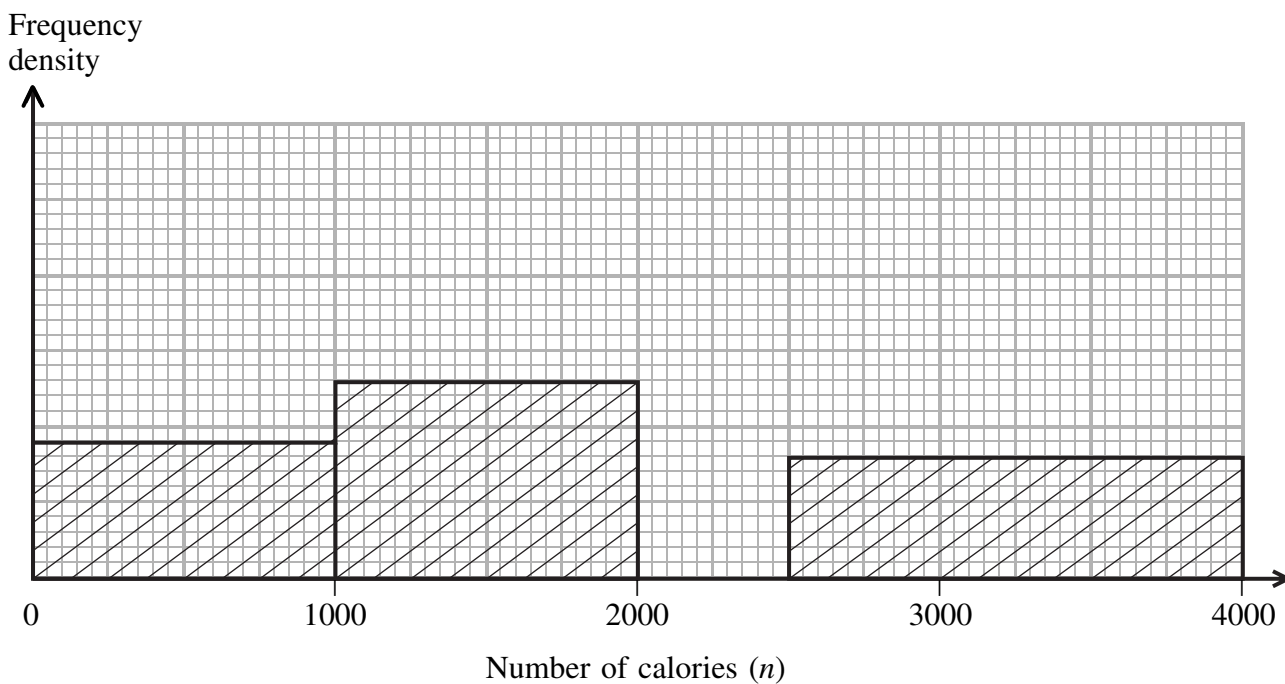
Q13

(Total 4 marks)

14. The unfinished table and histogram show information from a survey of women about the number of calories in the food they eat in one day.

Leave blank

Number of calories (n)	Frequency
$0 < n \leq 1000$	90
$1000 < n \leq 2000$	
$2000 < n \leq 2500$	140
$2500 < n \leq 4000$	



(a) (i) Use the information in the table to complete the histogram.

(ii) Use the information in the histogram to complete the table.

(3)

(b) Find an estimate for the upper quartile of the number of calories. You must make your method clear.

.....
(2)

Q14

(Total 5 marks)

15. The length of a side of a square is 6.81 cm, correct to 3 significant figures.

Leave blank

(a) Work out the lower bound for the perimeter of the square.

..... cm
(2)

(b) Give the perimeter of the square to an appropriate degree of accuracy.
You must show working to explain how you obtained your answer.

..... cm
(2)

Q15

(Total 4 marks)

16. Express the algebraic fraction $\frac{2x^2 - 3x - 20}{x^2 - 16}$ as simply as possible.

Q16

.....
(Total 3 marks)

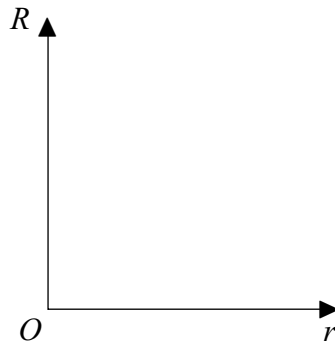
17. An electrician has wires of the same length made from the same material.
 The electrical resistance, R ohms, of a wire is inversely proportional to the square of its radius, r mm.
 When $r = 2$, $R = 0.9$

Leave blank

(a) (i) Express R in terms of r .

$R = \dots\dots\dots$

(ii) On the axes, sketch the graph of R against r .



(4)

One of the electrician's wires has a radius of 3 mm.

(b) Calculate the electrical resistance of this wire.

$\dots\dots\dots$ ohms
(1)

Q17

(Total 5 marks)

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18.

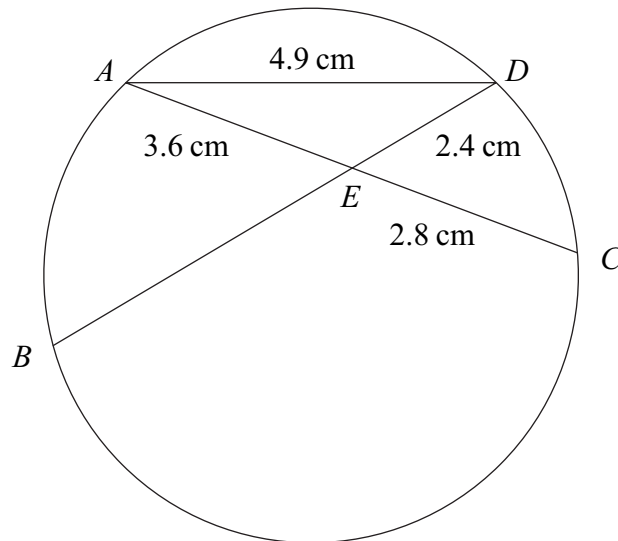


Diagram **NOT** accurately drawn

Leave blank

A , B , C and D are four points on the circumference of a circle. The chords AC and BD intersect at E .
 $AE = 3.6$ cm, $CE = 2.8$ cm, $DE = 2.4$ cm and $AD = 4.9$ cm.

(a) Calculate the length of BE .

..... cm
(3)

(b) Calculate the size of angle AED .
Give your answer correct to 3 significant figures.

.....
(3)

Q18

(Total 6 marks)

19.

$$f: x \mapsto 2x - 1$$

$$g: x \mapsto \frac{3}{x}, \quad x \neq 0$$

*Leave
blank*

(a) Find the value of

(i) $f(3)$,

.....

(ii) $fg(6)$.

.....
(2)

(b) Express the inverse function f^{-1} in the form $f^{-1}: x \mapsto \dots$

.....
(2)

(c) (i) Express the composite function gf in the form $gf: x \mapsto \dots$

.....

(ii) Which value of x must be excluded from the domain of gf ?

$x = \dots$
(2)

Q19

(Total 6 marks)

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20.

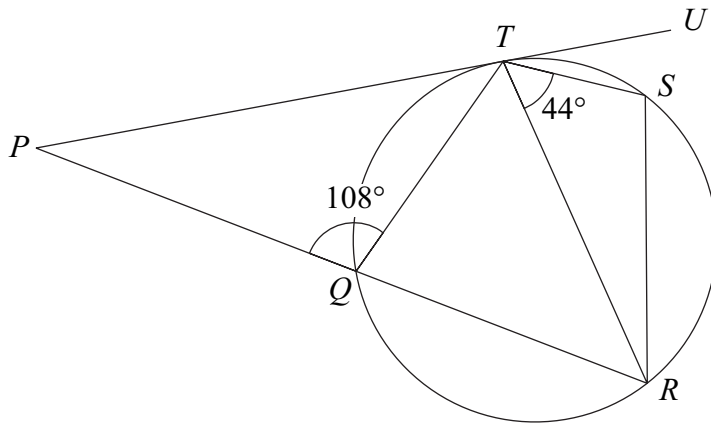


Diagram **NOT** accurately drawn

Leave blank

Q, R, S and T are points on the circumference of a circle.
 PU is a tangent to the circle at T .
 PQR is a straight line.
Angle $PQT = 108^\circ$.
Angle $STR = 44^\circ$.

Work out the size of angle STU .
You must give a reason for each step in your working.

Q20

.....
(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

END

**Edexcel International
London Examinations
IGCSE**

IGCSE Mathematics (4400)

Mark Schemes for May 2004 examination session

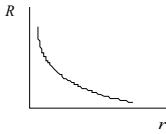
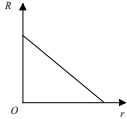
Paper 3H (Higher Tier)

No	Working	Answer	Mark	Notes
1	$\frac{2}{100} \times 69$ or 1.38 69 + "1.38"	70.38	3	M1 M1 dep on 1 st M1 A1 Accept 70.4 Condone 70 380 000, 70 400 000 or M2 for 69 × 1.02
2	a b c d	$6t + 3$ $x^2 - 3x + 5x - 15$ $x^2 + 2x - 15$ $5(2p - 3q)$ $n(n + 4)$	1 2 1 1	B1 cao M1 for 4 terms ignoring signs or 3 terms with correct signs A1 B1 B1
3	a b	$\pi \times 4.7^2$ 69.4 44	2 4	M1 A1 for 69.4 or better (69.39778...) M1 M1 for area of at least one rectangle M1 for area of triangle or trapezium A1 cao
4	ai ii b	$1 - (0.35 + 0.16 + 0.27)$ 0.22 0.62 12	4 2	M1 A1 oe M1 A1 oe M1 A1 cao

No	Working	Answer	Mark	Notes
5	a	prime factors 2 & 5 seen	2	M1 A1
	b	$2 \times 2 \times 2 \times 3 \times 5 \times 5$ 600	2	M1 for $2 \times 2 \times 2 \times 3 \times 5 \times 5$ or for lists of multiples with at least 3 correct in each list A1 cao
6	a	(5, 3)	2	B2 B1 for each coordinate
	b	$8 - 2 = 6$ & $5 - 1 = 4$ $6^2 + 4^2$ or $36 + 16$ or 52 $\sqrt{6^2 + 4^2}$ or $\sqrt{52}$ (7.2110...) 7.21	4	B1 M1 for squaring & adding M1 (dep on 1st M1) for square root A1 for 7.21 or better Either 6 or 4 must be correct for award of M marks
7	i	1, 3	3	B1 Condone repetition
	ii	1, 2, 3, 4, 5		B1 Condone repetition
	iii	“is a member of” oe		B1
8	i	$3x > -6$	4	M1 SC if M0, award B1 for -2 A1
	ii	$x > -2$ line to right of -2 indicated open circle at -2		B1 ft from (i) line must either have arrow or reach 4 B1 ft from (i)

No	Working	Answer	Mark	Notes
9	a	$\frac{16+8}{150}$ or $\frac{24}{150}$ or 0.16	2	M1
	b	16	4	A1 cao M1 finds products $f \times x$ consistently within intervals (inc end points) and sums them M1 use of midpoints M1 (dep on 1st M1) for division by 150
		11.1		A1 Accept 11 if $\frac{1665}{150}$ seen
	c	34, 82, 108, 126, 142, 150	1	B1 cao
	d	Points Curve	2	B1 $\pm \frac{1}{2}$ square ft from sensible table B1 or line segments (dep on 5 pts correct or ft correctly or 5 ordinates from (c) plotted correctly and consistently within intervals but not above end points)
e	cf of 75 (or $75\frac{1}{2}$) used	~ 9	2	M1 A1 ft from sensible graph
10	$\pi \times 12$ or 37.6991... $\div 4$ $+ 2 \times 6$ or +12	21.4	4	M1 M1 (dep) SC B2 for 3π or 9.4247... seen B1 (indep) A1 for 21.4 or better (21.4247...)

No	Working	Answer	Mark	Notes
11	a b	1.5×10^8 4.5×10^9	1 2	B1 cao M1 4.5×10^n for integer $n > 0$ A1 for $n = 9$ SC B1 for 4.5^{09}
12	a b eg eg eg	$4y = 3x - 15$ $y = \frac{3}{4}x - \frac{15}{4}$ $(3, -1\frac{1}{2})$	3 4	M1 M1 for " $\frac{3x - 15}{4}$ " A1 ft from " $\frac{3x - 15}{4}$ " M1 for clear attempt at first step in correct process to eliminate either x or y M1 Completes correct process to eliminate either x or y (Condone one error) A1 cao for non-eliminated one A1 cao
13	a b	$3t^2 + 8t - 5$ 20	2 2	B2 (B1 for 2 terms correct) M1 for $6t + 8$ or $d(a)/dt$ if at least B1 scored A1 ft
14	ai ii b	bar correct 130, 120 $\Sigma f = 480, \frac{3}{4} \times 480 = 360$ 2500	3 2	B1 $28 \pm \frac{1}{2}$ sq B2 B1 cao for each value M1 A1 ft from "480" ie Σf

No	Working	Answer	Mark	Notes
15	a	6.805×4	2	M1
	b	$6.815 \times 4 = 27.26$	2	A1 cao
16		27	3	M1
		$\frac{2x+5}{x+4}$		M1 A1 cao
17	ai	$R = \frac{k}{r^2}$	4	M1
	ii	$R = \frac{3.6}{r^2}$ 		A1
	b	0.4	1	B2 B1 for graph with negative gradient (increasing or constant) even if it touches or crosses one or both axes eg 

No		Working	Answer	Mark	Notes
18	a	$3.6 \times 2.8 = 2.4 \times BE$ $\frac{3.6 \times 2.8}{2.4}$	4.2	3	M1 Accept $AE \times CE = BE \times ED$ M1
	b	$\frac{3.6^2 + 2.4^2 - 4.9^2}{2 \times 3.6 \times 2.4}$ $- 0.3061$		3	A1 cao M1 A1 at least 3 sf A1 for 108 or better (107.826...)
19	ai	eg $\times 2 \rightarrow -1$ or attempt to make x the $\div 3 \leftarrow +1$ subject of $y = 2x - 1$	5	2	B1 cao
	ii		0		B1 cao
	b			2	M1
	ci		$\frac{x+1}{2}$ oe		A1
	ii	$\frac{3}{2x-1}$ $\frac{1}{2}$		2	B1 B1

No	Working	Answer	Mark	Notes
20	$\angle RST = 108^\circ$ opposite angles of a cyclic quadrilateral $\angle SRT = 28^\circ$ angle between chord & tangent = angle in alternate segment	28	5	B1 B1 or exterior angle = opposite interior angle Accept <i>cyclic quadrilateral</i> B1 B1 Accept <i>alternate segment</i> or <i>chord & tangent</i> B1
	or $\angle RST = 108^\circ$ opposite angles of a cyclic quadrilateral $\angle PTR = 108^\circ$ angle between chord & tangent = angle in alternate segment	28	5	B1 B1 or exterior angle = opposite interior angle Accept <i>cyclic quadrilateral</i> B1 B1 Accept <i>alternate segment</i> or <i>chord & tangent</i> B1
	or $\angle UTR = 72^\circ$ angle between chord & tangent = angle in alternate segment	28	5	B2 B1 Accept <i>alternate segment</i> or <i>chord & tangent</i> B2 B1 for 72 – 44

Centre No.				
Candidate No.				

Paper Reference					
4	4	0	0	/	4 H

Surname	Initial(s)
Signature	

Paper Reference(s)

4400/4H

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Tuesday 11 May 2004 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

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Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Page Numbers	Leave Blank
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Instructions to Candidates

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.

The paper reference is shown at the top of this page. Check that you have the correct question paper. Answer **ALL** the questions in the spaces provided in this question paper. Show all the steps in any calculations.

Information for Candidates

There are 16 pages in this question paper. All blank pages are indicated. The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. (2). You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

Answer ALL TWENTY TWO questions.

Leave
blank

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Work out the value of $\frac{6.1+3.4}{5.7-1.9}$

Q1

.....
(Total 2 marks)

2. Suhail cycles 117 km in 4 hours 30 minutes.
Work out his average speed in km/h.

Q2

..... km/h
(Total 3 marks)

3. The word formula gives the time, in minutes, needed to cook a turkey.

$$\text{Time} = 40 \times \text{weight in kg} + 20$$

A time of T minutes is needed to cook a turkey with a weight of W kg.

Write down a formula for T in terms of W .

Q3

.....
(Total 2 marks)

4. The mean height of a group of 4 girls is 158 cm.

*Leave
blank*

(a) Work out the total height of the 4 girls.

..... cm
(1)

Sarah joins the group and the mean height of the 5 girls is 156 cm.

(b) Work out Sarah's height.

..... cm
(3)

Q4

(Total 4 marks)

5. Plumbers' solder is made from tin and lead.

The ratio of the weight of tin to the weight of lead is 1 : 2

(a) Work out the weight of tin and the weight of lead in 120 grams of plumbers' solder.

tin g

lead g
(2)

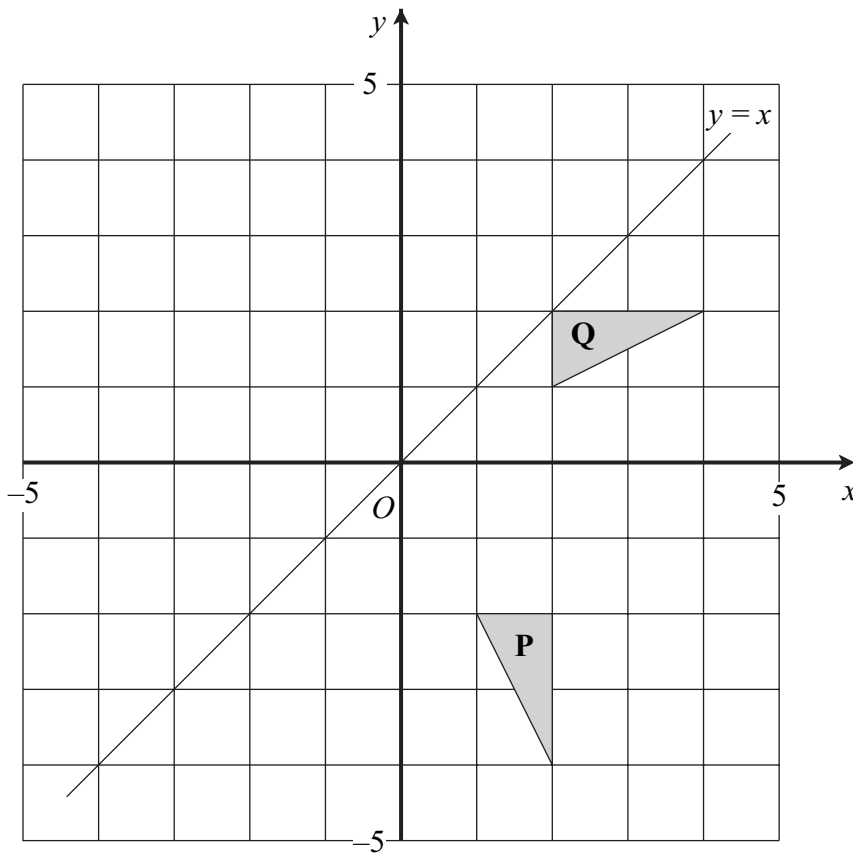
(b) What weight of plumbers' solder contains 25 grams of tin?

..... g
(1)

Q5

(Total 3 marks)

6.



Leave blank

(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

.....

(3)

(b) Reflect triangle **Q** in the line with equation $y = x$.

(2)

Q6

(Total 5 marks)

7. Work out $2\frac{2}{5} \times 1\frac{7}{8}$

Give your answer as a mixed number in its simplest form.

Q7

(Total 3 marks)

8. This formula is used in science.

Leave
blank

$$v = \sqrt{2gh}$$

- (a) Hanif uses the formula to work out an estimate for the value of v without using a calculator when $g = 9.812$ and $h = 0.819$

Write down approximate values for g and h that Hanif could use.

approximate value for g

approximate value for h

(2)

- (b) Make h the subject of the formula $v = \sqrt{2gh}$

$$h = \dots\dots\dots$$

(2)

Q8

(Total 4 marks)

9. (a) Simplify $n \times n \times n \times n$

.....
(1)

- (b) Simplify $p^2 \times p^5$

.....
(1)

- (c) Simplify $\frac{q^7}{q^3}$

.....
(1)

- (d) Simplify $\frac{t^4 \times t^7}{t^8}$

.....
(1)

Q9

(Total 4 marks)

10.

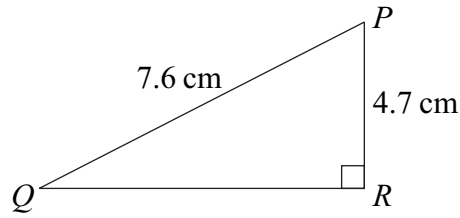


Diagram NOT accurately drawn

Leave blank

Triangle PQR is right-angled at R .
 $PR = 4.7$ cm and $PQ = 7.6$ cm.

- (a) Calculate the size of angle PQR .
Give your answer correct to 1 decimal place.

.....

 (3)

The length, 7.6 cm, of PQ is correct to 2 significant figures.

- (b) (i) Write down the upper bound of the length of PQ .

..... cm

- (ii) Write down the lower bound of the length of PQ .

..... cm
 (2)

Q10

(Total 5 marks)

11. Solve $4(x - 3) = 7x - 10$

$x =$

Q11

(Total 3 marks)

12.

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blank

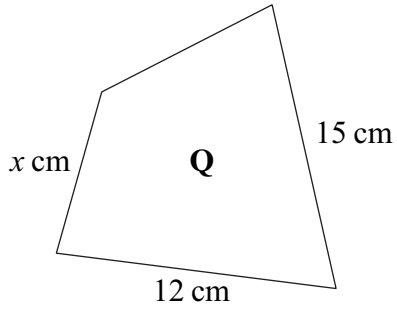
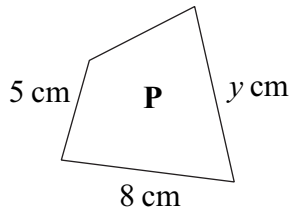


Diagram **NOT**
accurately drawn

Quadrilateral **P** is mathematically similar to quadrilateral **Q**.

(a) Calculate the value of x .

$x = \dots\dots\dots$
(2)

(b) Calculate the value of y .

$y = \dots\dots\dots$
(2)

The area of quadrilateral **P** is 60 cm^2 .

(c) Calculate the area of quadrilateral **Q**.

$\dots\dots\dots \text{ cm}^2$
(2)

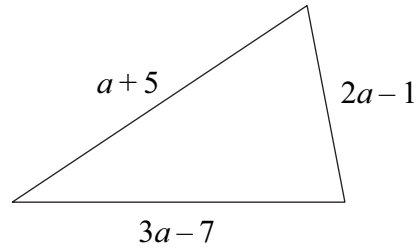
Q12

(Total 6 marks)

--

13.

Leave
blank



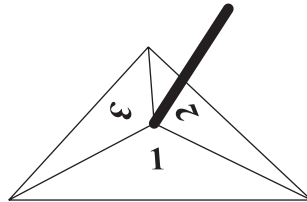
The lengths, in cm, of the sides of a triangle are $(a+5)$, $(3a-7)$ and $(2a-1)$.
The perimeter of the triangle is 24 cm.
Work out the value of a .

$a = \dots\dots\dots$

Q13

(Total 3 marks)

14. Here is a fair 3-sided spinner.



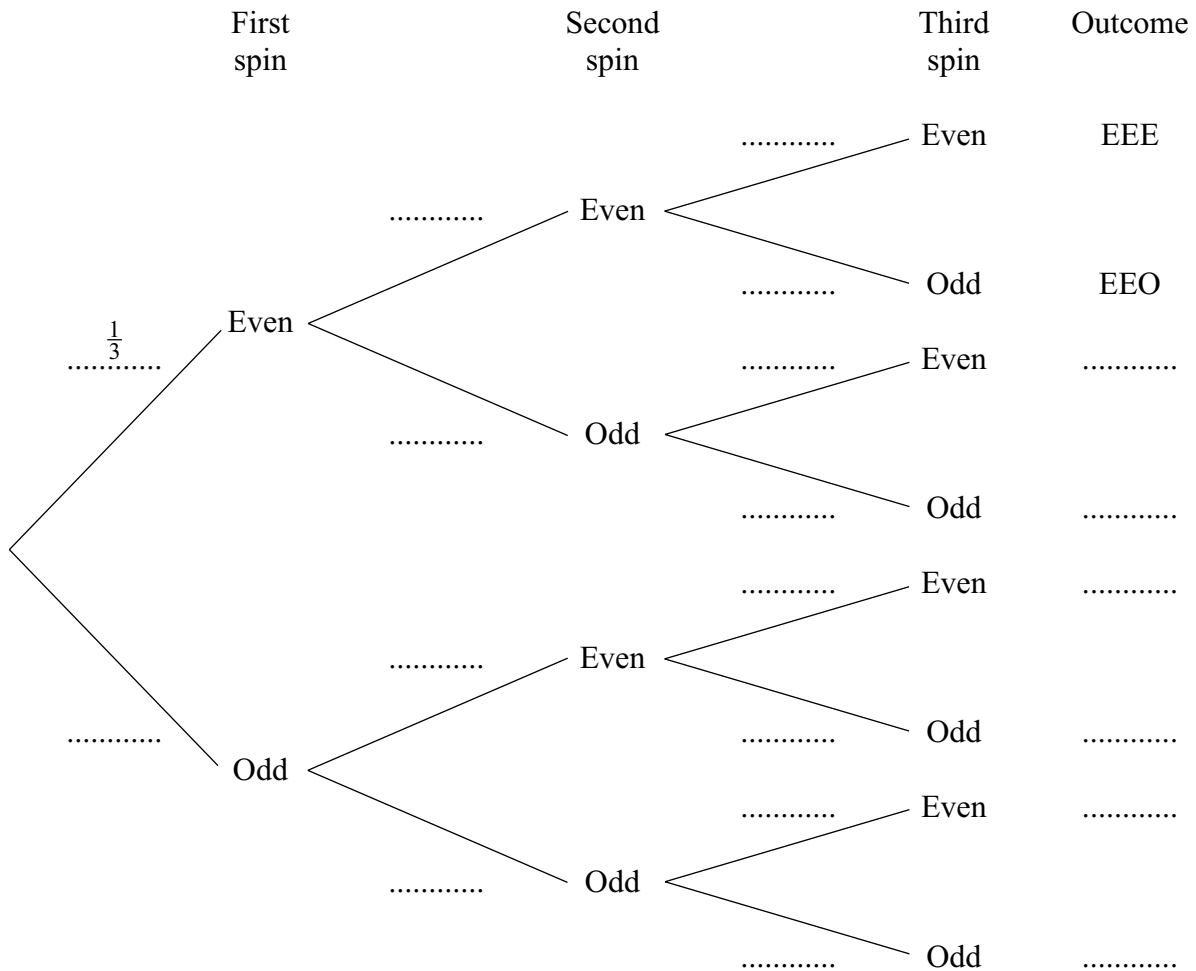
Its sides are labelled 1, 2 and 3 as shown.

- (a) Aisha is going to spin the spinner twice.
Work out the probability that it will land on 1 both times.

$\dots\dots\dots$
(2)

(b) Harry is going to spin the spinner 3 times.

(i) Complete the probability tree diagram.



(ii) Work out the probability that the spinner will land on an odd number 3 times.

.....

(iii) Work out the probability that the spinner will land on an even number exactly once.

.....

(9)

Q14

(Total 11 marks)

--	--

15. In a sale, normal prices are reduced by 12%.
The sale price of a computer is £726

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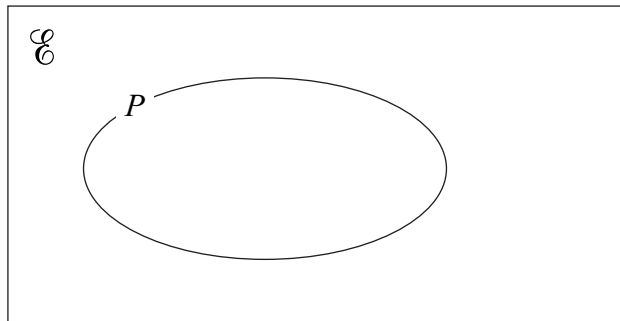
Work out the normal price of the computer.

£

Q15

(Total 3 marks)

16.



Set P is shown on the Venn Diagram.
Two sets, Q and R , are such that

$$R \subset P$$

$$Q \cap R = \emptyset$$

$$P \cup Q = P$$

Complete the Venn Diagram to show set Q and set R .

Q16

(Total 3 marks)

17. Convert the recurring decimal $0.3\dot{2}$ to a fraction.

Q17

.....
(Total 2 marks)

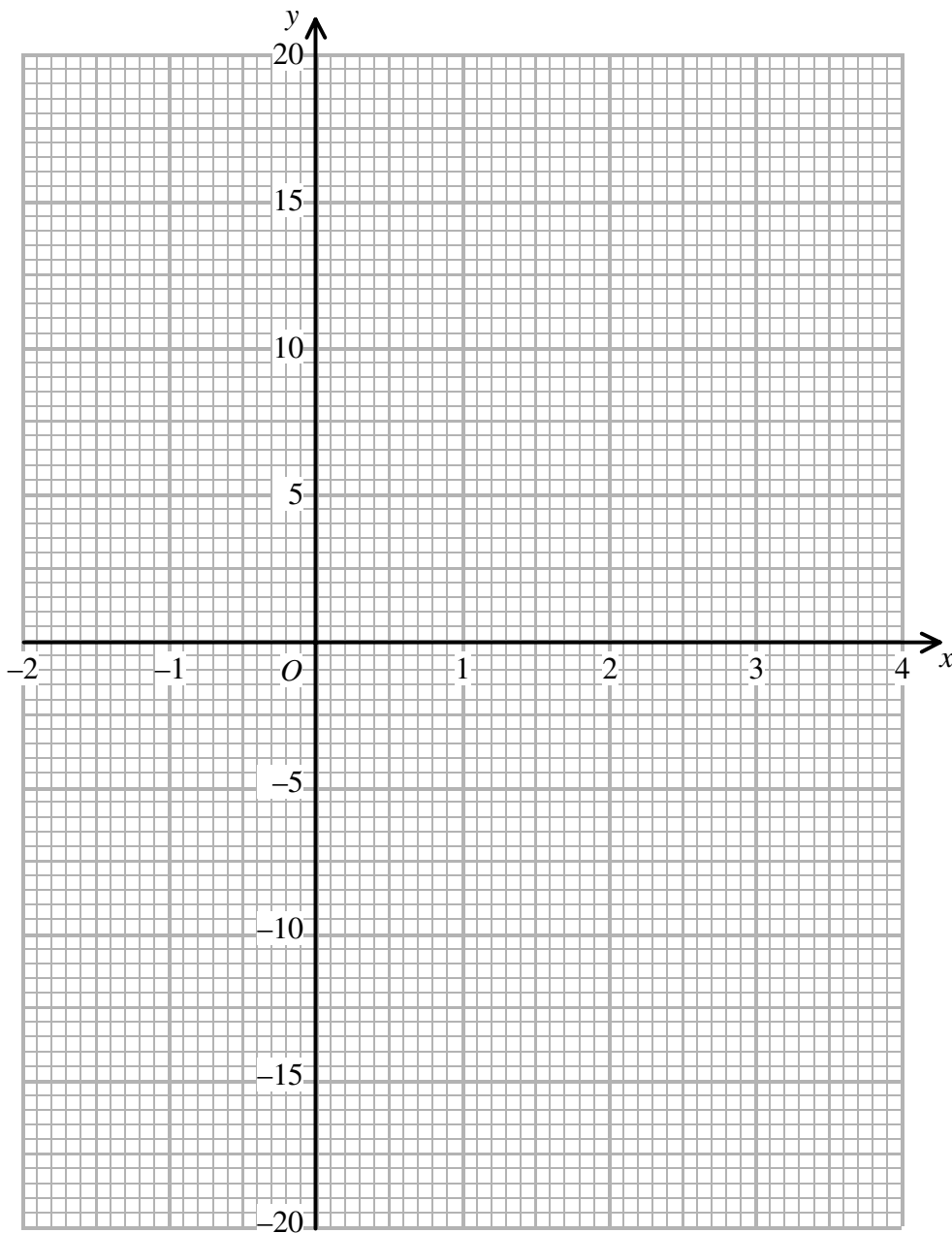
18. (a) Complete the table of values for $y = x^3 - 3x^2 + 2$

x	-2	-1	0	1	2	3	4
y		-2					

Leave
blank

(2)

(b) On the grid, draw the graph of $y = x^3 - 3x^2 + 2$



(2)

(c) Use your graph to find estimates, correct to 1 decimal place where appropriate, for the solutions of

Leave blank

(i) $x^3 - 3x^2 + 2 = 0$

.....

(ii) $x^3 - 3x^2 - 4 = 0$

.....

(4)

Q18

(Total 8 marks)

--

19. (a) Expand and simplify $(3p - 2q)(2p + 5q)$

.....

(2)

(b) Simplify $(2x^2y^4)^3$

.....

(2)

(c) Simplify $(a^4b^{-3})^{-2}$

.....

(2)

(d) Simplify $(27p^6)^{\frac{1}{3}}$

.....

(2)

Q19

(Total 8 marks)

--

20.

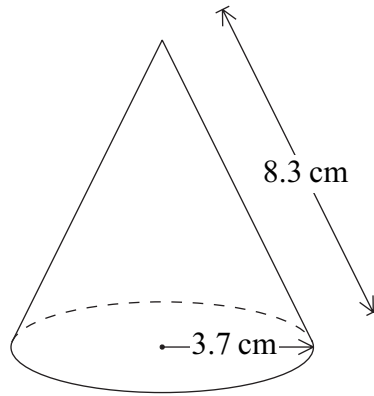


Diagram **NOT**
accurately drawn

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blank*

The diagram shows a solid cone.
The radius of its base is 3.7 cm and the slant height is 8.3 cm.

- (a) Calculate the total surface area of the cone.
Give your answer correct to 3 significant figures.

..... cm²
(2)

- (b) Calculate the volume of the cone.
Give your answer correct to 3 significant figures.

..... cm³
(4)

Q20

(Total 6 marks)

--

21. Solve the simultaneous equations

$$2x + y = 6$$

$$x^2 + y^2 = 20$$

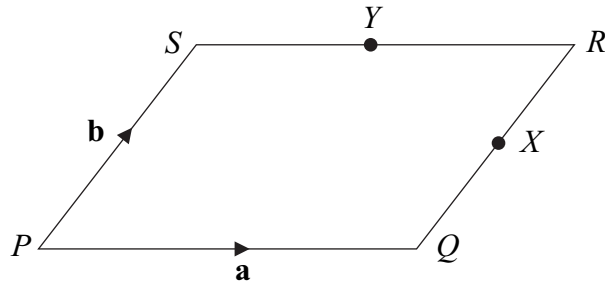
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blank*

Q21

.....
(Total 7 marks)

22.

Leave blank



$PQRS$ is a parallelogram.
 X is the midpoint of QR and Y is the midpoint of SR .
 $\vec{PQ} = \mathbf{a}$ and $\vec{PS} = \mathbf{b}$.

(a) Write down, in terms of \mathbf{a} and \mathbf{b} , expressions for

(i) \vec{PX}

.....

(ii) \vec{PY}

.....

(iii) \vec{QS}

.....

(3)

(b) Use a vector method to show that XY is parallel to QS and that $XY = \frac{1}{2}QS$.

(2)

Q22

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(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

END

**Edexcel International
London Examinations
IGCSE**

IGCSE Mathematics (4400)

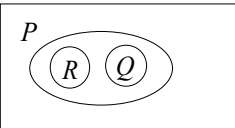
Mark Schemes for May 2004 examination session

Paper 4H (Higher Tier)

No	Working	Answer	Mark	Notes
1	$\frac{9.5}{3.8}$	2.5	2	M1 for 9.5 or 3.8 seen A1 cao
2	4.5 oe seen $\frac{117}{\text{"4.5"}}$	26	3	B1 M1 for $\frac{117}{\text{time}}$ eg $\frac{117}{270}$ A1 cao
3		$T = 40W + 20$ oe	2	B2 B1 for $T =$ linear expression in W B1 for $40W + 20$ oe
4	a b 5 x 156 or 780 "780"-"632"	632 148	1	B1 cao M1 M1 (dep M1) A1 cao
5	a b	40 80 75	2 1	B1 cao B1 cao B1 cao
6	a b	Rotation 90° (0, 0) or origin Correct image	3 2	B1 not "turn" B1 If 2 transfs given, B0B0B0 B1 B2 (B1 for 2 vertices correct)

No	Working	Answer	Mark	Notes
7	$\frac{12}{5} \times \frac{15}{8}$ $\frac{180}{40}$ or simpler inc $\frac{9}{2}$	$4\frac{1}{2}$	3	M1 Not 2.4 x 1.875 A1 Not 4..5 A1 cao
8	a b $v^2 = 2gh$	10 & 0.8 or 9.8 & 1 or 10 & 1 $\frac{v^2}{2g}$ oe	2 2	B2 B1 for 9.8 & 0.8 M1 A1
9	a b c d	n^4 p^7 q^4 t^3	1 1 1 1	B1 cao B1 cao B1 cao B1 cao
10	a $\sin \angle PQR = \frac{4.7}{7.6} = 0.6184\dots$ bi	38.2 7.65 7.55	3 2	M1 for sin & $\frac{4.7}{7.6}$ or 0.6184... M1 $\sin^{-1}(0.6184\dots)$ May be implied A1 for 38.2 or better B1 Accept 7.649 B1 cao
11	$4x - 12 = 7x - 10$ $-12 + 10 = 7x - 4x$ or $-2 = 3x$	$-\frac{2}{3}$ oe	3	B1 for $4x - 12$ seen M1 A1

No	Working	Answer	Mark	Notes
12	a $\frac{12}{8}$ or 1.5 oe seen		2	M1
	b $15 \times \frac{2}{3}$	7.5 oe	2	A1 M1
	c $\left(\frac{3}{2}\right)^2$ or $\frac{9}{4}$ or 2.25 oe	10	2	A1 cao M1
		135		A1 cao
13	$a + 5 + 3a - 7 + 2a - 1 = 24$ $6a - 3 = 24$		3	M1 M1 A1
		4.5 oe		
14	a $\frac{1}{3} \times \frac{1}{3}$ or all 9 combinations shown eg 2 way table or list		2	M1
	bi $\frac{2}{3}$ on bottom LH branch rest of probabilities correct	$\frac{1}{9}$	9	A1 B1 B1 B1 M1
	ii $\frac{2}{3} \times \frac{2}{3} \times \frac{2}{3}$			M1
	iii $\frac{1}{3} \times \frac{2}{3} \times \frac{2}{3}$ in any order or $\frac{4}{27}$ 3 correct paths identified	$\frac{8}{27}$ oe		A1 ft if 0 < probs < 1 M1
	" $\frac{4}{27}$ " $\times 3$			B1 may be implied by next M1 M1 or add 3 correct paths
		$\frac{4}{9}$ oe		A1 ft if 0 < probs < 1

No	Working	Answer	Mark	Notes
15	0.88 seen $\frac{726}{0.88}$	825	3	B1 M1 A1 cao
16			3	B3 B1 for each condition satisfied
17	$10x = 3.222\dots$	$\frac{29}{90}$	2	M1 A1 cao
18	a b c d indication that $y = 6$ used or $x^3 - 3x^2 + 2 = 6$ or $y = 6$ seen	$-18, (-2), 2, 0, -2, 2, 18$ Points plotted Curve $-0.7, 1, 2.7$ 3.4	2 2 2 2	B2 for all correct (B1 for 4 or 5 correct) B1 $\pm \frac{1}{2}$ sq ft if at least B1 in (a) B1 ft if awarded B1 for points B2 ft if awarded \geq B1 in (b) (B1 for 2 correct) M1 eg line, mark on graph A1 ft if awarded \geq B1 in (b)
19	a b c d $6p^2 + 15pq - 4pq - 10q^2$	$6p^2 + 11pq - 10q^2$ $8x^6y^{12}$ $a^{-8}b^6$ $3p^2$	2 2 2 2	M1 for 3 terms correct A1 cao B2 (B1 for 2 of 3 parts correct) B2 (B1 for one part correct) Accept $\frac{1}{a^8b^{-6}}$ B2 (B1 for one part correct)

No	Working	Answer	Mark	Notes
20	a $\pi \times 3.7^2 + \pi \times 3.7 \times 8.3$	139 to 140	2	M1 A1
	b $8.3^2 - 3.7^2$ or 55.2 $\sqrt{55.2}$ or 7.4296... $\frac{1}{3}\pi \times 3.7^2 \times 7.43$	107	4	M1 M1 dep on 1 st M1 M1 A1 for 107 or better (106.512...)
21	$y = 6 - 2x$ $x^2 + (6 - 2x)^2 = 20$ $x^2 + 36 - 24x + 4x^2 = 20$ $5x^2 - 24x + 16 = 0$ $(5x - 4)(x - 4) = 0$	$x = 4$ and $x = \frac{4}{5}$ oe $x = \frac{4}{5}, y = 4\frac{2}{5}$ oe and $x = 4, y = -2$	7	M1 for making y (or x) the subject M1 for substitution M1 for correct expansion A1 M1 A1 cao A1 Must be in pairs One pair only, by trial & improvement, or without working, M0A0
22	ai ii iii b $\frac{1}{2}\mathbf{a} + \mathbf{b} - \mathbf{a} - \frac{1}{2}\mathbf{b}$ or $\frac{1}{2}\mathbf{b} - \frac{1}{2}\mathbf{a}$	$\mathbf{a} + \frac{1}{2}\mathbf{b}$ oe $\frac{1}{2}\mathbf{a} + \mathbf{b}$ oe $\mathbf{b} - \mathbf{a}$ oe $\overline{XY} = \frac{1}{2}\overline{QS}$	3 2	B1 B1 B1 B1 B1 Or equivalent. Must use vector not'n dep on 1st B1

Centre No.					
Candidate No.					

Surname	Initial(s)
Signature	

Paper Reference(s)

4400/3H

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Tuesday 2 November 2004 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

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4	
5	
6	
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10	
11	
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16	
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18	
19	
20	
Total	

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.
The paper reference is shown at the top of this page. Check that you have the correct question paper. Answer **ALL** the questions in the spaces provided in this question paper. Show all the steps in any calculations.

Information for Candidates

There are 20 pages in this question paper. All blank pages are indicated.
The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. (2).
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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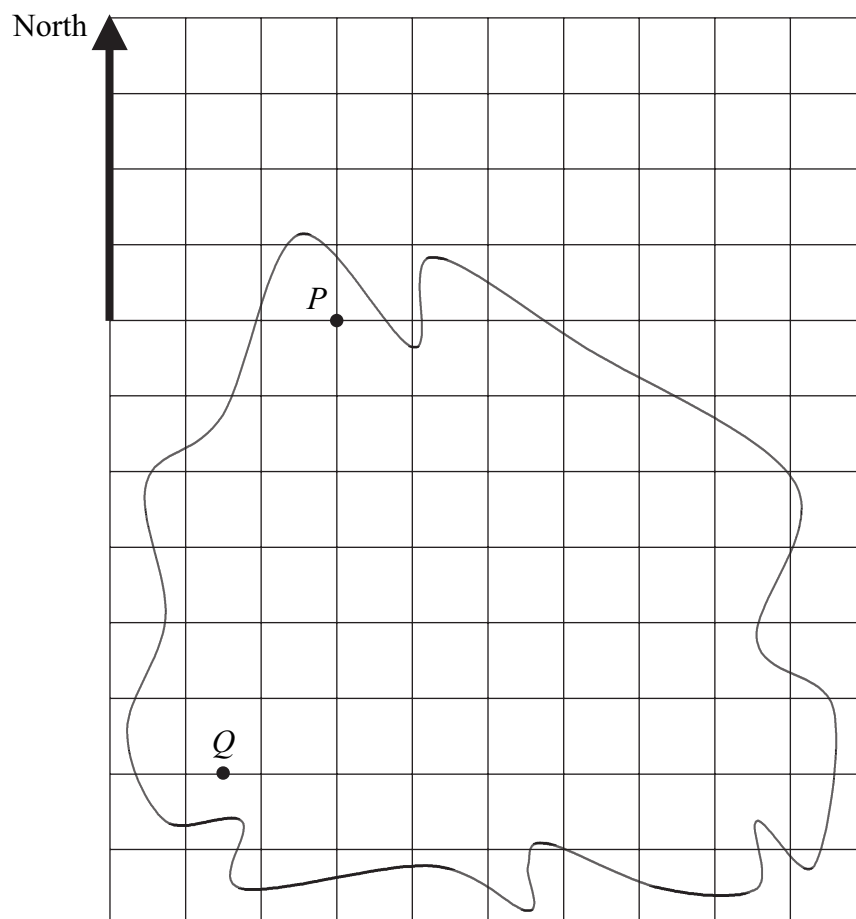
Turn over

Answer ALL TWENTY questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. The diagram shows a map of an island.
Two towns, P and Q , are shown on the map.



- (a) Find the bearing of Q from P .

.....
(2)

The scale of the map is 1 cm to 5 km.

(b) Find the real distance between P and Q .

..... km
(2)

Another town, R , is due East of Q .
The bearing of R from P is 135° .

(c) On the map, mark and label R .

(2)

Q1

(Total 6 marks)

2. The table shows the first three terms of a sequence.

Term number	1	2	3		
Term	2	5	10		

The rule for this sequence is

$$\text{Term} = (\text{Term number})^2 + 1$$

(a) Work out the next two terms of this sequence.

.....,
(2)

(b) One term of this sequence is 101.
Find the term number of this term.

.....
(2)

(Total 4 marks)

Q2

3. (a) Nikos drinks $\frac{2}{3}$ of a litre of orange juice each day.
How many litres does Nikos drink in 5 days?
Give your answer as a mixed number.

.....
(2)

(b) (i) Find the lowest common multiple of 4 and 6.

.....

(ii) Work out $3\frac{3}{4} + 2\frac{5}{6}$.
Give your answer as a mixed number.
You must show all your working.

.....
(3)

(Total 5 marks)

Q3

4. Toni buys a car for £2500 and sells it for £2775.
Calculate her percentage profit.

..... %

(Total 3 marks)

Q4

5. A straight road rises 60 m in a horizontal distance of 260 m.

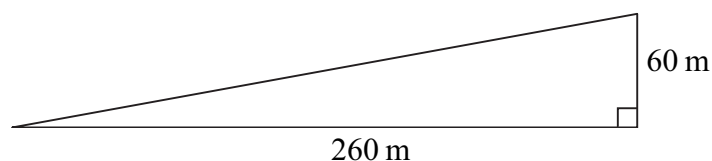


Diagram **NOT** accurately drawn

- (a) Work out the gradient of the road.
Give your answer as a fraction in its lowest terms.

.....
(2)

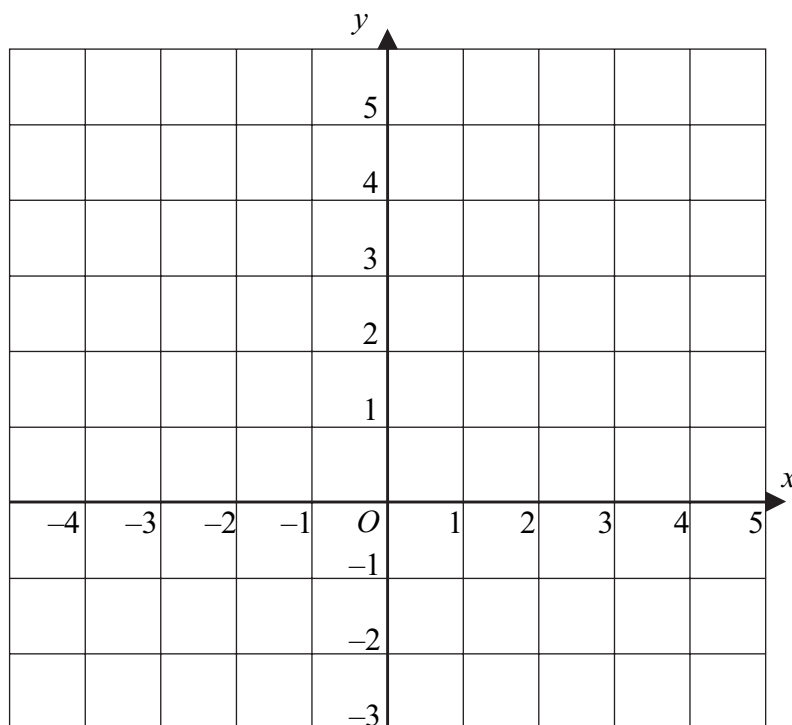
- (b) Calculate how far the road rises in a horizontal distance of 195 m.

..... m
(2)

(Total 4 marks)

Q5

6.



(a) On the grid, draw the line $x + y = 4$.

(1)

(b) On the grid, show clearly the region defined by the inequalities

$$x + y \geq 4$$

$$x \leq 3$$

$$y < 4$$

(4)

(Total 5 marks)

Q6

7. The diagram shows a circle, centre O .
 PTQ is the tangent to the circle at T .
 $PO = 6$ cm.
 Angle $OPT = 40^\circ$.

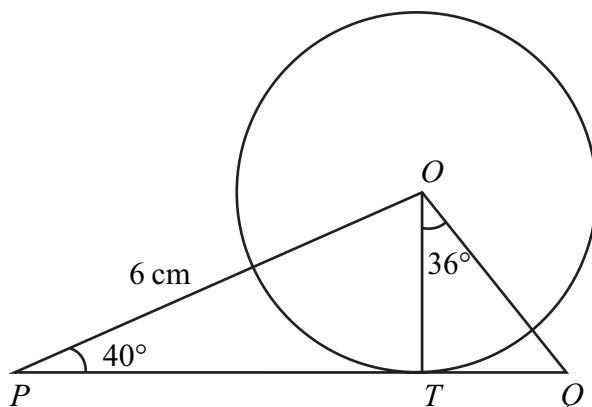


Diagram **NOT** accurately drawn

- (a) Explain why angle $OTP = 90^\circ$.

.....

(1)

- (b) Calculate the length of OT .
 Give your answer correct to 3 significant figures.

..... cm
 (3)

- (c) Angle $QOT = 36^\circ$.
 Calculate the length of OQ .
 Give your answer correct to 3 significant figures.

..... cm
 (3)

(Total 7 marks)

Q7

8. The table shows information about the ages of 24 students.

Age (years)	Number of students
16	9
17	3
18	8
19	4

(a) (i) Write down the mode of these ages.

..... years

(ii) Find the median of these ages.

..... years

(iii) Calculate the mean of these ages.

..... years
(6)

Another student, aged 18, joins the group.

(b) (i) Without calculating the new mean, state whether the mean will increase or decrease or stay the same.

.....

(ii) Give a reason for your answer to (i).

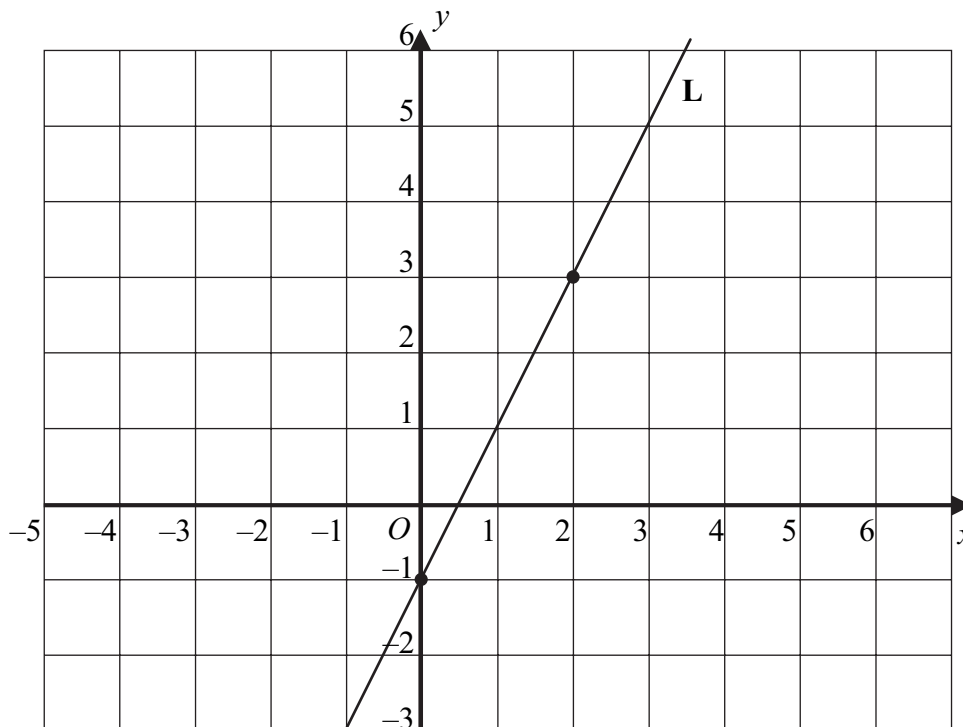
.....
.....
.....

(2)

Q8

(Total 8 marks)

9. The straight line, **L**, passes through the points $(0, -1)$ and $(2, 3)$.



(a) Work out the gradient of **L**.

.....
(2)

(b) Write down the equation of **L**.

.....
(2)

(c) Write down the equation of another line that is parallel to **L**.

.....
(1)

(Total 5 marks)

Q9

10. The table shows the mean distances of the planets from the Sun.

Planet	Mean distance from the Sun (km)
Mercury	5.8×10^7
Venus	1.1×10^8
Earth	1.5×10^8
Mars	2.3×10^8
Jupiter	7.8×10^8
Saturn	1.4×10^9
Uranus	2.9×10^9
Neptune	4.5×10^9
Pluto	5.9×10^9

(a) Which planet is approximately 4 times as far from the Sun as Mercury?

.....
(1)

(b) Find the ratio of the mean distance of Earth from the Sun to the mean distance of Neptune from the Sun. Give your answer in the form 1:*n*

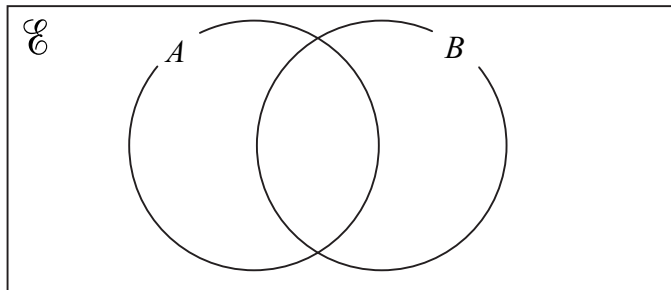
.....
(2)

(Total 3 marks)

Q10

11. The universal set, $\mathcal{U} = \{\text{Whole numbers}\}$
 $A = \{\text{Multiples of 5}\}$
 $B = \{\text{Multiples of 3}\}$

Sets A and B are represented by the circles in the Venn diagram.



- (a) (i) On the diagram, shade the region that represents the set $A \cap B'$.
 (ii) Write down **three** members of the set $A \cap B'$.

.....,,

(2)

$C = \{\text{Multiples of 10}\}$.

- (b) (i) On the diagram draw a circle to represent the set C .
 (ii) Write down **three** members of the set $A \cap B \cap C'$

.....,,

(2)

(Total 4 marks)

Q11

12. A, B, C and D are points on a circle.
 Angle $BAC = 40^\circ$.
 Angle $DBC = 55^\circ$.

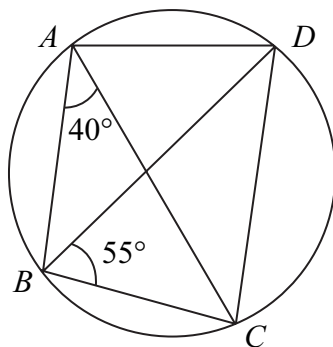


Diagram **NOT** accurately drawn

- (a) (i) Find the size of angle DAC .

.....^o

- (ii) Give a reason for your answer.

.....

(2)

- (b) (i) Calculate the size of angle DCB .

.....^o

- (ii) Give reasons for your answer.

.....

(3)

- (c) Is BD a diameter of the circle?

.....

Give a reason for your answer.

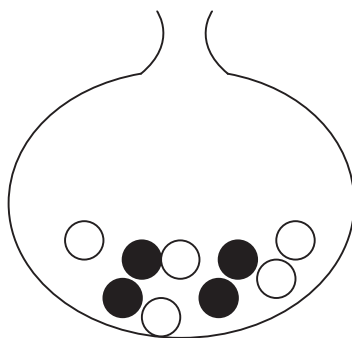
.....

(1)

(Total 6 marks)

Q12

13. A bag contains 4 black discs and 5 white discs.

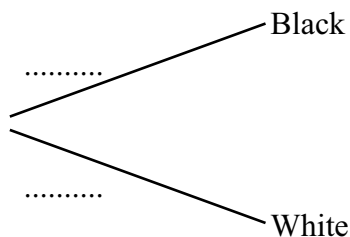


Ranjit takes a disc at random from the bag and notes its colour.
 He then replaces the disc in the bag.
 Ranjit takes another disc at random from the bag and notes its colour.

(a) Complete the probability tree diagram to show all the possibilities.

First disc

Second disc



(4)

(b) Calculate the probability that Ranjit takes two discs of different colours.

.....
(3)

(Total 7 marks)

Q13

14. Oil is stored in either small drums or large drums.
The shapes of the drums are mathematically similar.

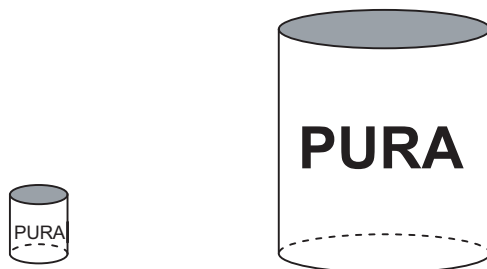


Diagram **NOT** accurately drawn

A **small** drum has a volume of 0.006 m^3 and a surface area of 0.2 m^2 .

The height of a **large** drum is 3 times the height of a small drum.

- (a) Calculate the volume of a large drum.

..... m^3
(2)

- (b) The cost of making a drum is \$1.20 for each m^2 of surface area.
A company wants to store 3240 m^3 of oil in large drums.
Calculate the cost of making enough large drums to store this oil.

\$
(4)

(Total 6 marks)

Q14

15. Solve the equation $3x^2 + 2x - 6 = 0$
 Give your answers correct to 3 significant figures.

.....
(Total 3 marks)

Q15

16. (a) Factorise the expression $2x^2 + 5x - 3$

.....
(2)

(b) Simplify fully $\frac{x^2 - 9}{x^2 - 9x + 18}$

.....
(3)

(Total 5 marks)

Q16

17. A curve has equation $y = x^2 - 4x + 1$.

(a) For this curve find

(i) $\frac{dy}{dx}$,

.....

(ii) the coordinates of the turning point.

.....

(4)

(b) State, with a reason, whether the turning point is a maximum or a minimum.

.....

.....

(2)

(c) Find the equation of the line of symmetry of the curve $y = x^2 - 4x + 1$

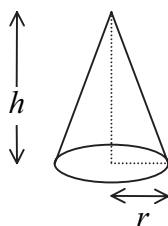
.....

(2)

(Total 8 marks)

Q17

18. A cone has base radius r cm and vertical height h cm.



The volume of the cone is $12\pi \text{ cm}^3$.
Find an expression for r in terms of h .

$r = \dots\dots\dots$

(Total 3 marks)

Q18

19. Express $\sqrt{98}$ in the form $a\sqrt{b}$ where a and b are integers and $a > 1$.

$\dots\dots\dots$

(Total 2 marks)

Q19

20. A box contains 7 good apples and 3 bad apples.

Nick takes two apples at random from the box, **without** replacement.

(a) (i) Calculate the probability that both of Nick's apples are bad.

.....

(ii) Calculate the probability that at least one of Nick's apples is good.

.....

(4)

Another box contains 8 good oranges and 4 bad oranges.

Crystal keeps taking oranges at random from the box one at a time, **without** replacement, until she gets a good orange.

(b) Calculate the probability that she takes exactly three oranges.

.....

(2)

(Total 6 marks)

Q20

TOTAL FOR PAPER: 100 MARKS

END

No	Working	Answer	Mk	Notes
1a	6.2 ± 0.1 or a length x 5	194 ± 2 ⁰	2	B2 (+ 5 ⁰ : B1)
b		31 ± 0.5 km	2	M1 A1
c		Correct pos'n ± 1mm	2	B2 (either 135 or 90 ± 2 ⁰ : B1)
2a	100 or √ seen	17, 26	2	B1B1
b		10	2	M1 A1
3a	2/3 x 5 or 10/3	3 ¹ / ₃ 12 6 ⁷ / ₁₂	2	M1 Allow 0.666... x 5
bi	9/12 and 10/12 or 19/12 or 45/12 and 34/12 or 79/12		1	A1 B1
bii			2	M1 or 18/24 and 20/24, or 38/24 etc or 6 ¹⁴ / ₂₄ A1
4	2775 – 2500 <u>275</u> x 100 2500	OR 2775/2500 111-100	3	M1 M1 A1 11%
5a	60/260	3/13	2	M1 A1
b	60 x 195/260 oe or her 3/13 x 195	45 44.8 to 45.1	2	M1 A1f Follow her grad or %
6a		Correct line x = 3 OR y = 4 drawn Correct region clear	1	B1 thro' ≥ 3 pts ± 2mm
b			4	B1 B3 B1 x+y ≥ 4 B1 x ≤ 3 OR y < 4 B1 if correct region <u>clear</u> . fit his (a) and/or his x = 3 & y = 4 so long as vert & horiz pair
7a	sin40 ⁰ = OT / 6 OT = 6sin40 ⁰ cos36 ⁰ = his 3.86 / OQ OQ = (his 3.86) / cos36	Tangent, radius	1	B1
b		3.86 cm	3	M1 M1 A1 or better
c		4.77 or 4.8 cm	3	M1 M1 A1f or better

No	Working	Answer	Mark	Notes
8ai		16	1	B1
aii	Attempt find 12 th or 13 th student's age	17.5	2	M1 A1
aiii	\square fx attempted (= 415) / 24	17.3 or better	3	M1 M1dep A1 17, no wking, M0M0A0 17, correct wking, M1M1A1
bi,ii		18 > old mean Increase	2	B1 B1
9a	v/h attempted			M1
b		2	2	A1
c		$y = 2x - 1$ $y = 2x + c, c \neq 1$	2 1	B2 2x: B1 -1: B1; omit "y =": -B1 incl $y = 2x$
10a		Mars	1	B1
b	$4.5 \times 10^9 / 1.5 \times 10^8$ or inverted or 30 or $1/30$ seen	1:30	2	M1 A1
11ai		$A \cap B'$ shaded	1	B1
aii		Eg 5, 10, 20	1	B1 No ft from diag
bi		Shape, wholly within A & overlapping B	1	B1
bii		Eg 15, 45, 75	1	B1 SC1: aii 30,15,45 & bii 30,60,90
12ai		55^0		B1
aii	<s in same seg		2	B1 or equiv, eg both stand on DC
bi		85^0		B1
bii	Opp <s of cyc quad $180 - (40 + 55)$		3	B1 or $BDC = 40$, <s in same seg
c		No. DCB (or DAC) $\neq 90^0$	1	B1

No	Working	Answer	Mark	Notes
13a		4/9 or 5/9 seen Correct structure 4/9 or 5/9 correctly placed once All correct		B1 B1 With labels correct or omitted B1 B1
b	$4/9 \times 5/9 + 5/9 \times 4/9$	40/81 or 0.49.... oe	4 3	M2 (M1 for one product) A1f ft his tree if p's <1
14a	0.006×3^3			M1
b	$\frac{3240}{\text{her } 0.162}$ or 20 000 seen 0.2×3^2 or 1.8 seen her 20 000 x her 1.8 x 1.2	0.162 \$43 200	2 4	A1 M1 M1 M1 Dep both M1s scored A1
15	$\frac{-2 \pm \sqrt{4 - (-72)}}{6}$ oe			M1
		1.12, -1.79 or better	3	A1,A1
16a		$(2x-1)(x+3)$	2	B2 (Signs interchanged, B1)
b	$\frac{(x+3)(x-3)}{(x-6)(x-3)}$	$\frac{x+3}{x-6}$	3	M1 (Num.) M1 (Denom.) A1
17ai		$2x - 4$		B1
aii	his $2x - 4 = 0$	$x = 2$ $(2,-3)$ Coeff of x^2 +ve or shape is "U" oe	4	M1 A1f Follow her linear y' A1f Follow her x
b		oe Min	2	B1 or any correct method B1dep B1
c	$x = \text{constant}$	$x = 2$	2	M1 A1
18	$\frac{1}{3} \square r^2 h = 12 \square$ $r^2 = \frac{36}{h}$	$r = \frac{6}{\sqrt{h}}$ oe	3	M1 $\frac{1}{3} \square r^2 h = 12$ M0 M1 $r^2 = \frac{36}{\square h}$ M1 A1

No	Working	Answer	Mark	Notes
19	7^2 or 49 seen	$7\sqrt{2}$	2	M1 A1
20ai	$3/10 \times 2/9$	$1/15$ or 0.066(66..) oe	2	M1 A1
ii	1 – her $1/15$	$14/15$ oe	2	M1 A1f
b	$4/12 \times 3/11 \times 8/10$	$4/55$ or 0.072(72..) oe	2	M1 A1

Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4400/4H

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Thursday 4 November 2004 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

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3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
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Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.
 The paper reference is shown at the top of this page. Check that you have the correct question paper.
 Answer **ALL** the questions in the spaces provided in this question paper.
 Show all the steps in any calculations.

Information for Candidates

There are 24 pages in this question paper. All blank pages are indicated.
 The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. (2).
 You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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INTERNATIONAL

Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. The total weight of 3 identical video tapes is 525 g.
Work out the total weight of 5 of these video tapes.

..... g

(Total 2 marks)

Q1

2. Solve $5x - 3 = 2x - 1$

$x =$

(Total 3 marks)

Q2

3.

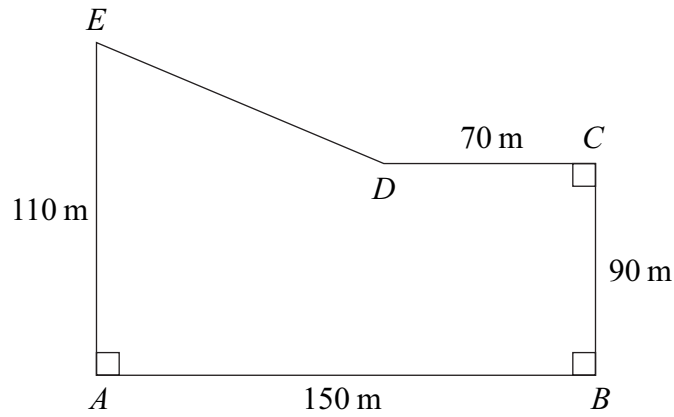


Diagram **NOT** accurately drawn

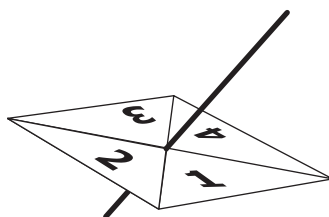
The shape $ABCDE$ is the plan of a field.
 $AB = 150$ m, $BC = 90$ m, $CD = 70$ m and $EA = 110$ m.
 The corners at A , B and C are right angles.

Work out the area of the field.

..... m²
(Total 4 marks)

Q3

4. Here is a 4-sided spinner.



The sides of the spinner are labelled 1, 2, 3 and 4.

The spinner is biased.

The probability that the spinner will land on each of the numbers 1, 2 and 3 is given in the table.

Number	1	2	3	4
Probability	0.2	0.1	0.4	

(a) Work out the probability that the spinner will land on 4

.....
(2)

Tom spun the spinner a number of times.

The number of times it landed on 1 was 85

(b) Work out an estimate for the number of times the spinner landed on 3

.....
(1)

(Total 3 marks)

Q4

5. Calculate the value of $\sqrt{2.6^3 - 3.9^2}$
 Write down all the figures on your calculator display.

.....

(Total 2 marks)

Q5

6. (a) Expand $y(y + 2)$

.....

(1)

(b) Expand and simplify $3(2x + 1) + 2(x - 4)$

.....

(2)

(Total 3 marks)

Q6

7. Paul got 68 out of 80 in a science test.

(a) Work out 68 out of 80 as a percentage.

.....%
(2)

Paul got 72 marks in a maths test.
72 is 60% of the total number of marks.

(b) Work out the total number of marks.

.....
(2)

(Total 4 marks)

Q7

8. The n th term of a sequence is given by this formula.

$$n\text{th term} = 20 - 3n$$

(a) Work out the 8th term of the sequence.

.....
(1)

(b) Find the value of n for which $20 - 3n = -22$

$n =$
(2)

Here are the first five terms of a different sequence.

8 11 14 17 20

(c) Find an expression, in terms of n , for the n th term of this sequence.

n th term =
(2)

(Total 5 marks)

Q8

9.

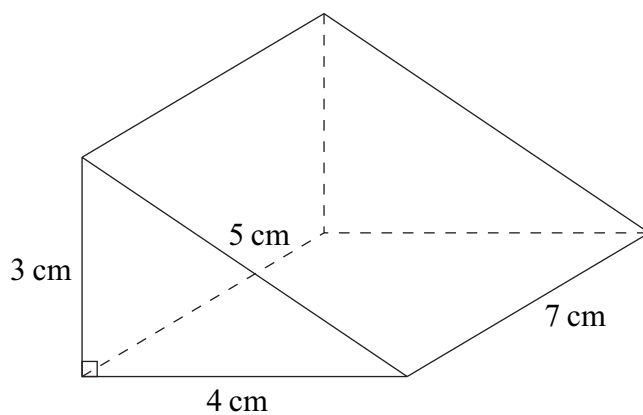


Diagram **NOT** accurately drawn

The diagram shows a prism.
 The cross-section of the prism is a right-angled triangle.
 The lengths of the sides of the triangle are 3 cm, 4 cm and 5 cm.
 The length of the prism is 7 cm.

(a) Work out the volume of the prism.

..... cm³
(3)

(b) Work out the total surface area of the prism.

..... cm²
(3)

(Total 6 marks)

Q9

10. The table gives information about the speeds, in km/h, of 200 cars passing a speed checkpoint.

Speed (v km/h)	Frequency
$30 < v \leq 40$	20
$40 < v \leq 50$	76
$50 < v \leq 60$	68
$60 < v \leq 70$	28
$70 < v \leq 80$	8

(a) Write down the modal class.

.....
(1)

(b) Work out an estimate for the probability that the next car passing the speed checkpoint will have a speed of more than 60 km/h.

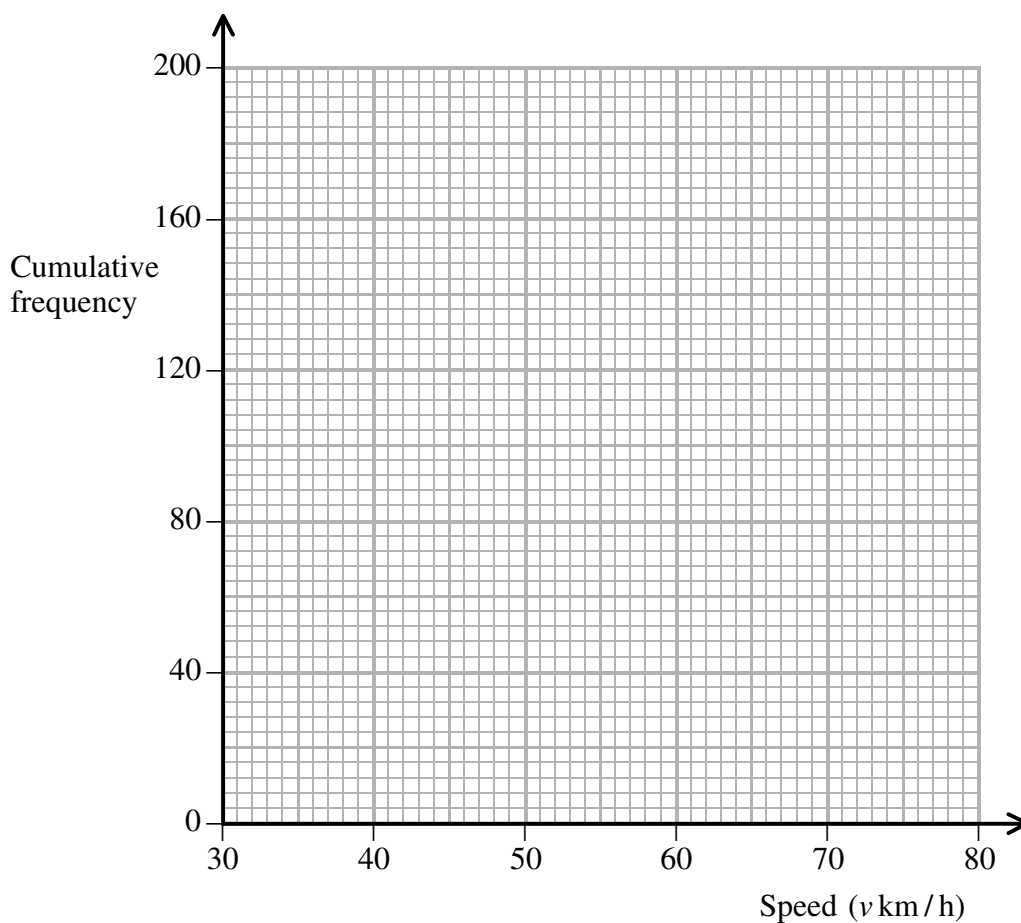
.....
(2)

(c) Complete the cumulative frequency table.

Speed (v km/h)	Cumulative frequency
$30 < v \leq 40$	
$30 < v \leq 50$	
$30 < v \leq 60$	
$30 < v \leq 70$	
$30 < v \leq 80$	

(1)

(d) On the grid, draw a cumulative frequency graph for your table.



(2)

(e) Use your graph to find an estimate for the inter-quartile range of the speeds. Show your method clearly.

..... km/h
(2)

(Total 8 marks)

Q10

11. (a) Simplify, leaving your answer in index form

(i) $2^4 \times 2^3$

.....

(ii) $3^8 \div 3^2$

.....

(2)

(b) $5^x = 1$

Find the value of x .

$x =$

(1)

(Total 3 marks)

Q11

12. Solve the simultaneous equations

$$6x - 5y = 13$$

$$4x - 3y = 8$$

$x =$

$y =$

(Total 4 marks)

Q12

13.

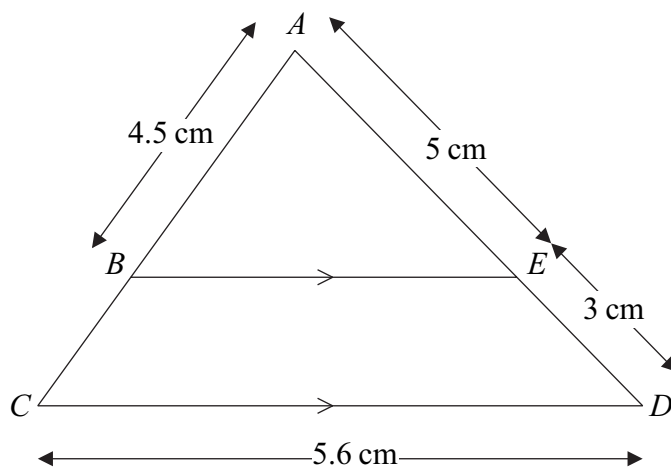


Diagram **NOT** accurately drawn

BE is parallel to CD .
 $AB = 4.5$ cm, $AE = 5$ cm, $ED = 3$ cm, $CD = 5.6$ cm.

(a) Calculate the length of BE .

..... cm
 (2)

(b) Calculate the length of BC .

..... cm
 (2)

(Total 4 marks)

Q13

14. (a) Find the Highest Common Factor of 75 and 105.

.....
(2)

(b) Find the Lowest Common Multiple of 75 and 105.

.....
(2)

(Total 4 marks)

Q14

15. Make v the subject of the formula $m(v - u) = I$

$v =$

(Total 3 marks)

Q15

16. Kate is going to mark some examination papers.
 When she marks for n hours each day, she takes d days to mark the papers.

d is inversely proportional to n .

When $n = 9$, $d = 15$

(a) Find a formula for d in terms of n .

$d = \dots\dots\dots$
(3)

(b) Kate marks for $7\frac{1}{2}$ hours each day.

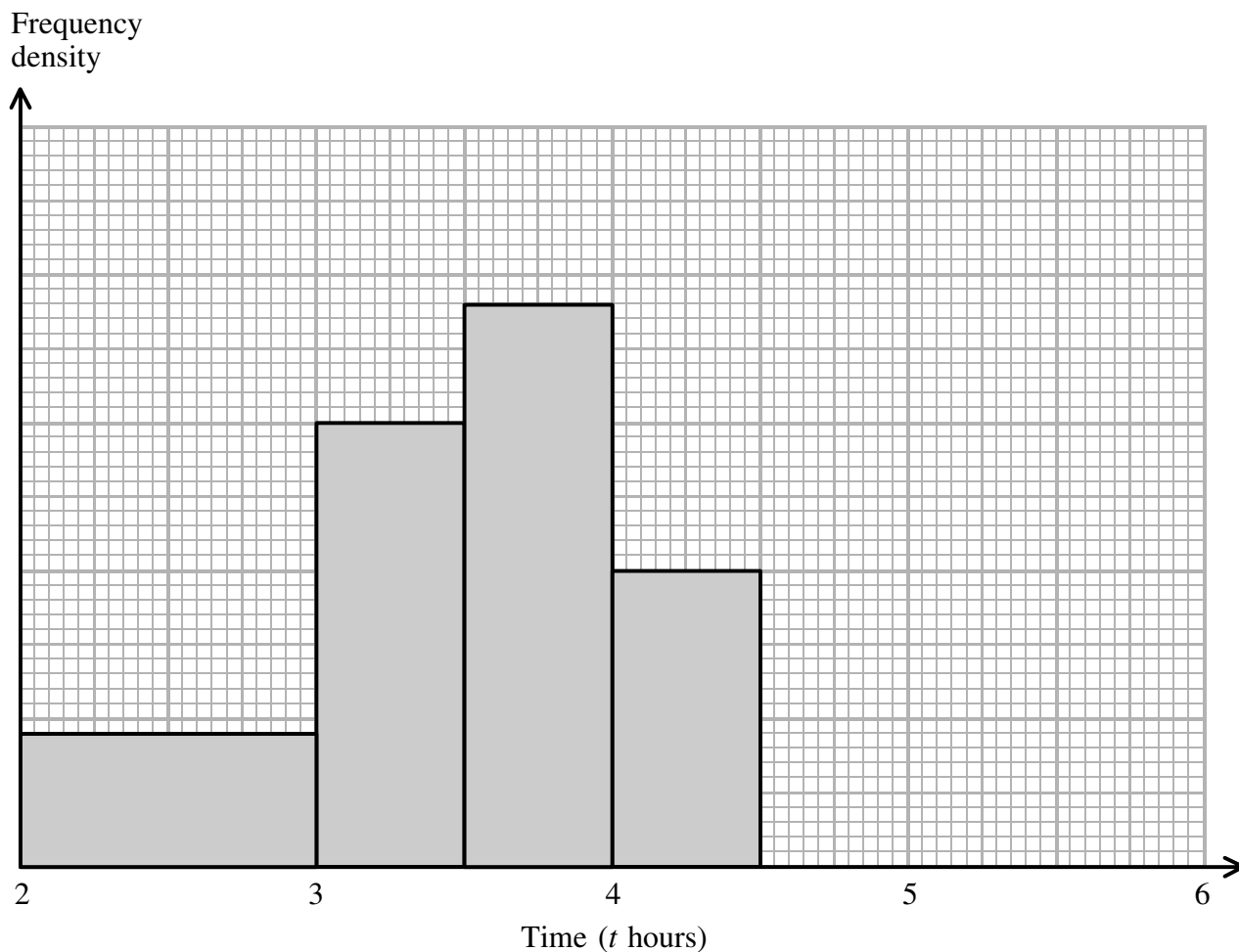
Calculate the number of days she takes to mark the papers.

$\dots\dots\dots$
(2)

(Total 5 marks)

Q16

17. The unfinished histogram and table give information about the times, in hours, taken by runners to complete the Mathstown Marathon.



Time (t hours)	Frequency
$2 \leq t < 3$	
$3 \leq t < 3.5$	1200
$3.5 \leq t < 4$	
$4 \leq t < 4.5$	800
$4.5 \leq t < 6$	1440

(a) Use the histogram to complete the table. (2)

(b) Use the table to complete the histogram. (1)

(Total 3 marks)

Q17

18.

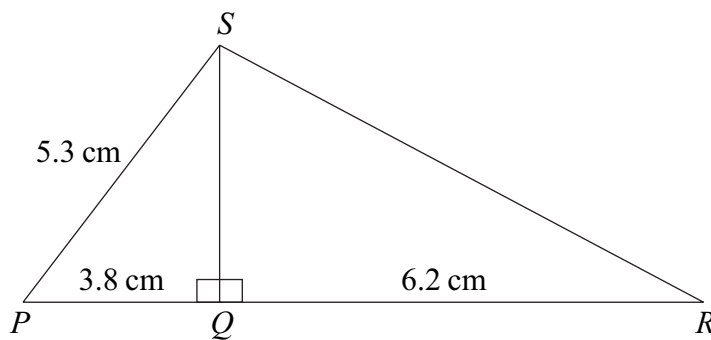


Diagram **NOT** accurately drawn

Angle $PQS = 90^\circ$.

Angle $RQS = 90^\circ$.

$PS = 5.3\text{ cm}$, $PQ = 3.8\text{ cm}$, $QR = 6.2\text{ cm}$.

Calculate the length of RS .

Give your answer correct to 3 significant figures.

..... cm

(Total 5 marks)

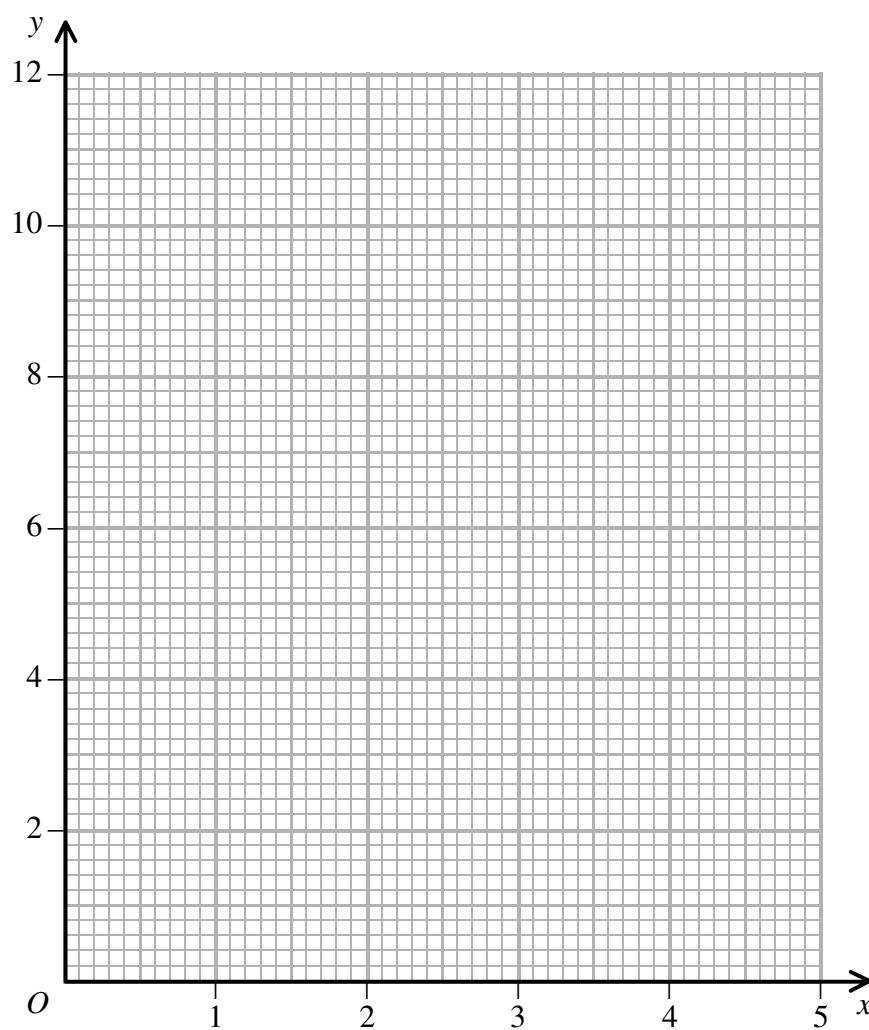
Q18

19. (a) Complete the table of values for $y = x + \frac{2}{x}$

x	0.2	0.4	0.6	0.8	1	1.5	2	3	4	5
y	10.2		3.9		3	2.8		3.7		5.2

(2)

(b) On the grid, draw the graph of $y = x + \frac{2}{x}$ for $0.2 \leq x \leq 5$



(2)

(c) Use your graph to find estimates for the solutions of the equation

$$x + \frac{2}{x} = 4$$

$x = \dots\dots\dots$ or $x = \dots\dots\dots$

(2)

The solutions of the equation $2x + \frac{2}{x} = 7$ are the x -coordinates of the points of intersection of the graph of $y = x + \frac{2}{x}$ and a straight line **L**.

(d) Find the equation of **L**.

$\dots\dots\dots$
(2)

(Total 8 marks)

Q19

20.

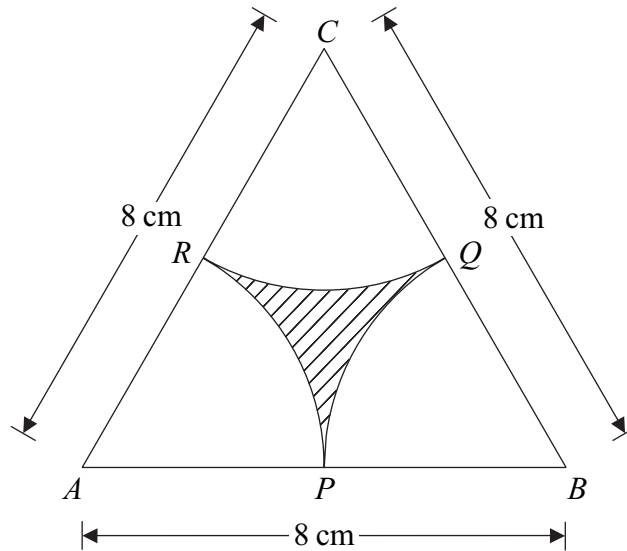


Diagram **NOT** accurately drawn

ABC is an equilateral triangle of side 8 cm .
 With the vertices A , B and C as centres, arcs of radius 4 cm are drawn to cut the sides of the triangle at P , Q and R .
 The shape formed by the arcs is shaded.

- (a) Calculate the perimeter of the shaded shape.
 Give your answer correct to 1 decimal place.

..... cm
(3)

Leave blank

- (b) Calculate the area of the shaded shape.
Give your answer correct to 1 decimal place.

..... cm²
(4)

(Total 7 marks)

Q20

21. Correct to 1 significant figure, $x = 7$ and $y = 9$

- (a) Calculate the lower bound for the value of xy

.....
(2)

- (b) Calculate the upper bound for the value of $\frac{x}{y}$

.....
(3)

(Total 5 marks)

Q21

22.

$$f(x) = x^2$$

$$g(x) = x - 6$$

Solve the equation $fg(x) = g^{-1}(x)$

Q22

.....

(Total 5 marks)

23. There are 10 beads in a box.
 n of the beads are red.
Meg takes one bead at random from the box and does not replace it.
She takes a second bead at random from the box.
The probability that she takes 2 red beads is $\frac{1}{3}$.

Show that $n^2 - n - 30 = 0$

Q23

(Total 4 marks)

TOTAL FOR PAPER: 100 MARKS**END**

No	Working	Answer	Mark	Notes
1	$525 \div 3$ or 175	875	2	M1 A1 cao
2	$5x - 2x = 3 - 1$ $3x = 2$	$\frac{2}{3}$ oe	3	M1 M1 A1 Accept 0.66 or 0.67 or better
3	Splits shape appropriately eg 90×70 (6300) or 150×90 (13 500) eg $\left(\frac{110 + 90}{2}\right) \times 80$ (8000) or $\frac{1}{2} \times 80 \times 20$ (800)	14 300	4	M1 eg rectangle + triangle or rectangle + trapezium M1 dep on 1st M1 for relevant rectangle area M1 dep on 1st M1 for relevant triangle or trapezium area A1 cao
4 a	$1 - (0.2 + 0.1 + 0.4)$	0.3	2	M1 A1
b		170	1	B1 cao
5	2.366	1.5381...	2	M1 A1 for at least first 4 figures
6 a		$y^2 + 2y$	1	B1 oe inc $y \times y + 2 \times y$
b	$6x + 3$ and $2x - 8$	$8x - 5$	2	M1 A1 cao
7 a	$\frac{68}{80}$ or 0.85	85	2	M1 A1 cao
b	eg $\frac{72}{0.6}$	120	2	M1 A1 cao

No	Working	Answer	Mark	Notes
8	a	-4	1	B1 cao
	b	$3n = 20 + 22$ or $-3n = -22 - 20$	2	M1
	c	14 $3n + 5$ oe	2	A1 cao B2 B1 for $3n$ oe seen
9	a	$\frac{3 \times 4}{2}$ or 6 "6"×7	3	M1
	b	"6"×2 $3 \times 7 + 4 \times 7 + 5 \times 7$ or $21 + 28 + 35$	3	M1 M1 M1
		96		A1 ft from "6"
10	a	$40 < v \leq 50$	1	B1
	b	$\frac{36}{200}$	2	M1 for fraction with a denominator of 200
	c	0.18 oe 20, 96, 164 192, 200	1	A1 for numerator of 36 B1
	d	Points correct Curve or lines	2	B1 B1 ft
	e	50 (or $50\frac{1}{4}$) & 150 (or $150\frac{3}{4}$) indicated ~ 13	2	M1 A1 ft from graph if B1 or B2 in (d)
11	i	2^7	3	B1 cao
	ii	3^6		B1 cao
	iii	0		B1 cao

No	Working		Answer	Mark	Notes
12	$12x - 10y = 26$	$18x - 15y = 39$		4	M1 for coefficients of x or y the same followed by correct operation. Condone one arithmetical error
	$12x - 9y = 24$	$20x - 15y = 40$		A1	cao
	$y = -2$	$2x = 1$		M1	(dep on 1st M1) for substituting for other variable
			$\frac{1}{2}, -2$	A1	cao
13	a	$5.6 \times \frac{5}{8}$		2	M1
			3.5	A1	cao
	b	$4.5 \times \frac{3}{5}$		2	M1
			2.7	A1	cao
14	a	$75 = 3 \times 5^2$ and $105 = 3 \times 5 \times 7$ or 1, 3, 5, 15, 25, 75 and 1, 3, 5, 15, 21, 35, 105		2	M1
			15	A1	cao
	b	$3 \times 5^2 \times 7$ or 75, 150, 225, 300, 375, 450, 525 and 105, 210, 315, 420, 525		2	M1
			525	A1	cao
15	$mv - mu = I$			3	M1
	$mv = I + mu$			M1	or M2 for $v - u = \frac{I}{m}$
			$\frac{I + mu}{m}$ or $u + \frac{I}{m}$	A1	

No	Working	Answer	Mark	Notes
16	a $d = \frac{k}{n}$ or $d \propto \frac{1}{n}$ $15 = \frac{k}{9}$	$\frac{135}{n}$	3	M1 M1 A1
	b $\frac{135}{7.5}$	18	2	M1 A1 cao
17	a	720, 1520	2	B2 B1 for each cao
	b	bar of height 12 little squares	1	B1
18	$5.3^2 - 3.8^2 = 28.09 - 14.44$ 13.65 "13.65"+6.2 ² or 52.09 $\sqrt{"13.65"+6.2^2}$	7.22	5	M1 for squaring and subtracting A1 M1 for squaring and adding M1 (dep on previous M1) for square root A1 for 7.21 or 7.22 or answers rounding to either of these

No	Working	Answer	Mark	Notes
19	a	5.4 3.3 3 4.5	2	B2 for all 4 correct (B1 for 2 correct)
	b	Points	2	B1 dep on at least B1 in (a) for plotting at least 7 points which are correct or ft correctly $\pm \frac{1}{2}$ square
	c	0.59, 3.41	2	B1 dep on previous B1 for joining points with a smooth curve B2 B1 for each solution ft from graph
	d	$x + \frac{2}{x} = 7 - x$ $y = 7 - x$ or $x + y = 7$	2	M1 A1
20	a	$\frac{60}{360}$ oe or $\frac{180}{360}$ oe seen $\frac{2\pi \times 4}{2}$	3	B1 M1
	b	eg $\frac{1}{2} \times 8 \times 8 \times \sin 60^\circ$ $\frac{1}{2} \times \pi \times 4^2$	4	A1 for 12.6 or better (12.5663...) M1 for any method of finding Δ area M1 A1 for one correct evaluation to 3sf or better 27.7 (27.7128...) or 25.1 (25.1327...) A1 for 2.6 or better (2.580...)

No	Working	Answer	Mark	Notes
21	a	6.5×8.5	2	B2 for 55.25 (B1 for 6.5 or 8.5 seen)
	b	$\frac{7.5}{8.5}$	3	B1 for numerator 7.5 B1 for denominator 8.5 B1 for 0.88 or better (0.8823529...) Accept 0.9 if 7.5 and 8.5 seen
22	$(x-6)^2 = x+6$ $x^2 - 12x + 36 = x+6$ $x^2 - 13x + 30 = 0$ $(x-10)(x-3) = 0$	$x = 10$ or $x = 3$	5	B1 for $(x-6)^2$ B1 for $x+6$ M1 for $x^2 - 13x + 30 = 0$ M1 for $(x-10)(x-3) = 0$ A1 cao
23	$\frac{n}{10} \times \frac{n-1}{9} = \frac{1}{3}$ $3n(n-1) = 90$ or $n(n-1) = 30$ $3n^2 - 3n = 90$ or $n^2 - n = 30$		4	B1 for $\frac{n}{10}$ and $\frac{n-1}{9}$ seen M1 for $\frac{n}{10} \times \frac{n-1}{9} = \frac{1}{3}$ M1 A1

Centre No.						Surname	Initial(s)
						Signature	
Candidate No.							

Paper Reference(s)

4400/3H

**London Examinations IGCSE
Mathematics**

Paper 3H

Higher Tier

Thursday 12 May 2005 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

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3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
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19	
Total	

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
 The paper reference is shown at the top of this page. Check that you have the correct question paper. Answer **ALL** the questions in the spaces provided in this question paper. Show all the steps in any calculations.

Information for Candidates

There are 20 pages in this question paper. All blank pages are indicated.
 The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. (2).
 You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Use your calculator to work out the value of $\frac{9.5 - 3.7}{1.3 \times 2.4}$

Write down all the figures on your calculator display.

.....

(Total 2 marks)

Q1

2. Solve $5(2x + 3) = 30$

$x = \dots\dots\dots$

(Total 3 marks)

Q2



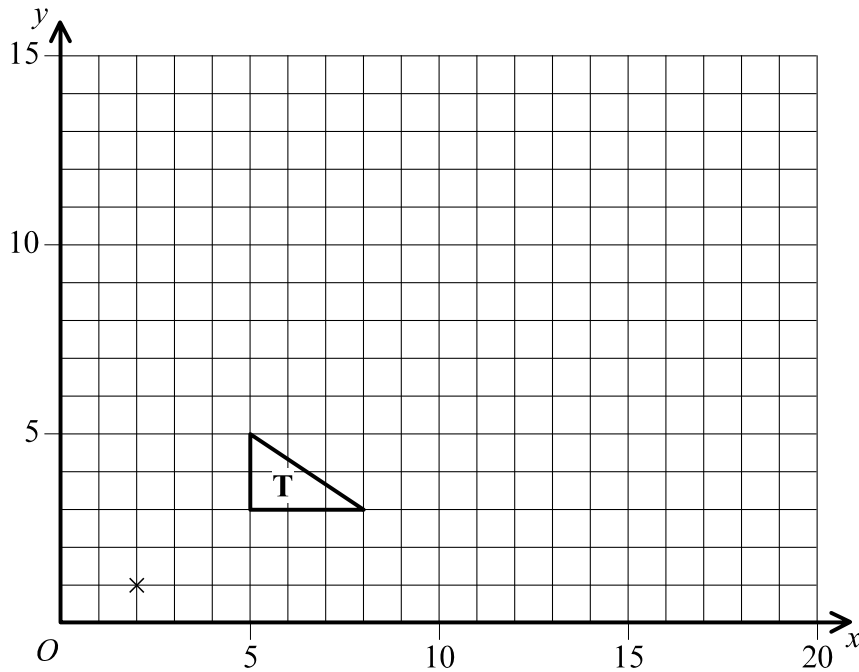
3. Work out $\frac{5}{6} - \frac{4}{9}$

Give your answer as a fraction in its simplest form.

.....
(Total 2 marks)

Q3

4.



On the grid, enlarge triangle **T** with a scale factor of 3 and centre (2, 1).

(Total 3 marks)

Q4



5. The probability that a person chosen at random has brown eyes is 0.45
The probability that a person chosen at random has green eyes is 0.12

(a) Work out the probability that a person chosen at random has either brown eyes **or** green eyes.

.....
(2)

250 people are to be chosen at random.

(b) Work out an estimate for the number of people who will have green eyes.

.....
(2)

(Total 4 marks)

Q5

6. (a) Factorise $9p + 15$

.....
(1)

(b) Factorise $q^2 - 4q$

.....
(1)

(c) Factorise $x^2 - 3x - 10$

.....
(2)

(Total 4 marks)

Q6



7.

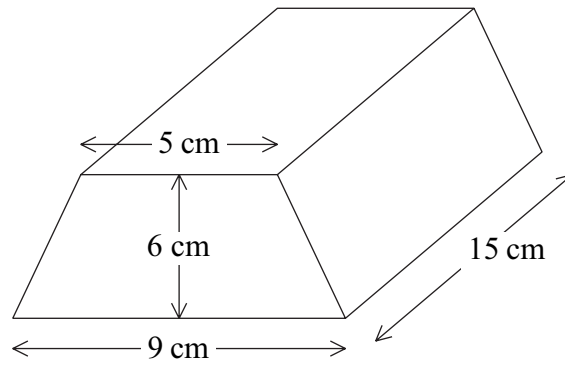


Diagram **NOT** accurately drawn

The diagram shows a prism.
 The cross section of the prism is a trapezium.
 The lengths of the parallel sides of the trapezium are 9 cm and 5 cm.
 The distance between the parallel sides of the trapezium is 6 cm.
 The length of the prism is 15 cm.

(a) Work out the area of the trapezium.

..... cm²
 (2)

(b) Work out the volume of the prism.

..... cm³
 (2)

(Total 4 marks)

Q7



8. In a sale at *Bargain Buys*, all the normal prices are reduced by 15%.
The normal price of a printer is £240

(a) Work out the sale price of the printer.

£.....
(3)

In the same sale, the sale price of a laptop computer is £663

(b) Work out the normal price of the laptop computer.

£.....
(3)

(Total 6 marks)

Q8

9. (a) Solve the inequality $2x - 3 < 5$

.....
(2)

(b) n is a positive integer.

Write down all the values of n which satisfy the inequality $2n - 3 < 5$

.....
(2)

(Total 4 marks)

Q9



10. The table gives information about the ages, in years, of the 80 members of a sports club.

Age (t years)	Frequency
$10 < t \leq 20$	8
$20 < t \leq 30$	38
$30 < t \leq 40$	28
$40 < t \leq 50$	4
$50 < t \leq 60$	2

(a) Work out an estimate for the mean age of the 80 members.

..... years
(4)

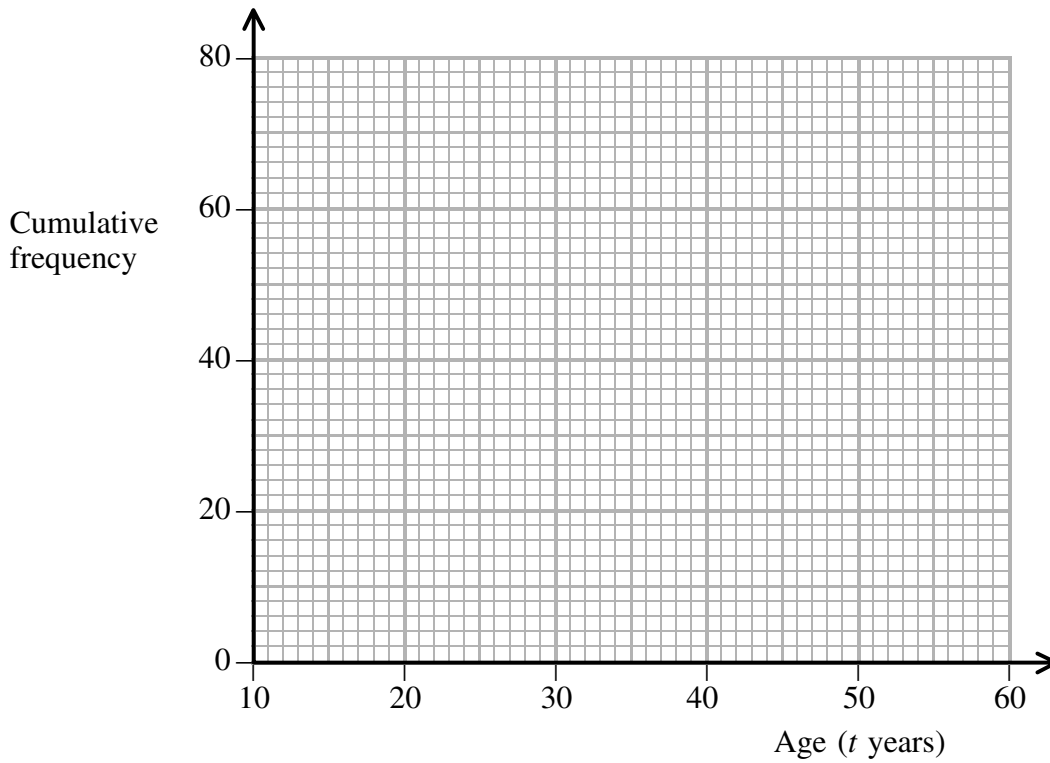
(b) Complete the cumulative frequency table.

Age (t years)	Cumulative frequency
$10 < t \leq 20$	
$10 < t \leq 30$	
$10 < t \leq 40$	
$10 < t \leq 50$	
$10 < t \leq 60$	

(1)



(c) On the grid, draw a cumulative frequency graph for your table.



(2)

(d) Use your graph to find an estimate for the median age of the members of the club. Show your method clearly.

..... years

(2)

(Total 9 marks)

Q10

11. Make W the subject of the formula $h = \sqrt{\frac{W}{I}}$

$W =$

Q11

(Total 2 marks)



12. The height of a hall is 12 m.
 A scale model is made of the hall.
 The height of the scale model of the hall is 30 cm.

(a) Express the scale of the model in the form $1:n$

.....
 (3)

The length of the scale model of the hall is 95 cm.

(b) Work out the real length of the hall.
 Give your answer in metres.

..... m
 (3)

(Total 6 marks)

Q12

13. The size of each exterior angle of a regular polygon is 18° .

(a) Work out how many sides the polygon has.

.....
 (2)

(b) Work out the **sum** of the interior angles of the polygon.

.....
 (2)

(Total 4 marks)

Q13



14. Solve $\frac{x-1}{2} + \frac{2x+3}{4} = 1$

$x = \dots\dots\dots$

(Total 4 marks)

Q14

15. (a) Express $\frac{10}{\sqrt{5}}$ in the form $k\sqrt{5}$ where k is an integer.

$\dots\dots\dots$
(2)

(b) Express $(5 + \sqrt{3})^2$ in the form $a + b\sqrt{3}$ where a and b are integers.

$\dots\dots\dots$
(2)

(Total 4 marks)

Q15



16.

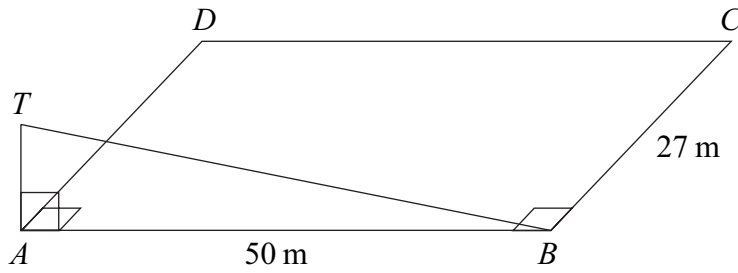


Diagram **NOT** accurately drawn

$ABCD$ is a horizontal rectangular field.

$AB = 50$ m.

$BC = 27$ m.

AT is a vertical mast.

- (a) The angle of elevation of T from B is 19° .
 Calculate the length of AT .
 Give your answer correct to 3 significant figures.

..... m
(3)

- (b) Calculate the distance from C to T .
 Give your answer correct to 3 significant figures.

..... m
(3)

(Total 6 marks)

Q16



17.

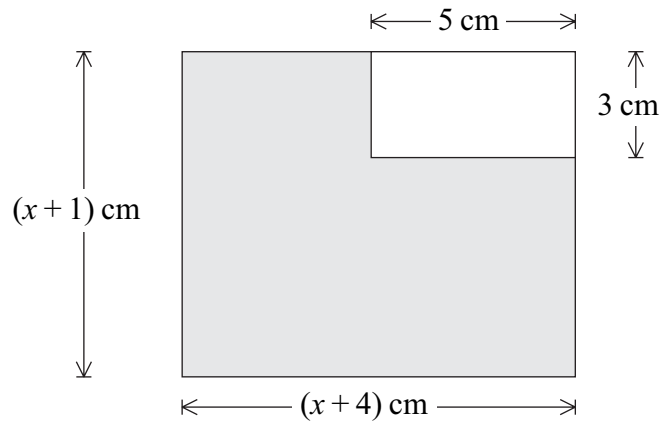


Diagram **NOT** accurately drawn

A rectangular piece of card has length $(x + 4)$ cm and width $(x + 1)$ cm.
 A rectangle 5 cm by 3 cm is cut from the corner of the piece of card.
 The remaining piece of card, shown shaded in the diagram, has an area of 35 cm^2 .

(a) Show that $x^2 + 5x - 46 = 0$

(3)

(b) Solve $x^2 + 5x - 46 = 0$ to find the value of x .
 Give your answer correct to 3 significant figures.

$x = \dots\dots\dots$
 (3)

(Total 6 marks)

Q17



18.

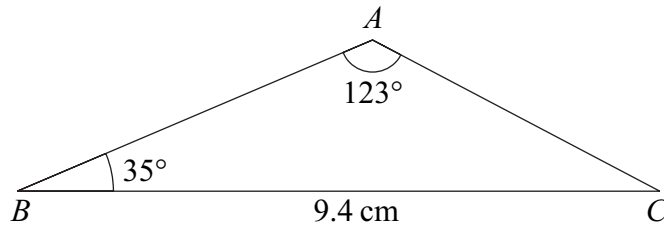


Diagram **NOT** accurately drawn

$BC = 9.4$ cm.
 Angle $BAC = 123^\circ$.
 Angle $ABC = 35^\circ$.

- (a) Calculate the length of AC .
 Give your answer correct to 3 significant figures.

..... cm
(3)

- (b) Calculate the area of triangle ABC .
 Give your answer correct to 3 significant figures.

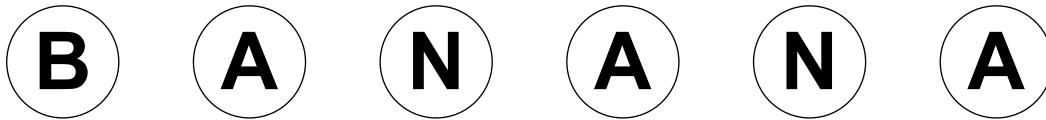
..... cm^2
(3)

(Total 6 marks)

Q18



19. The diagram shows six counters.



Each counter has a letter on it.

Bishen puts the six counters into a bag.

He takes a counter at random from the bag.

He records the letter which is on the counter and replaces the counter in the bag.

He then takes a second counter at random and records the letter which is on the counter.

(a) Calculate the probability that the first letter will be A and the second letter will be N.

.....
(2)

(b) Calculate the probability that both letters will be the same.

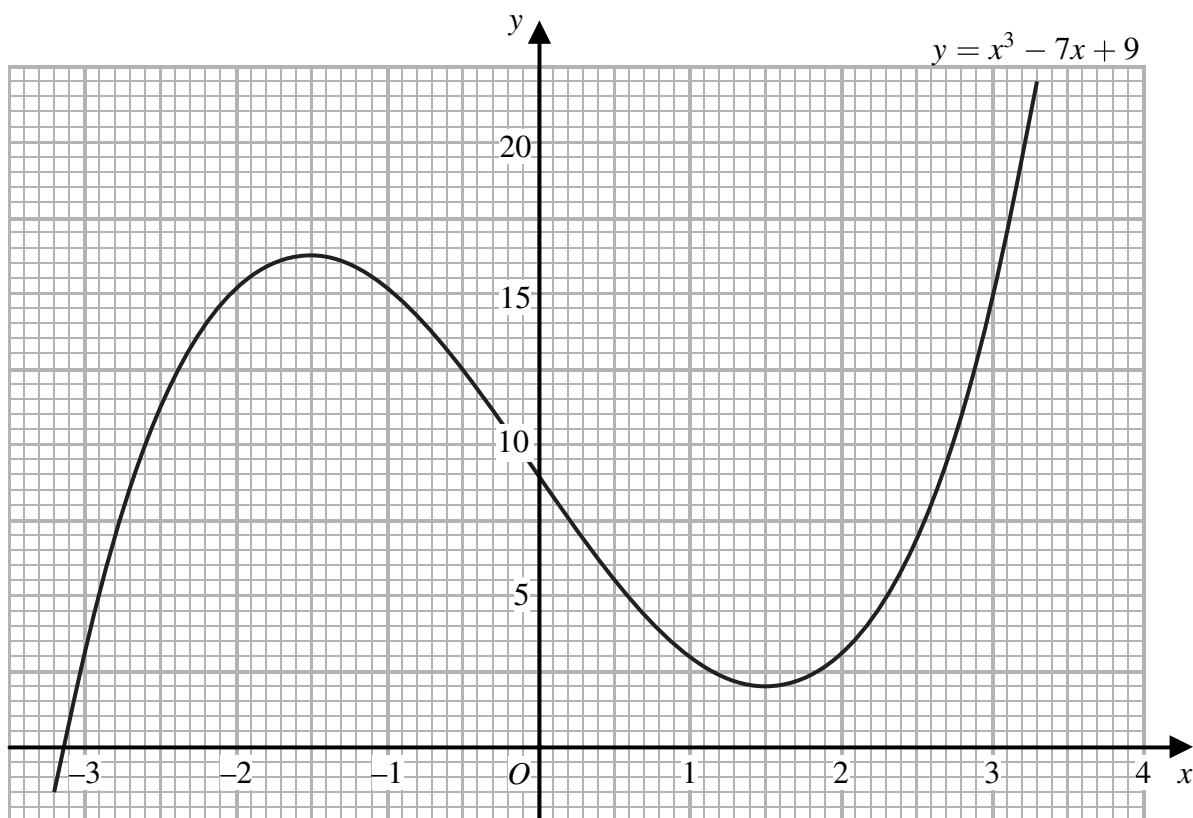
.....
(4)

(Total 6 marks)

Q19



20. Part of the graph of $y = x^3 - 7x + 9$ is shown on the grid.



The graph of $y = x^3 - 7x + 9$ and the line with equation $y = k$, where k is an integer, have 3 points of intersection.

(a) Find the greatest possible value of the integer k .

$k = \dots\dots\dots$
(1)



(b) By drawing a suitable straight line on the grid, find estimates of the solutions of the equation $x^3 - 6x - 2 = 0$.
Give your answers correct to 1 decimal place.

.....

(3)

Q20

(Total 4 marks)



21.

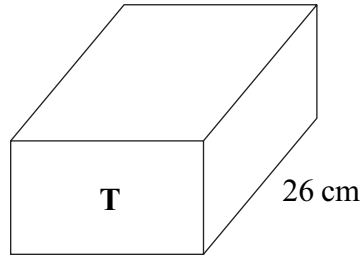
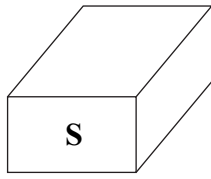


Diagram **NOT** accurately drawn

Two cuboids, **S** and **T**, are mathematically similar.
 The total surface area of cuboid **S** is 157 cm^2 and the total surface area of cuboid **T** is 2512 cm^2 .

- (a) The length of cuboid **T** is 26 cm.
 Calculate the length of cuboid **S**.

..... cm
(3)

- (b) The volume of cuboid **S** is 130 cm^3 .
 Calculate the volume of cuboid **T**.

..... cm^3
(2)

(Total 5 marks)

Q21



22. Simplify fully $\frac{2}{x-1} + \frac{x-11}{x^2+3x-4}$

.....
Q22**(Total 6 marks)****TOTAL FOR PAPER: 100 MARKS****END**

Q	Working	Answer	Mark	Notes
1.	$\frac{5.8}{3.12}$	1.8589...	2	M1 For 5.8 or 3.12 seen
				A1 For first 5 figures
Total 2 marks				
2.	$10x + 15 = 30$ or $2x + 3 = 6$ $10x = 30 - 15$ or $2x = 6 - 3$	$1\frac{1}{2}$	3	M1 For $10x + 15$ or $2x + 3 = 6$
				M1 For isolating x term in $ax + b = c$
				A1 For $1\frac{1}{2}$ or 1.5
Total 3 marks				
3.	$\frac{15}{18} - \frac{8}{18}$	$\frac{7}{18}$	2	M1 For clear attempt to express with common denominator - at least one correct
				A1 cao
Total 2 marks				
4.		correct enlargement	3	B2: for translation of correct shape or 2 vertices correct B1: for one side correct length or for enlargement scale factor 2, centre (2,1)
Total 3 marks				

5.	(a)	$0.45 + 0.12$	2	M1	For $0.45 + 0.12$ or $1 - (0.45 + 0.12)$ or $1 - 0.45 - 0.12$ or 0.43
		0.57		A1	For 0.57 oe as final answer
	(b)	250×0.12 or 250×0.1	2	M1	For 250×0.12 or 250×0.1
		30		A1	cao

Total 4 marks

6.	(a)	$3(3p + 5)$	1	B1	cao
	(b)	$q(q - 4)$	1	B1	cao
	(c)	$(x + 2)(x - 5)$	2	B2	(B1 for one correct factor or signs reversed)

Total 4 marks

7.	(a)	$\left(\frac{9+5}{2}\right) \times 6$	2	M1	
		42		A1	cao
	(b)	"42" \times 15	2	M1	
		630		A1	ft from (a)

Total 4 marks

8.	(a) eg $\frac{15}{100} \times 240$ or 36 240 - "36"	204	3	M1 M1 A1	Or M2 for $\frac{100-15}{100} \times 240$ dep on first M1 cao
	(b) 0.85 oe seen $\frac{663}{0.85}$	780	3	B1 M1 A1	For $\frac{663}{0.85}$ or $\frac{663}{1-0.15}$ cao
Total 6 marks					
9.	(a) $2x < 8$	$x < 4$	2	M1 A1	For $x < 4$ as final answer
	(b)	1, 2, 3	2	B2	(B1 for two correct and none wrong or three correct and one wrong)
Total 4 marks					
10.	(a) $15 \times 8 + 25 \times 38 + 35 \times 28 + 45$ $\times 4 + 55 \times 2$ $= 120 + 950 + 980 + 180 + 110$ $= 2340$ $2340 \div 80$	29.25	4	M1 M1 M1 A1	For products $m \times f$ where m is consistent inc end points (dep)for use of midpoints (15,25... or 15.5,25.5,...) (dep on 1 st M1) for adding and $\div 80$ Accept 29, 29.2, 29.3 if first two M1s scored (If 15.5,25.5... used, mean = $\frac{2380}{80} = 29.75$)

(b)	8, 46, 74, 78, 80	1	B1	cao
(c)	Points correct Curve or line segments	2	B1 B1	$\pm\frac{1}{2}$ sq ft from sensible table ft from points if 4 or 5 points correct or if points are plotted consistently within each interval at the correct heights
(d)	use of 40 (or 40.5) on graph or 40 th (or 40.5 th) stated	2	M1 A1	For use of 40 (or 40.5) on graph or 40 th (or 40.5 th) stated If M1 scored, ft from cumulative frequency graph If no working, follow through only from correct curve

Total 9 marks

11.	$h^2 = \frac{W}{l}$	2	M1 A1	
	lh^2			

Total 2 marks

12.	(a) 30 : 1200 or 1200 : 30 oe	3	M2 A1	For 30 : 1200 or 1200 : 30 oe [M1 for 12(00...) : 30(00...) or 30(00...) : 12(00...) oe] Accept 1 : 0.025, 1 : $\frac{1}{40}$ oe, $n = 40$ ft if M1 scored SC B2 for 1 : 2.5, 1 : 4, 1 : 0.4, 1 : 400, 1 : 25, 1 : 250
	1 : 40			

(b) $95 \times "40"$ or 3800
 $"3800" \div 100$

38

3

M1
M1
A1ft from their n

OR $\frac{95}{30}$
 $\times 12$

38

3

M1
M1
A1

(dep)

Total 6 marks

13. (a) $\frac{360}{18}$

20

2

M1

A1 cao

(b) $"20" \times (180 - 18)$
or $("20" - 2) \times 180$

3240

2

M1

A1 ft from (a)

Total 4 marks

14.	$2(x - 1) + 2x + 3 = 4$ $\text{or } \frac{2(x - 1) + 2x + 3}{4} = 1$ $\text{or } \frac{2(x - 1)}{4} + \frac{2x + 3}{4} = 1$ $2x - 2 + 2x + 3 = 4$ $\text{or } \frac{2x - 2 + 2x + 3}{4} = 1$ $\text{or } \frac{2x - 2}{4} + \frac{2x + 3}{4} = 1$ $4x = 3$	4	<p>M1 Clear attempt to multiply both sides by 4 (or multiple) or expressing LHS with a denominator of 4 or a multiple of 4</p> <p>M1 (dep) expanding brackets or M2 for $\frac{x}{2} - \frac{1}{2} + \frac{2x}{4} + \frac{3}{4} = 1$ (M1 if one error)</p> <p>M1 (dep on first M1) reducing to form $ax = b$ using a correct method or $\frac{x}{2} + \frac{2x}{4} = 1 + \frac{1}{2} - \frac{3}{4}$</p> <p>A1 oe</p>
Total 4 marks			
15.	<p>(a) $\frac{10}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$</p> <p style="margin-left: 100px;">$2\sqrt{5}$</p> <p>(b) $25 + (5\sqrt{3}) + (5\sqrt{3}) + (\sqrt{3})^2$</p> <p style="margin-left: 100px;">$28 + 10\sqrt{3}$</p>	2 2	<p>M1 Accept $10 = k5$ or $\sqrt{20}$</p> <p>A1 Accept $k = 2$</p> <p>M1 A1 Accept $a = 28, b = 10$</p>
Total 4 marks			

16.	(a) Angle of elevation identified $50 \tan 19^\circ$	17.2	3	B1 M1 A1	On diagram or implied by working 17.2 or better (17.2163...)
	(b) $50^2 + 27^2$ or 56.8(2...) or $50^2 + "17.2"'^2$ or value rounding to 52.88.. $\sqrt{"56.8"'^2 + "17.2"'^2}$ or $\sqrt{"52.9"'^2 + 27^2}$	59.3 - 59.4	3	M1 A1	 For 59.3 - 59.4

Total 6 marks

17.	(a) $(x + 4)(x + 1) - 15 = 35$ $x^2 + 5x + 4 - 15 = 35$	$x^2 + 5x - 11 = 35$	3	M1 B1 A1	For $(x + 4)(x + 1) - 15 = 35$ or $(x + 1)(x + 4) = 50$ For $x^2 + 5x + 4$ or $x^2 + x + 4x + 4$ For $x^2 + 5x + 4 - 15 = 35$ or $x^2 + 5x + 4 = 50$ or simpler
	OR $(x + 1)(x - 1) + 5(x - 2) = 35$ $x^2 + x - x - 1 + 5x - 10$	$x^2 + 5x - 11 = 35$	3	M1 B1 A1	For $(x + 1)(x - 1) + 5(x - 2) = 35$ For $x^2 + x - x - 1 + 5x - 10$ or simpler For $x^2 + 5x - 1 - 10 = 35$
	(b) $\frac{-5 \pm \sqrt{5^2 - 4 \times -46}}{2}$ $\frac{-5 \pm \sqrt{209}}{2}$	4.73	3	M1 M1 A1	 May be implied by an answer of 4.75 For 4.73 or better (4.7284...) Accept 4.73 and -9.73 or better

Total 6 marks

18.	(a)	$\frac{9.4}{\sin 123^\circ} = \frac{AC}{\sin 35^\circ}$	3	M1	
		$AC = \frac{9.4 \sin 35^\circ}{\sin 123^\circ}$		M1	
		6.43		A1	For 6.43 or better (6.4287...)
	(b)	$\frac{1}{2} \times 9.4 \times \text{"6.43"} \times \sin x^\circ$ or $\frac{1}{2} \times AB \times \text{"6.43"} \times \sin 123^\circ$ or $\frac{1}{2} \times AB \times 9.4 \times \sin 35^\circ$	3	M1 B1	For clear attempt to use " $\frac{1}{2}absinC$ " For $x = 22$ or $AB = 4.2$ or better (4.1987...) appropriate for their form of $\frac{1}{2}absinC$ If M0, award for $x = 22$ or $AB = 4.2$ or better (may be shown on diagram)
		11.3		A1	11.3 or better (11.3188); ft from (a)
Total 6 marks					
19.	(a)	$\frac{3}{6} \times \frac{2}{6}$	2	M1	
		$\frac{6}{36}$		A1	
	(b)	$\frac{1}{6} \times \frac{1}{6} + \frac{3}{6} \times \frac{3}{6} + \frac{2}{6} \times \frac{2}{6}$ $= \frac{1}{36} + \frac{9}{36} + \frac{4}{36}$	4	M1 M1 M1	1 correct product All 3 correct products Summing at least 2 correct products
		$\frac{14}{36}$		A1	

OR BB BA BN BA BN BA
 AB AA AN AA AN AA
 NB NA NN NA NN NA
 AB AA AN AA AN AA
 NB NA NN NA NN NA
 AB AA AN AA AN AA

$$\frac{14}{36}$$

4

M3

List of all 36 combinations
 M2 for 1 omission
 M1 for 15 or more combinations

A1

Total 6 marks

20. (a)

16

1

B1

cao

(b) $x^3 - 7x + 9 = 11 - x$
 or $-x + 11$ oe seen
 line $x + y = 11$ drawn

3

M1

May be implied by line $x + y = 11$

M1

A1

Accept coordinates ft from
 candidate's line if first M1 scored,
 line has negative gradient and there
 are 3 points of intersection

$\sim -2.3, -0.3, 2.6$

Total 4 marks

21. (a)

$\frac{2512}{157}$ or 16 or $\frac{157}{2512}$ or 0.0625

3

M1

$\sqrt{16}$ or 4 or $\frac{1}{4}$

M1

For $\sqrt{16}$ or 4 or $26^2 \times \frac{157}{2512}$ (42.25)

A1

cao

6.5

(b) 4^3 or 64

8320

2

M1

A1

cao

Total 5 marks

22.

$$\frac{2}{x-1} + \frac{x-11}{(x-1)(x+4)}$$

$$\frac{2(x+4) + (x-11)}{(x-1)(x+4)}$$

or

$$\frac{2(x+4)}{(x-1)(x+4)} + \frac{x-11}{(x-1)(x+4)}$$

$$\frac{2x+8+x-11}{(x-1)(x+4)}$$

$$\frac{3x-3}{(x-1)(x+4)}$$

$$\frac{3(x-1)}{(x-1)(x+4)}$$

$$\frac{3}{(x+4)}$$

6

B1

For factorising $x^2 + 3x - 4$

B1

For correct single fraction even if unsimplified, or for correct sum of two fractions with the same denominator ft from incorrect factorisation

B1

For expanding brackets correctly in numerator

B1

For simplifying their numerator

B1

For factorising a correct numerator

B1

cao

SC If no denominator, award 3rd B1 for $2x + 8 + x - 11$ or $2x^2 + 6x - 8 + x^2 - 11x - x + 11$ and 4th B1 for $3x - 3$ or $3x^2 - 6x + 3$ **Total 6 marks****TOTAL FOR PAPER: 100 MARKS**

Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4400/4H

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Mathematics

Paper 4H

Higher Tier

Friday 13 May 2005 – Morning

Time: 2 hours

Page Numbers	Leave Blank
3	
4	
5	
6	
7	
8	
9	
10	
11	
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13	
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Total	

Materials required for examination

Ruler graduated in centimetres and millimetres, pen, HB pencil, eraser, calculator.

Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.

The paper reference is shown at the top of this page. Check that you have the correct question paper.

Answer **ALL** the questions in the spaces provided in this question paper.

Show all the steps in any calculations.

Information for Candidates

There are 20 pages in this question paper. All blank pages are indicated.

The total mark for this paper is 100. The marks for parts of questions are shown in round brackets:

e.g. (2).

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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INTERNATIONAL

Answer ALL NINETEEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Solve the equation

$$3p + 5 = 7p + 3$$

$p = \dots\dots\dots$

(Total 3 marks)

Q1

2. Krishnan used 611 units of electricity.
The first 182 units cost £0.0821 per unit.
The remaining units cost £0.0704 per unit.
Tax is added at 5% of the total amount.

Complete Krishnan's bill.

182 units at £0.0821 per unit	£.....
..... units at £0.0704 per unit	£.....
Total amount	£_____
Tax at 5% of the total amount	£.....
Amount to pay	£_____

(Total 7 marks)

Q2



3. In the diagram, PQR and PST are straight lines.
 QS and RT are parallel lines.
 Angle $QRT = 70^\circ$.
 Angle $QST = 120^\circ$.

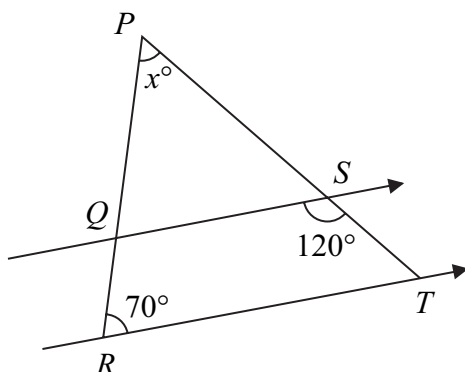


Diagram **NOT** accurately drawn

- (a) Work out the value of x .

$x = \dots\dots\dots$
(3)

- (b) Give a reason for each step in your working.

.....

(2)

(Total 5 marks)

Q3



4. (a) Simplify

(i) $p \times p \times p \times p$

.....

(ii) $2a + 3b - 5a + b - 7$

.....

(iii) $\frac{q^3 \times q^5}{q^2}$

.....

(4)

(b) Multiply out $x(2x + 3)$

.....

(2)

(c) Multiply out and simplify $(y - 1)(y + 2)$

.....

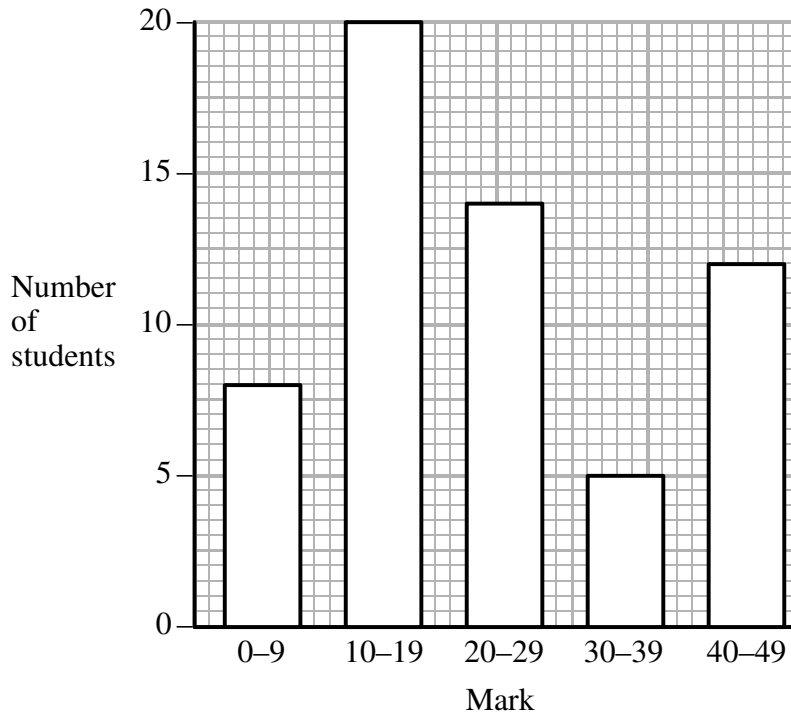
(2)

(Total 8 marks)

Q4



5. The frequency diagram gives information about the marks gained by a group of 59 students in a test.



(a) Which is the modal class?

.....
(1)

A student is chosen at random from the whole group.

(b) Find the probability that this student's mark is less than 30.

.....
(2)

(c) Calculate an estimate of the total number of marks scored by all the students in the group.

.....
(3)

(Total 6 marks)

Q5



6. In a club, $\frac{1}{2}$ of the members are left-handed and $\frac{1}{4}$ of the members wear glasses.
A member is chosen at random.

Stavros says “The probability that this member is left-handed **or** wears glasses is $\frac{3}{4}$.”

Is he correct?

.....

Explain your answer.

.....
.....

(Total 2 marks)

Q6

7. The diagram shows a triangle LMN .
 $MN = 15$ cm. $LN = 8$ cm.
Angle $LMN = 90^\circ$.

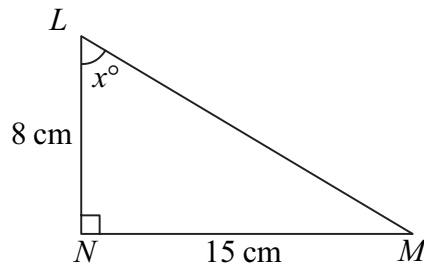


Diagram **NOT** accurately drawn

- (a) Calculate the length of ML .

..... cm
(3)

- (b) Write down the value of $\tan x^\circ$.

.....
(1)

(Total 4 marks)

Q7



8. (a) The universal set, $\mathcal{U} = \{\text{Angela's furniture}\}$.
 $A = \{\text{Chairs}\}$.
 $B = \{\text{Kitchen furniture}\}$.

Describe fully the set $A \cap B$.

.....

 (2)

- (b) $P = \{2, 4, 6, 8\}$.
 $Q = \{\text{Odd numbers less than 10}\}$

(i) List the members of the set $P \cup Q$.

.....

(ii) Is it true that $P \cap Q = \emptyset$?

.....

Explain your answer.

.....

 (3)

(Total 5 marks)

Q8

9. The formula for the curved surface area, A , of a cylinder is

$$A = 2\pi rh$$

where r is the radius and h is the height.

Calculate the value of r when $A = 19.8$ and $h = 2.1$
Give your answer correct to one decimal place.

$A =$

(Total 2 marks)

Q9



10. The table shows the annual world production of four foods.

Food	Annual world production, in tonnes
Cocoa	1.75×10^6
Coffee	1.85×10^6
Sugar	9.72×10^7
Wheat	4.98×10^8

(a) Calculate the total annual world production of coffee and sugar.

..... tonnes
(2)

(b) Brazil produces 9.7% of the world's sugar.
Calculate the annual production of sugar from Brazil.

..... tonnes
(2)

(c) Express the world production of wheat as a percentage of the total production of all four foods.

.....%
(3)

(Total 7 marks)

Q10



11. (a) Solve the simultaneous equations

$$2x + 3y = 4$$

$$6x + 5y = 8$$

$$x = \dots\dots\dots y = \dots\dots\dots$$

(3)

(b) Write down the coordinates of the point of intersection of the two lines whose equations are

$$2x + 3y = 4 \text{ and}$$

$$6x + 5y = 8$$

$$(\dots\dots\dots, \dots\dots\dots)$$

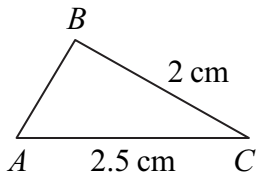
(1)

(Total 4 marks)

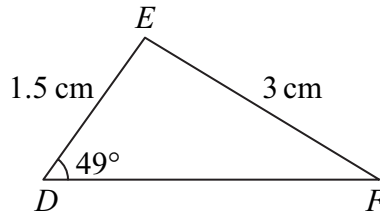
Q11



12. Triangles ABC and DEF are similar.



$AC = 2.5 \text{ cm}$ $BC = 2 \text{ cm}$



$DE = 1.5 \text{ cm}$ $EF = 3 \text{ cm}$ Angle $EDF = 49^\circ$

Diagrams **NOT** accurately drawn

(a) Find the size of angle BAC .

.....
 °
(1)

(b) Work out the length of

(i) DF ,

..... cm

(ii) AB .

..... cm
(4)

(Total 5 marks)

Q12



13. f and g are functions.

$$f: x \mapsto 2x - 3$$

$$g: x \mapsto 1 + \sqrt{x}$$

(a) Calculate $f(-4)$

.....
(2)

(b) Given that $f(a) = 5$, find the value of a .

$a =$
(2)

(c) Calculate $gf(6)$

.....
(2)

(d) Which values of x cannot be included in the domain of g ?

.....
(1)

(e) Find the inverse function g^{-1} in the form $g^{-1}: x \mapsto \dots$

.....
(3)

(Total 10 marks)

Q13



14. A farmer wants to make a rectangular pen for keeping sheep. He uses a wall, AB , for one side. For the other three sides, he uses 28 m of fencing. He wants to make the area of the pen as large as possible.

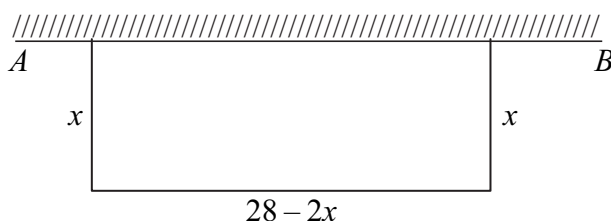


Diagram NOT accurately drawn

The width of the pen is x metres.
The length parallel to the wall is $(28 - 2x)$ metres.

- (a) The area of the pen is $y \text{ m}^2$.
Show that $y = 28x - 2x^2$.

(1)

- (b) For $y = 28x - 2x^2$

- (i) find $\frac{dy}{dx}$,

.....

- (ii) find the value of x for which y is a maximum.

$x = \dots\dots\dots$

- (iii) Explain how you know that this value gives a maximum.

.....
.....

(5)

- (c) Find the largest possible area of the pen.

..... m^2
(2)

(Total 8 marks)

Q14



15. A fan is shaped as a sector of a circle, radius 12 cm, with angle 110° at the centre.

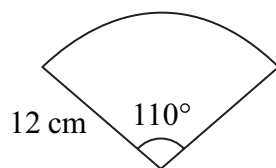


Diagram **NOT** accurately drawn

(a) Calculate the area of the fan.

..... cm^2
(2)

Another fan is shaped as a sector of a circle, radius r cm, with angle 120° at the centre.

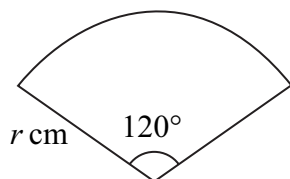


Diagram **NOT** accurately drawn

(b) Show that the total perimeter of this fan is $\frac{2}{3}r(3 + \pi)$ cm.

(3) **Q15**

(Total 5 marks)



16. PQR is a triangle.
 M and N are the midpoints of PQ and PR respectively.

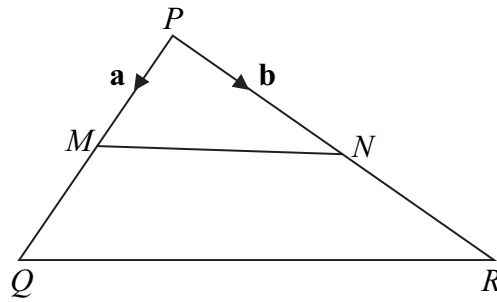


Diagram **NOT** accurately drawn

$\vec{PM} = \mathbf{a}$ $\vec{PN} = \mathbf{b}$.

- (a) Find, in terms of \mathbf{a} and/or \mathbf{b} ,

(i) \vec{MN}

.....

(ii) \vec{PQ}

.....

(iii) \vec{QR}

.....

(3)

- (b) Use your answers to (a)(i) and (iii) to write down two geometrical facts about the lines MN and QR .

.....

.....

(2)

(Total 5 marks)

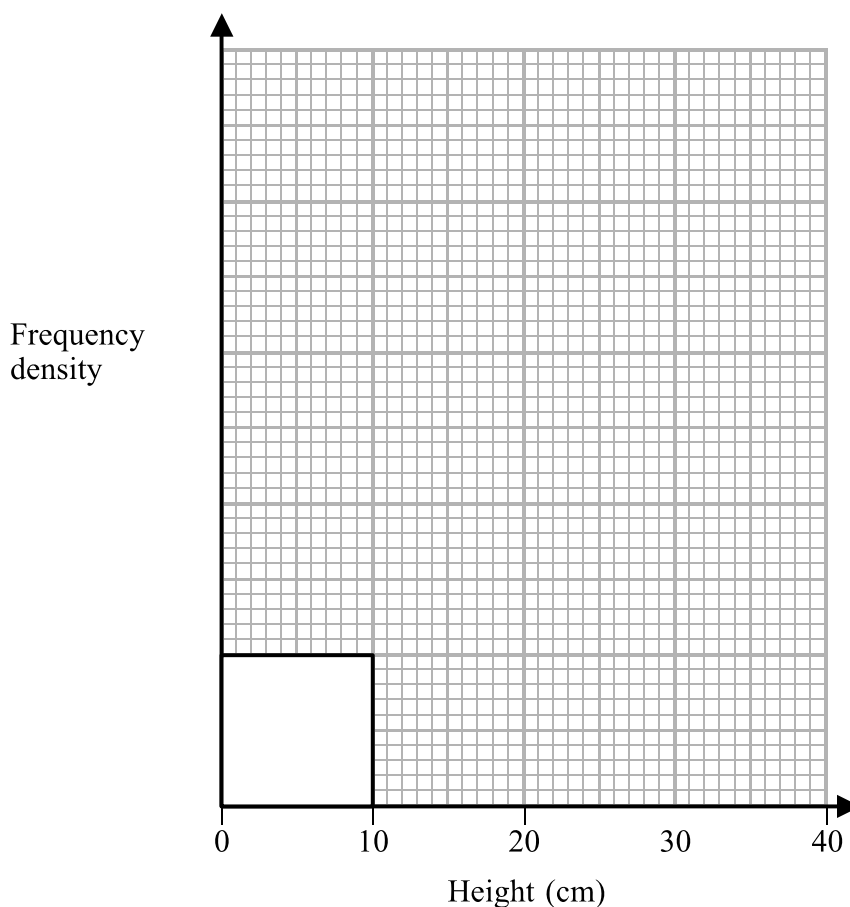
Q16



17. In an experiment, 52 plants were grown and their heights were measured. The results are summarised in the table.

Height	$0 \leq h < 10$	$10 \leq h < 15$	$15 \leq h < 20$	$20 \leq h < 40$
Number of plants	10	20	14	8

(a) Complete the histogram for these results.



(4)

The plants with heights from 17.5 cm to 25 cm are chosen for a display.

(b) Calculate an estimate of the number of plants chosen for the display.

.....
(2)

(Total 6 marks)

Q17



18. In order to start a course, Bae has to pass a test.
He is allowed only two attempts to pass the test.

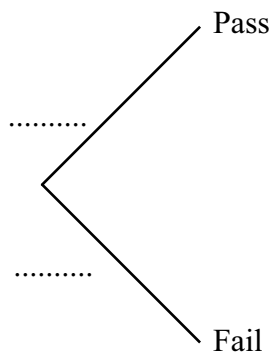
The probability that Bae will pass the test at his first attempt is $\frac{2}{5}$.

If he fails at his first attempt, the probability that he will pass at his second attempt is $\frac{3}{4}$.

(a) Complete the probability tree diagram.

First attempt

Second attempt



(3)

(b) Calculate the probability that Bae will be allowed to start the course.

.....
(3)

(Total 6 marks)

Q18



Leave
blank

19. Convert 0.5̄ to a fraction.

.....

Q19

(Total 2 marks)

TOTAL FOR PAPER: 100 MARKS

END



Q	Working	Answer	Mark	Notes
1.	Correctly collect p terms in eqn Correctly collect constants in eqn	$\frac{1}{2}$ oe	3 M1 M1 A1	eg $4p + 3 = 5$ (not $7p - 3p + 3 = 5$)
Total 3 marks				
2.	14.9422 $611 - 182 = 429$ "429" \times 0.0704 or 30.2016 "14.9422" + "30.2016" or 45.1438 "45.1438" \times 5/100 or 2.25719 "45.1438" + "2.25719"	47.40(099)	7 B1 B1 M1 M1 M1 M1 A1	Allow working to 3 s.f. or better throughout M marks can be implied 45.14 \times 1.05 or 47.50 or 2.25 Can be awarded in previous line At least 2 d.p.
Total 7 marks				
3. (a)		50°	3 B3	If B3 not gained: $PQS = 70^\circ$ / $\angle PTR = 60^\circ$ / ext $\angle PTR = 120^\circ$: B2 If B2 not gained: $\angle PST = 60^\circ$: B1
(b)		\angle s on a straight line = 180° or \angle sum of triangle = 180° or ext \angle of Δ = sum of int opp \angle s AND Corresponding \angle s or alternate \angle s or allied or supp or included or interior or co-interior \angle s	2 B1 B1	
Total 5 marks				

4.	(a)	(i)	p^4	1	B1	
		(ii)	$-3a + 4b - 7$	2	B2	B1: 2 terms. subs include
		(iii)	q^6	1	B1	working: -B1
	(b)		$2x^2 + 3x$	2	B2	B1 each term. subs include working: -B1
	(c)		$y^2 + 2y - y - 2$	2	M1	3 terms correct or 4 terms correct ignoring sign
			$y^2 + y - 2$		A1	Incorrect subsequent work: -A1
Total 8 marks						
5.	(a)		10-19	1	B1	
	(b)		42/59 or 0.71(...) or 71(...)%	2	B2	B1 num, B1 denom 42:59 B1
	(c)		$8 \times 4.5 + 20 \times 14.5 + 14 \times 24.5 + 5 \times 34.5 + 12 \times 44.5$ Midpoints 4.5 (or 5 or 4) etc	3	M1	\geq four <i>fx</i> attempted, consistent <i>x</i> within interval dep (for midpoints 4 or 5 etc)
			1375(.5) or 1376		M1	ISW eg $\div 59$
					A1	23.3, 1405, 1346 (no working): SC B2 22.8, 23.8 : SC B1
Total 6 marks						
6.			No or not necessarily Some are (or may be) both	2	B1 B1	dep on 2 nd B1
Total 2 marks						

7.	(a)	$8^2 + 15^2$ or 289 seen $\sqrt{\quad}$	17cm	3	M1	$\tan x = 15/8$ dep on x used
					M1	dep $8/\cos x$
					A1	Answer rounds to 17.0
	(b)		15/8 or 1.875 or 1.88 seen	1	B1	ISW
Total 4 marks						
8.	(a)		Kitchen chairs	2	B1	Or equivalent. Must be clear that overlap is intended eg "chairs that are part of / common to kitchen furniture" "furniture that is both a chair and in the kitchen"
			belonging to Angela or "her"		B1	
	(b)	(i)	1, 2, 3, 4, 5, 6, 7, 8, 9	2	B2	-B1 each omission or extra Any order, in a single list Ignore negative odd numbers
		(ii)	Yes - no common members	1	B1	Or eg "No odd numbers in P." "P is even numbers, or Q is odd numbers." Must refer to sets or odd or even
Total 5 marks						
9.		$19.8 = 2\pi \times r \times 2.1$ or $19.8 / (2\pi \times 2.1)$	1.5 or better	2	M1A1	Or $19.8 = 2\pi \times 1.5 \times 2.1$
		OR $2\pi \times 19.8 \times 2.1$	261(.3..)		M1A1	
Total 2 marks						

- | | | | | | |
|-----|-----|--|---|----------------|---|
| 10. | (a) | 9.905×10^7 or 99 050 000 or
9.91×10^7 or 99 100 000 | 2 | B2 | B1 for digits 9905 or 991 |
| | (b) | $9.7/100 \times 9.72 \times 10^7$

9.43×10^6 or 9 430 000 or better | 2 | M1
A1 | |
| | (c) | Total = 5.988×10^8 or 598800000
(4.98×10^8 / her 5.988×10^8) $\times 100$

83% or better | 3 | B1
M1
A1 | Or 599000000
dep total clearly attempted |

Total 7 marks

- | | | | | | |
|-----|-----|---|---|------------|--|
| 11. | (a) | 3 x (i) or otherwise equalize
coeffs

$\frac{1}{2}, 1$ | 3 | M1
A1A1 | Whole equations correct
T & I: 3 or 0 |
| | (b) | Her ($\frac{1}{2}, 1$) | 1 | B1f | |

Total 4 marks

- | | | | | | |
|-----|------|-------------------------------------|---|----------|---------------------|
| 12. | (a) | 49 | 1 | B1 | |
| | (b) | (i) $2.5 \times 3/2$ oe

3.75 | 2 | M1
A1 | cao |
| | (ii) | $1.5 \times 2/3$ oe

1 | 2 | M1
A1 | Or 1.5 - 0.5
cao |

Total 5 marks

13. (a)	$2(-4) - 3$	-11	2	M1 A1	
(b)	$2a - 3 = 5$ or $(5 + 3)/2$	4	2	M1 A1	
(c)	$f(2 \times 6 - 3) + 1$	4	2	M1 A1	
(d)		Negative or $x < 0$	1	B1	
(e)	$y = 1 + \sqrt{x}$ $x = (y - 1)^2$	$f, +1$ becomes $-1, ()^2$ $g^{-1} : x \rightarrow (x - 1)^2$ or $y = (x - 1)^2$	3	M1 M1 A1	Or $x = 1 + \sqrt{y}$ Or $g^{-1}(x) = (x - 1)^2$ or $(x - 1)^2$

Total 10 marks

14. (a)		$x(28 - 2x)$ seen	1	B1	Brackets essential
(b) (i)		$28 - 4x$	2	B1B1	Ignore "y ="
(ii)	$"28 - 4x" = 0$	$x = 7$	2	M1 A1	
(iii)		negative coeff. of x^2 or \cap shape or $\frac{d^2y}{dx^2} = -4$, which is negative	1	B1	Not "the value is negative." ft her $28 - 4x$
(c)	$28 \times 7 - 2 \times 7^2$	98	2	M1 A1	ft his (ii) if working seen cao

Total 8 marks

15. (a)	$\pi \times 12^2 \times 110/360$		2	M1	Or $\pi \times 12^2 \times 0.31,$ Or $\pi \times 12^2 \div 3.3$ or better
		138(.2. . .)		A1	
(b)	$1/3 \times 2\pi r$ or $120/360 \times 2\pi r$ seen + $2r$ seen		3	M1 M1 A1	Or equivalent explanation
		$\frac{2\pi r}{3} + 2r$ or $2/3\pi r + 2r$			
Total 5 marks					

16. (a)	(i)	-a + b	oe	1	B1	} Simplification not required } Allow plain a, b }
	(ii)	2a	oe	1	B1	
	(iii)	-2a + 2b	oe	1	B1	
(b)		Parallel $QR = ZMN$ or lines in ratio 1:2 or 2:1		2	B1 B1	(b) marks dep (a)(i)&(iii) correct Without vector symbols unless "length" stated.
Total 5 marks						

17. (a)	One block of correct height, or $20/5$ or $14/5$ or $8/20$ seen		4	M1	8cm, 5.6cm or 0.8cm, any width
		Correct blocks, height & width		A1A1A1	
(b)	$1/2 \times 14$ or $1/4 \times 8$ or 2.5×2.8 or 5×0.4		2	M1	Value "7" or "2" not enough
		9		A1	
Total 6 marks					

18. (a) $\frac{2}{5}$ and $\frac{3}{5}$ correctly placed 3 B1
 $\frac{3}{4}$ and $\frac{1}{4}$ correctly placed B1 Allow even if extra branches
 Correct structure includes labels B1

(b) $\frac{3}{5} \times \frac{3}{4}$ or $\frac{9}{20}$ 3 M1
 $+ \frac{2}{5}$ M1 dep

$\frac{17}{20}$ or 0.85 oe A1

Total 6 marks

19. $5.\dot{1}-0.5\dot{1}$ or $51.\dot{1}-5.\dot{1}$ or $51.\dot{1}-0.5\dot{1}$ 2 M1 Or 1/90 seen

$\frac{23}{45}$ or $\frac{46}{90}$ or $\frac{460}{900}$ oe A1

Total 2 marks

TOTAL FOR PAPER: 100 MARKS

Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4400/3H

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Friday 4 November 2005 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

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3	
4	
5	
6	
7	
8	
9	
10	
11	
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22	
23	
Total	

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.

The paper reference is shown at the top of this page. Check that you have the correct question paper.

Answer **ALL** the questions in the spaces provided in this question paper.

Show all the steps in any calculations.

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There are 24 pages in this question paper. All blank pages are indicated.

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e.g. (2).

You may use a calculator.

Advice to Candidates

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Turn over

Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. (a) Use your calculator to work out the value of

$$2.6 - \frac{9.8}{2.7 + 1.2}$$

Write down all the figures on your calculator display.

.....
(2)

- (b) Give your answer to part (a) correct to 2 significant figures.

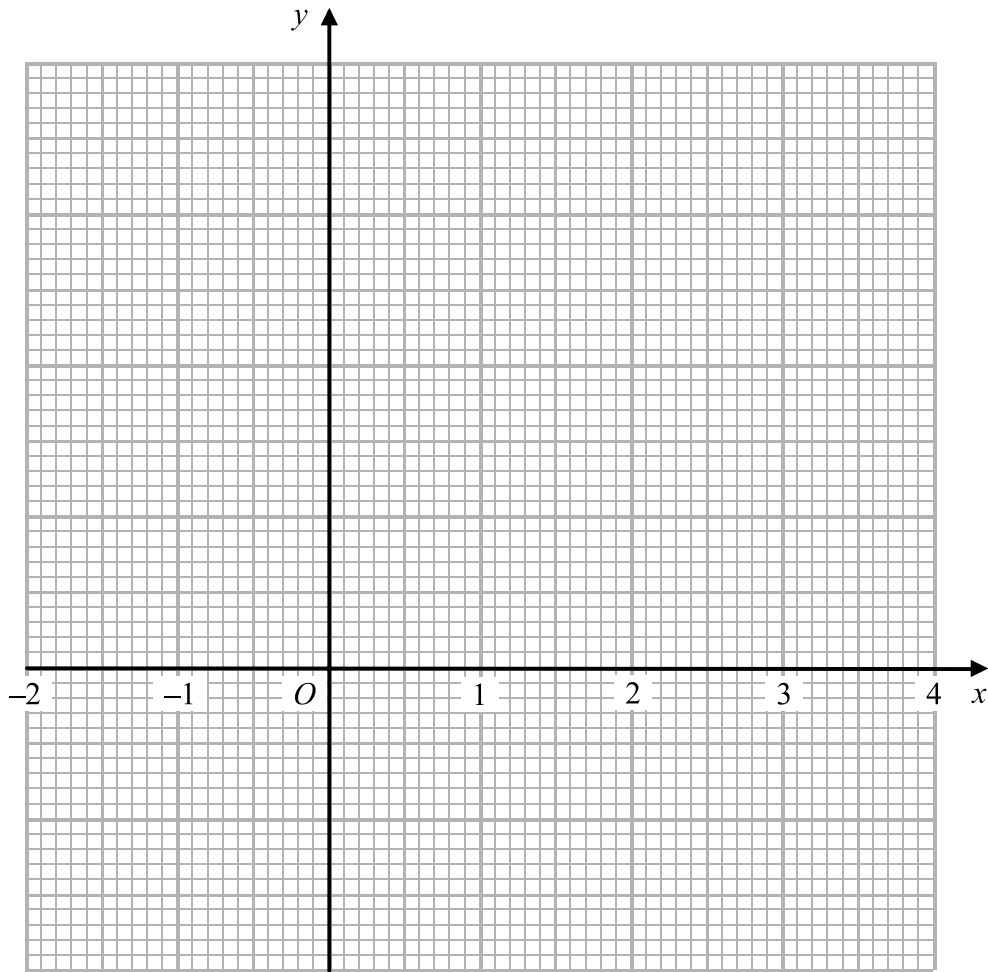
.....
(1)

(Total 3 marks)

Q1



2. On the grid, draw the graph of $y = 3x + 5$ from $x = -2$ to $x = 4$



(Total 3 marks)

Q2



3. The lengths of two of the sides of a kite are 7.6 cm and 4.3 cm.
The length of the shorter diagonal of the kite is 5.2 cm.

In the space below, use ruler and compasses to **construct** an accurate, full-size drawing of the kite.

You must show all construction lines.

Q3

(Total 4 marks)



4. The table shows information about the number of bananas the students in class 1B ate in one week.

Number of bananas	Frequency
0	1
1	6
2	5
3	2
4	7
5	4

- (a) Find the mean number of bananas.

.....
(3)

There are 575 students in the school.

The numbers of bananas eaten by students in class 1B are typical of the numbers eaten by students in the whole school.

- (b) Work out an estimate for the number of students in the whole school who will eat exactly one banana next week.

.....
(3)

(Total 6 marks)

Q4



5.

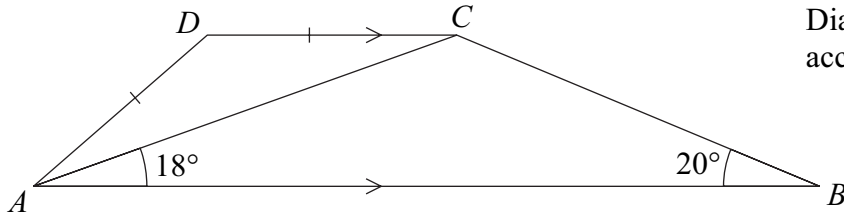


Diagram **NOT** accurately drawn

- $ABCD$ is a trapezium.
- AB is parallel to DC .
- Angle $BAC = 18^\circ$.
- Angle $ABC = 20^\circ$.
- $AD = DC$.

Calculate the size of angle ADC .
Give a reason for each step in your working.

.....
(Total 5 marks)

Q5



6.

$$f = \frac{uv}{u+v}$$

Work out the value of f when $u = 5.7$ and $v = -7.6$

$f = \dots\dots\dots$

(Total 3 marks)

Q6

7. The amount of petrol a car uses is directly proportional to the distance it travels.
A car uses 3 litres of petrol when it travels 50 km.

(a) Work out the amount of petrol the car uses when it travels 125 km.

$\dots\dots\dots$ litres

(2)

(b) Work out the distance the car travels when it uses 5.7 litres of petrol.

$\dots\dots\dots$ km

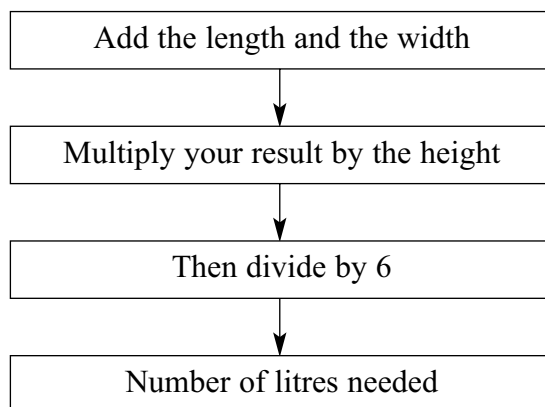
(2)

(Total 4 marks)

Q7



8. This rule can be used to work out the number of litres of paint needed to cover the walls of a room, using the length, width and height, in metres, of the room.



A room has length L metres, width W metres and height H metres. N litres of paint are needed to cover the walls of the room.

(a) Find a formula for N in terms of L , W and H .

.....
(3)

The perimeter of the room is P metres.

(b) Find a formula for N in terms of P and H .

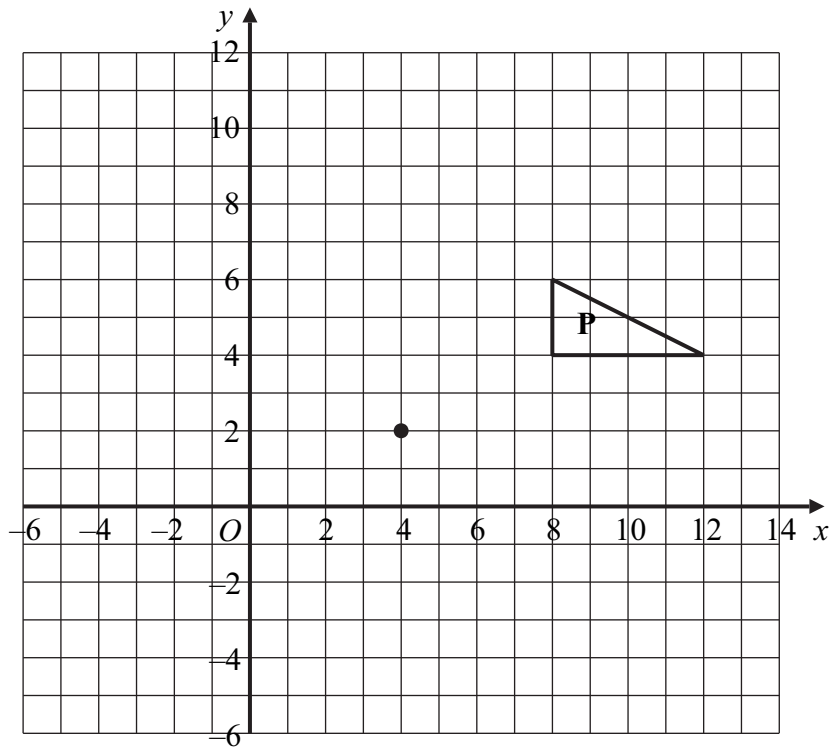
.....
(2)

(Total 5 marks)

Q8



9. (a)

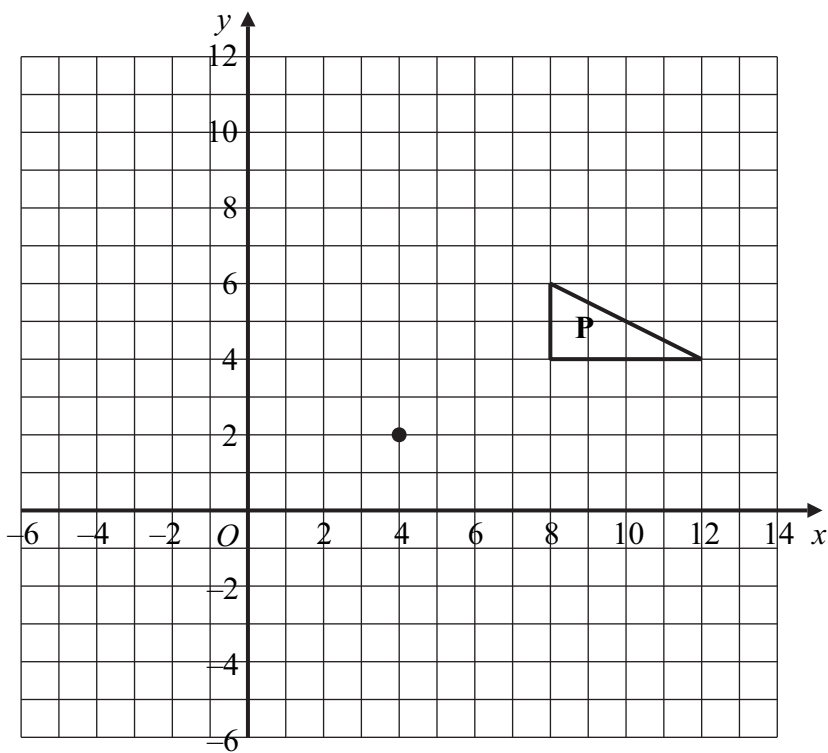


On the grid, rotate triangle **P** 90° anti-clockwise about the point $(4, 2)$.

(2)



(b)



On the grid, enlarge triangle **P** with scale factor $\frac{1}{2}$ and centre (4, 2).

(2)

Q9

(Total 4 marks)



10. Pat drops a ball onto a wooden floor.
The ball bounces to a height which is 26% less than the height from which it is dropped.

- (a) Pat drops the ball from a height of 85 cm.
Calculate the height to which it first bounces.

..... cm
(3)

- (b) Pat drops the ball from a different height.
It first bounces to a height of 48.1 cm.
Calculate the height from which he dropped it.

..... cm
(3)

(Total 6 marks)

Q10

11. Solve $\frac{5x+4}{3} = 2$

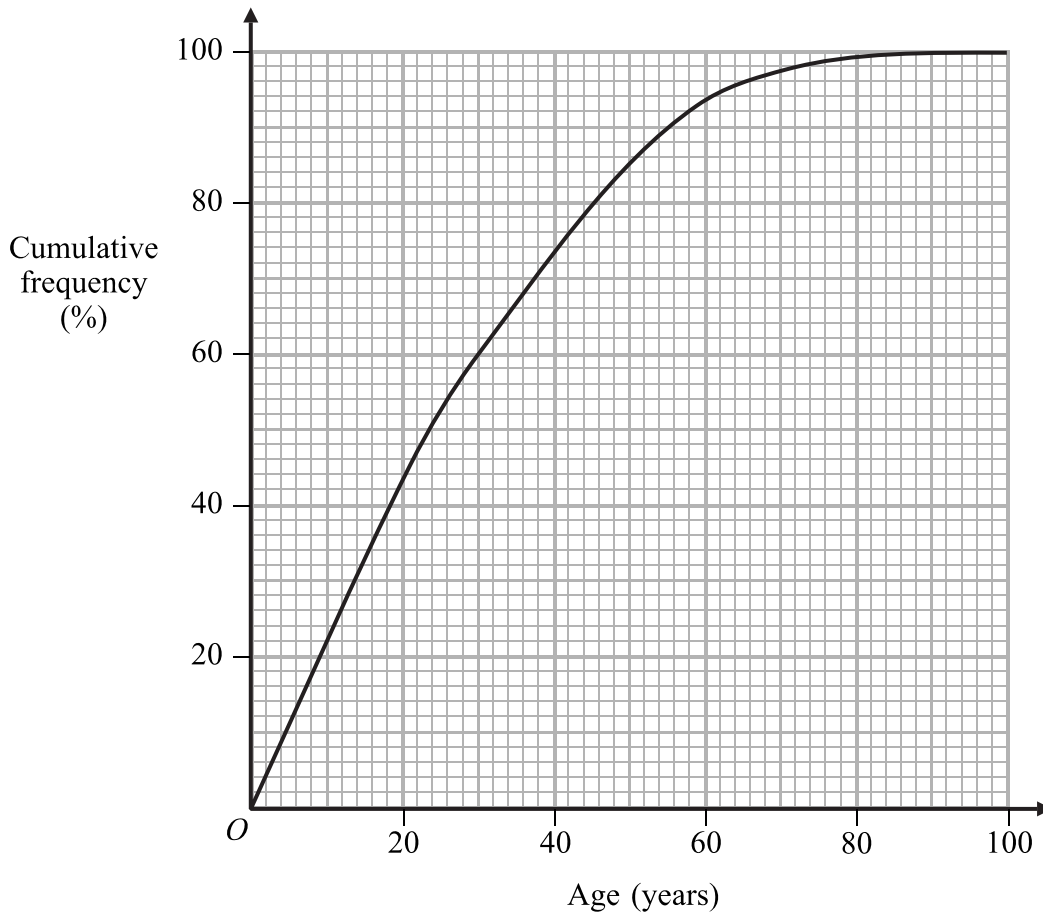
$x =$

(Total 3 marks)

Q11



12. The cumulative frequency graph gives information about the ages of people in India. The cumulative frequency is given as a percentage of all the people in India.



(a) Use the cumulative frequency graph to find an estimate for the percentage of people in India who are

(i) aged less than 20,

.....%

(ii) aged 54 or over.

.....%

(2)

(b) Find an estimate for the interquartile range of the ages of people in India.

..... years

(2)

(Total 4 marks)

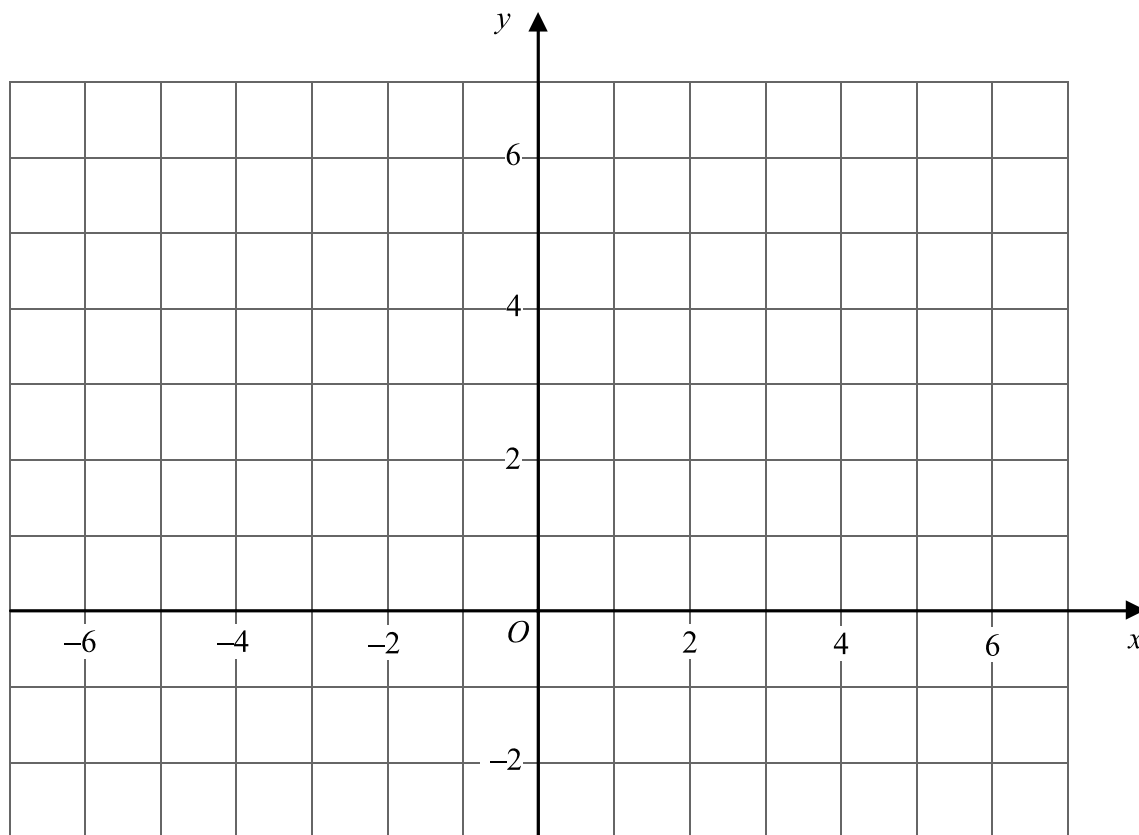
Q12



13. Show, by shading on the grid, the region which satisfies all three of these inequalities.

$$x \geq 1 \quad y \geq x \quad x + 2y \leq 6$$

Label your region **R**.



Q13

(Total 4 marks)



14.

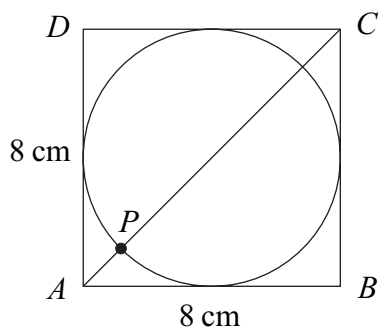


Diagram NOT accurately drawn

The diagram shows a circle of radius 4 cm inside a square $ABCD$ of side 8 cm. P is a point of intersection of the circle and the diagonal AC of the square.

(a) Show that $AP = 1.66$ cm, correct to 3 significant figures.

(4)

(b) Calculate the length of DP .
Give your answer correct to 3 significant figures.

..... cm
(3)

(Total 7 marks)

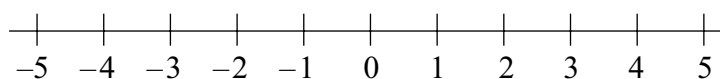
Q14



15. (a) Solve the inequality $x^2 \leq 4$

.....
(2)

(b) On the number line, represent the solution set of $x^2 \leq 4$



(2)

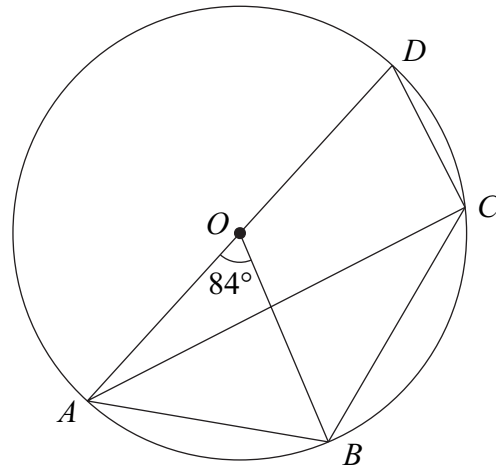
Q15

(Total 4 marks)



16.

Diagram **NOT** accurately drawn



A , B , C and D are points on a circle with centre O .
 AOD is a diameter of the circle.
 Angle $AOB = 84^\circ$.

(a) (i) Calculate the size of angle ACB .

.....
 °

(ii) Give a reason for your answer.

.....
 (2)

(b) Calculate the size of angle BCD .

.....
 °

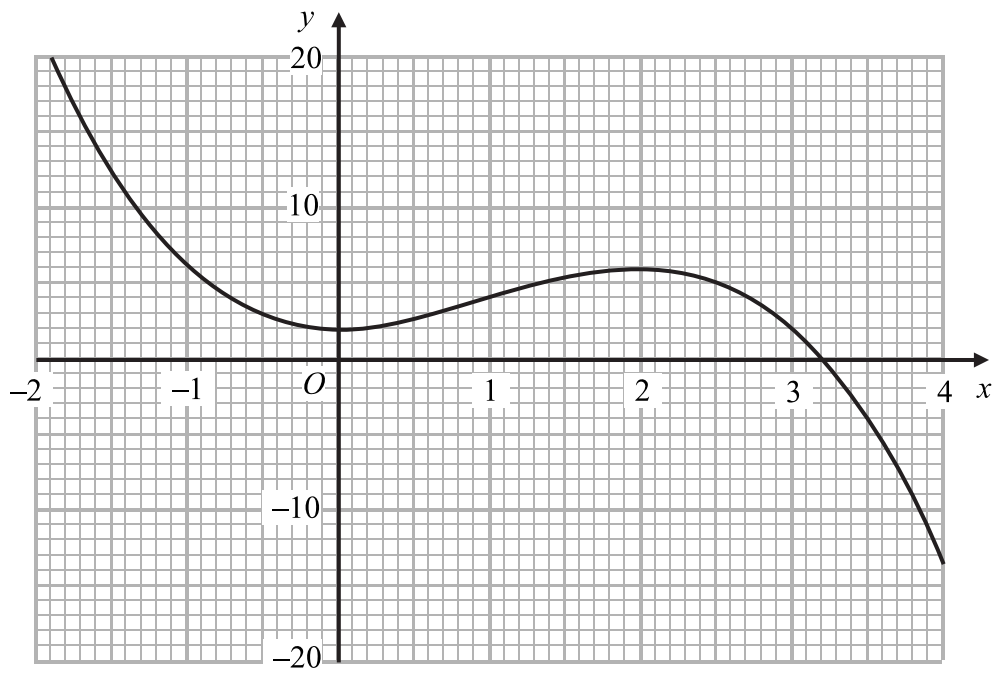
(2)

(Total 4 marks)

Q16



17. The diagram shows part of the graph of $y = f(x)$.



(a) Find $f(3)$.

.....
(1)

(b) Solve $f(x) = 6$

.....
(2)

(c) Find $ff(1)$.

.....
(2)



(d) Find an estimate for the gradient of the curve at the point where $x = -1$

.....

(3)

The equation $f(x) = k$, where k is a number, has 3 solutions between $x = -2$ and $x = 4$

(e) Complete the inequalities which k must satisfy.

..... $< k <$

(2)

Q17

(Total 10 marks)

--	--



18.

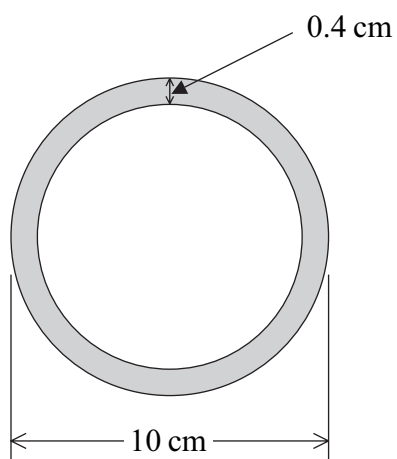


Diagram **NOT** accurately drawn

The outer diameter of a hollow spherical ball is 10 cm.
The ball is made from rubber which is 0.4 cm thick.

Calculate the volume of rubber needed to make the ball.
Give your answer correct to 3 significant figures.

..... cm³

(Total 4 marks)

Q18



19. The probability that Gill will walk to school on Monday is $\frac{3}{5}$.
 If Gill walks to school on Monday, the probability that she will walk to school on Tuesday is $\frac{1}{6}$.
 If she does **not** walk to school on Monday, the probability that she will walk to school on Tuesday is $\frac{7}{10}$.

(a) Calculate the probability that she walks to school on Monday but not on Tuesday.

.....
(2)

(b) Calculate the probability that she walks to school on **at least** one of the two days.

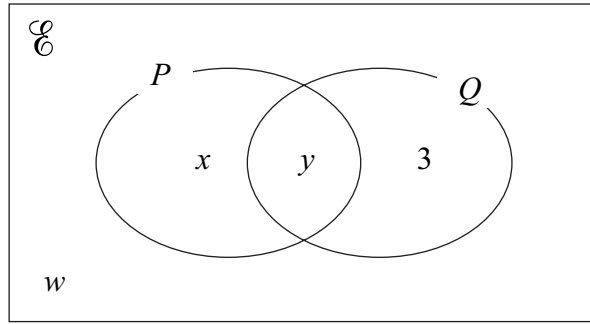
.....
(3)

(Total 5 marks)

Q19



20.



In the Venn diagram, 3, w , x and y represent the **numbers** of elements.
 $n(C) = 24$ $n(P') = 8$ $n((P \cap Q)') = 15$

(a) Find the value of (i) w (ii) x (iii) y

(i) $w = \dots\dots\dots$

(ii) $x = \dots\dots\dots$

(iii) $y = \dots\dots\dots$

(3)

(b) (i) Find $n(P' \cap Q)$.

.....

(ii) Find $n(P' \cup Q')$.

.....

(iii) Find $n(P \cap Q \cap P')$.

.....

(3)

(Total 6 marks)

Q20



21. Solve the simultaneous equations $y = 3x^2$
 $y = 2x + 5$

.....
.....

(Total 6 marks)

Q21

TOTAL FOR PAPER: 100 MARKS

END



IGCSE MATHEMATICS 4400, NOVEMBER 2005 MARK SCHEME

Paper 3H

Q		Working	Answer	Mark		Notes
1	(a)	2.6 - 2.5128...	0.087179...	2	B2	for 0.08717 or better (B1 for 2.5128... seen)
	(b)		0.087	1	B1	ft from (a) if <0.1
						Total 3 marks
2			one correct point plotted or stated second correct point plotted or stated correct straight line between -2 and 4	3	B1 B1 B1	-B1 if no y scale
						Total 3 marks
3			kite with sides correct lengths correct arcs radius 7.6cm seen correct arcs radius 4.3cm seen correct kite	4	B1 M1 M1 A1	allow $\pm 2\text{mm}$ allow $\pm 2\text{mm}$ allow $\pm 2\text{mm}$ within guidelines dep on both M marks
						Total 4 marks

4	(a)	$(0 \times 1) + (1 \times 6) + (2 \times 5) + (3 \times 2) + (4 \times 7) + (5 \times 4)$ OR $6 + 10 + 6 + 28 + 20$ $70/25$	2.8	3	M1 M1 A1	for no. bananas x frequency (dep on 1 st M1) for sum and $\div 25$
	(b)	$6/25 \times 575$	138	3	B1 M1 A1	for 6/25 seen for $6/25 \times 575$
						Total 6 marks

5		$\angle ACD = 18^\circ$ alternate angles $180 - 2 \times "18"$ isosceles Δ and \angle sum of Δ	144	5	B1 B1 M1 B1 A1	stated or shown on diagram for both ft from "18"
						Total 5 marks

6		5.7×-7.6 or -43.32 $5.7 - 7.6$ or -1.9	22.8	3	M1 M1 A1	cao
						Total 3 marks

7	(a)	$3 \times 125/20$	7.5	2	M1 A1	cao
	(b)	$50 \times 5.7/3$ or $5.7 = 3d / 50$	95	2	M1 A1	cao
						Total 4 marks

8	(a)		$N = \frac{H(L+W)}{6}$ oe	3	B1 B2	for $N =$ expression with L, W, H for $\frac{H(L+W)}{6}$ oe (B1 for $\frac{L+WH}{6}$, $L + \frac{WH}{6}$ etc)
	(b)	$P = 2L + 2W$	$(N =) \frac{PH}{12}$	2	M1 A1	for $\frac{PH}{12}$ oe; condone missing $N =$
						Total 5 marks

9	(a)		correct image	2	B2	B1: rotation 90° about any centre or rotation 90° clockwise about (4,2) or 2 vertices correct
	(b)		correct image	2	B2	B1: enlargement with scale factor $\frac{1}{2}$ (or $-\frac{1}{2}$) from any centre or 2 vertices correct
						Total 4 marks

10	(a)	$26/100 \times 85$ or 22.1 85 - "22.1"	62.9	3	M1 M1 A1	(dep) or M2 for $74/100 \times 85$
	(b)	$48.1 / 0.74$	65	3	B1 M1 A1	for 0.74 seen for $48.1 / 0.74$ cao
						Total 6 marks

11		$5x + 4 = 6$ $5x = 2$	2/5	3	M1 M1 A1	
Total 3 marks						

12	(a)	(i)	42 - 44	2	B1	
		(ii)	10 - 12		B1	
	(b)	UQ = 41 - 43 LQ = 10 - 12	28 - 33	2	M1 A1	for reading at 25 and 75 stated or cfs of 25 and 75 indicated on graph
Total 4 marks						

13			lines region	4	B3 B1	B1 for each correct line for correct region shaded in or out
Total 4 marks						

14	(a)	$8^2 + 8^2 = 64 + 64 = 128$ $\sqrt{"128"}$ 11.3137... $\frac{11.3137... - 8}{2}$ OR $4^2 + 4^2 = 16 + 16 = 32$ $\sqrt{"32"}$ 5.6568... 5.6568... - 4		4	M1 M1 A1 B1 M1 M1 M1 B1	for $8^2 + 8^2$ (dep)
----	-----	---	--	---	--	--------------------------

	(b)	$8^2 + 1.66^2 - 2 \times 8 \times 1.66 \cos 45^\circ$ or $8^2 + 9.66^2 - 2 \times 8 \times 9.66 \cos 45^\circ$ 47.974... OR $PX=AX = 1.66 \cos 45^\circ = 1.173...$ $(8 - "1.173...")^2 + "1.173...)^2$ OR $OD = 4 + 1.66 = 5.66$ $5.66^2 + 4^2$	6.93 6.93 6.93	3	M1 A1 A1 M1 M1 A1 M1 M1 A1	for 6.93 or better dep for 6.93 or better for 6.93 or better
Total 7 marks						

15	(a)		$-2 \leq x \leq 2$	2	B2	B1 $x \leq 2$ or $x \geq -2$ or $-2 < x < 2$ or $x \leq \pm 2$ or $x \leq \sqrt{4}$
	(b)		solid circles at 2 and -2 line joining circles	2	B1 B1	ft from (a) SC if $x \leq 2$ in (a) award B1 for solid circle at 2 and B1 for line to left
Total 4 marks						

16	(a)	(i) (ii)	42 angle at centre = 2 x angle at circumference	2	B1 B1	cao
-----------	-----	-------------	---	----------	----------	-----

	(b)	$90 + "42" \text{ or } 180 - 48$	132	2	M1 A1	ft from "42"
						Total 4 marks

17	(a)		2	1	B1	cao
	(b)		-1 2	2	B1 B1	cao accept 1.9
	(c)	f (4)	-14	2	M1 A1	accept -13 to -14 inclusive
	(d)	tangent drawn at (-1,9) $\frac{\text{vertical difference}}{\text{horizontal difference}}$	≈ -9	3	M1 M1 A1	within guidelines of points on tang or chord near (-1,6) dep on second M1
	(e)		2 6	2	B1 B1	cao cao
						Total 10 marks

18		$\frac{4\pi}{3} \times 5^3 - \frac{4\pi}{3} \times 4.6^3$ 523.59... - 407.72...	116	4	M1 B1 B1 A1	for $\frac{4\pi}{3} R^3 - \frac{4\pi}{3} r^3$ R = 5 used correctly r = 4.6 used for 116 or better (115.878...) ft from r if $4 < r < 5$
						Total 4 marks

19	(a)	$\frac{3}{5} \times \frac{5}{6}$	$\frac{1}{2}$	2	M1 A1	
	(b)	$\frac{3}{5} + \frac{2}{5} \times \frac{7}{10}$ or $\frac{3}{5} \times \frac{5}{6} + \frac{2}{5} \times \frac{7}{10} + \frac{3}{5} \times \frac{1}{6}$ or $\frac{1}{2} + \frac{2}{5} \times \frac{7}{10} + \frac{3}{5} \times \frac{1}{6}$ or $1 - \frac{2}{5} \times \frac{3}{10}$	$\frac{44}{50}$ or $\frac{22}{25}$	3	M1 M1 A1	for one correct product or term for complete correct expression SC if no marks in either part M1 for correct tree diagram
						Total 5 marks

20	(a)	(i) (ii) (iii)	5 7 9	3	B1 B1 B1	cao cao ft from $24 - (3 + w + x)$
	(b)	(i) (ii) (iii)	3 15 0	3	B1 B1 B1	cao ft from $w + x + 3$ cao
						Total 6 marks

21	$3x^2 = 2x + 5$ $(3x - 5)(x + 1) = 0$ $x = \frac{5}{3} \text{ and } x = -1$ <p>e.g. $2x \times \frac{5}{3} + 5$ $2x \times -1 + 5$</p> <p>OR</p> $y = 3\left(\frac{y-5}{2}\right)^2$ $(3y - 25)(y - 3) = 0$ $y = \frac{25}{3} \text{ and } y = 3$ <p>e.g. $\frac{25}{3} = 2x + 5$ $3 = 2x + 5$</p>	$x = \frac{5}{3}, y = \frac{25}{3}$ $x = -1, y = 3$ $x = \frac{5}{3}, y = \frac{25}{3}$ $x = -1, y = 3$	6	M1 M1 A1A1 M1 A1 M1 M1 A1 A1 M1 A1	for correct factorisation dep on both method marks for substituting both their x values into one of the original equations for both pairs; dep on first M1 for correct factorisation dep on both method marks for substituting both their x values into one of the original equations for both pairs; dep on first M1
					<p style="text-align: right;">Total 6 marks</p> <p style="text-align: right;">PAPER TOTAL 100 MARKS</p>

Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4400/4H

**London Examinations IGCSE
Mathematics**

Paper 4H

Higher Tier

Monday 7 November 2005 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

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Page Number	Leave Blank
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
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18	
19	
20	
Total	

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.

The paper reference is shown at the top of this page. Check that you have the correct question paper.

Answer **ALL** the questions in the spaces provided in this question paper.

Show all the steps in any calculations.

Information for Candidates

There are 20 pages in this question paper.

The total mark for this paper is 100. The marks for parts of questions are shown in round brackets:

e.g. (2).

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. $A = \{\text{Prime numbers between 10 and 16}\}$
 $B = \{\text{Multiples of 3 between 10 and 16}\}$

(a) List the members of $A \cup B$.

.....
(2)

(b) What is $A \cap B$?

.....
(1)

(c) Is it true that $11 \in B$?

.....

Explain your answer.

.....
.....
(1)

(Total 4 marks)

Q1



2. Two fruit drinks, *Fruto* and *Tropico*, are sold in cartons.

(a) *Fruto* contains only orange and mango.

The ratio of orange to mango is 3 : 2

A carton of *Fruto* contains a total volume of 250 cm³.

Find the volume of orange in a carton of *Fruto*.

..... cm³
(3)

(b) *Tropico* contains only lemon, lime and grapefruit.

The ratios of lemon to lime to grapefruit are 1 : 2 : 5

The volume of grapefruit in a carton of *Tropico* is 200 cm³.

Find the total volume of *Tropico* in a carton.

..... cm³
(3)

(Total 6 marks)

Q2

3. (a) Factorise

$$x^2 - 5x$$

.....
(1)

(b) Multiply out

$$x(2x + 3y)$$

.....
(2)

(c) Expand and simplify

$$(x - 4)(x + 2)$$

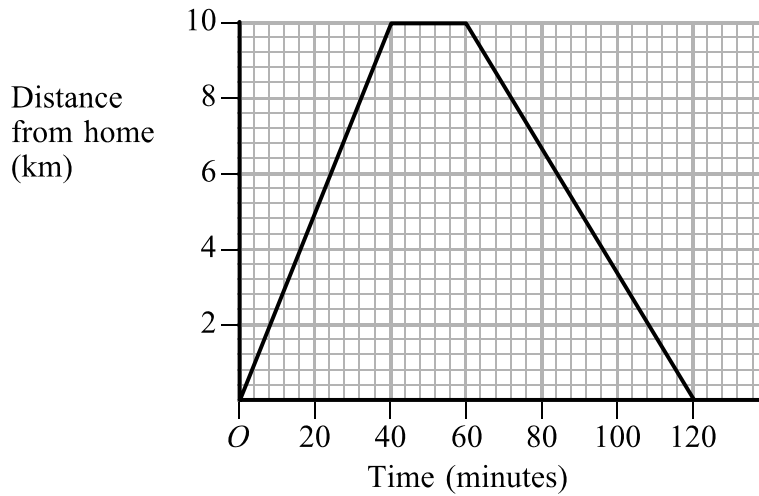
.....
(2)

(Total 5 marks)

Q3



4. Jodi went on a trip by cycle from his home.
The diagram shows his distance/time graph.



- (a) At what times was Jodi 6 km from home?

..... minutes

..... minutes

(2)

- (b) Where was Jodi after 120 minutes?

.....

(1)

- (c) Between what times was Jodi moving fastest?

..... minutes, minutes

(1)

- (d) Calculate Jodi's speed during the first 20 minutes of his trip.
Give your answer in kilometres per hour.

..... km/h

(2)

- (e) At what time had Jodi cycled 14 km?

..... minutes

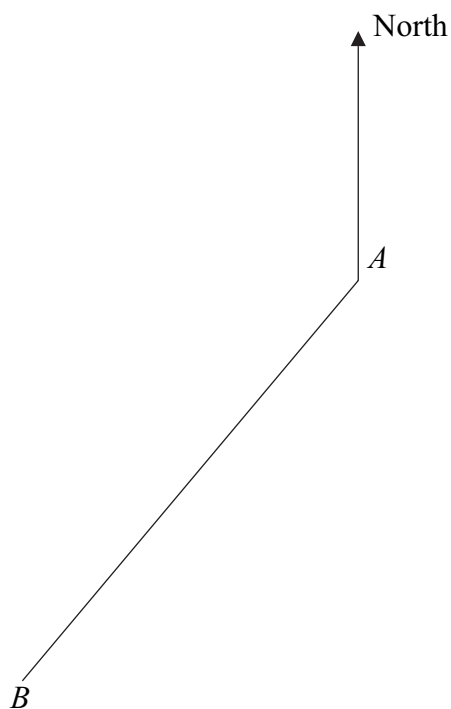
(1)

(Total 7 marks)

Q4



5. The diagram shows two towns, *A* and *B*.



(a) Measure the bearing of *B* from *A*.

.....
 °
 (2)

(b) A plane flies along the perpendicular bisector of the line *AB*.
 Use ruler and compasses to construct the perpendicular bisector of *AB*.
 Show all your construction lines.

(2)

(c) The bearing of another town, *C*, from *A* is 120° .
 Work out the bearing of *A* from *C*.

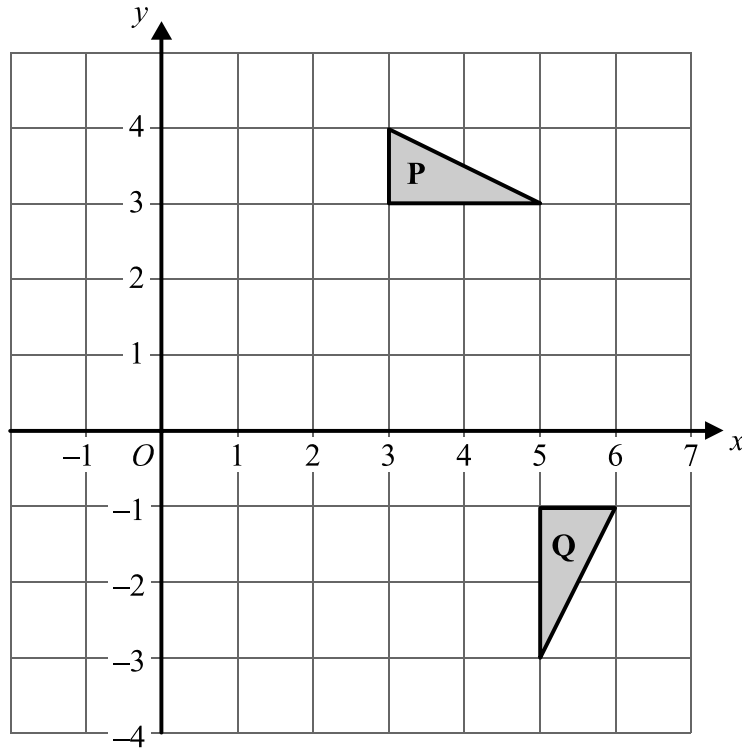
.....
 °
 (1)

(Total 5 marks)

Q5



6.



(a) Describe fully the **single** transformation that maps **P** onto **Q**.

.....

(3)

(b) Another shape, **R**, is enlarged by scale factor 2 to give shape **S**.

Write down whether each of the following statements is a true statement or a false statement.

- (i) The lengths in **R** and **S** are the same.
- (ii) The angles in **R** and **S** are the same.
- (iii) Shapes **R** and **S** are similar.
- (iv) Shapes **R** and **S** are congruent.

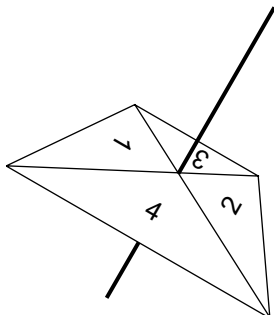
(2)

(Total 5 marks)

Q6



7. Here is a four sided spinner.



Its sides are labelled 1, 2, 3 and 4

The spinner is biased.

The probability that the spinner lands on each of the numbers 1, 2 and 3 is given in the table.

Number	Probability
1	0.25
2	0.25
3	0.1
4	

The spinner is spun once.

(a) Work out the probability that the spinner lands on 4

.....
(2)

(b) Work out the probability that the spinner lands on either 2 or 3

.....
(2)

(Total 4 marks)

Q7



8. The table gives information about the heights of some plants.

Height, h cm	Frequency
$0 < h \leq 5$	4
$5 < h \leq 10$	6
$10 < h \leq 15$	8
$15 < h \leq 20$	2

Calculate an estimate of the mean height.

..... cm

(Total 4 marks)

Q8

9.

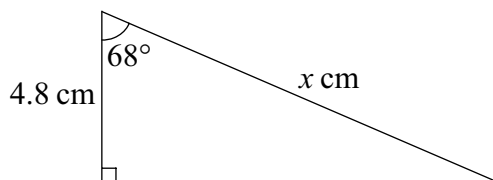


Diagram NOT accurately drawn

Calculate the value of x .

$x =$

(Total 3 marks)

Q9



10. The table shows the populations of five countries.

Country	Population
The Gambia	1.4×10^6
Kenya	3.2×10^7
Mali	1.2×10^7
Nigeria	1.4×10^8
Swaziland	1.2×10^6

(a) Which of these countries has the largest population?

.....
(1)

(b) Calculate the difference between the population of Kenya and the population of Nigeria.
Give your answer in standard form.

.....
(2)

(c) The population of South Africa is 30 times the population of The Gambia.
Calculate the population of South Africa.
Give your answer in standard form.

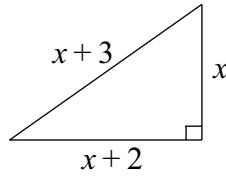
.....
(1)

(Total 4 marks)

Q10



11. A right-angled triangle has sides of length x cm, $(x + 2)$ cm and $(x + 3)$ cm.



(a) Use Pythagoras' theorem to write down an equation in x .

..... (1)

(b) Show that your equation simplifies to $x^2 - 2x - 5 = 0$

(2)

(c) By solving the equation $x^2 - 2x - 5 = 0$, find the length of each side of the triangle. Give your answers correct to one decimal place.

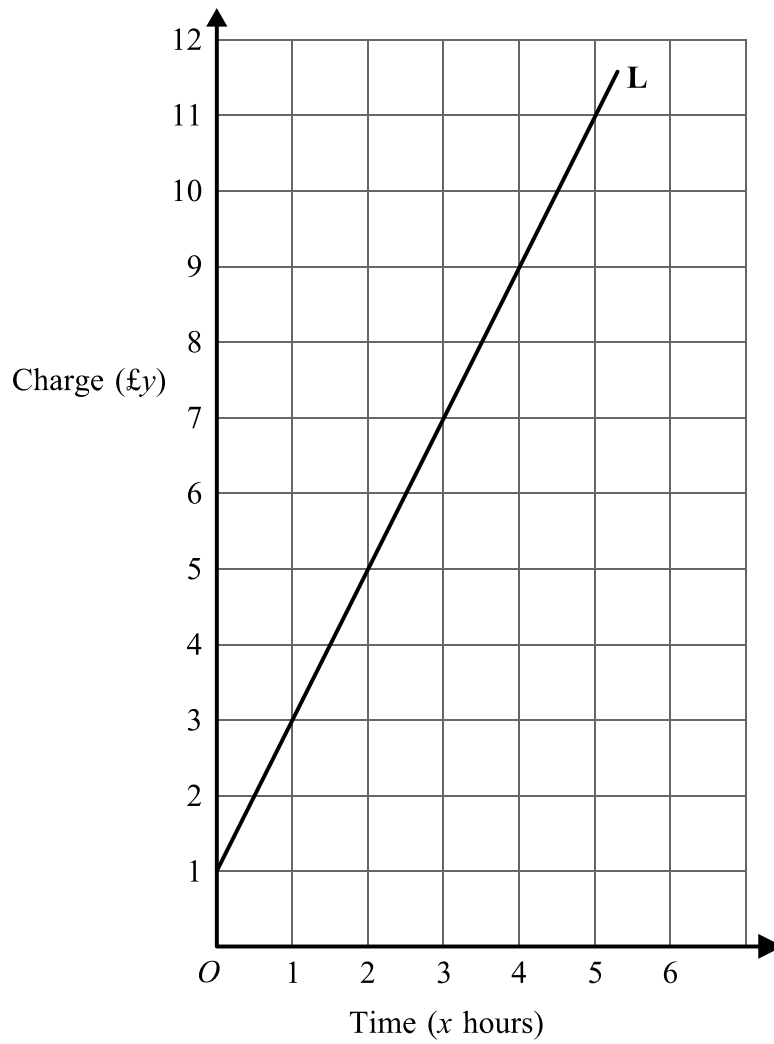
..... cm, cm, cm (3)

(Total 6 marks)

Q11



12. The charge, $\pounds y$, for hiring a bike for x hours can be found from the straight line **L**.



(a) (i) Find the gradient of the line **L**.

.....

(ii) Give an interpretation of your gradient.

.....

(3)



(b) Write down the equation of the line **L**.

.....
(2)

(c) Another bike hire shop charges £3 with an additional charge of £1.50 per hour.
Find the time for which the two shops' charges are equal.

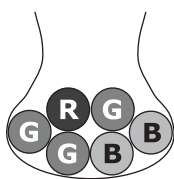
..... hours
(2)

(Total 7 marks)

Q12

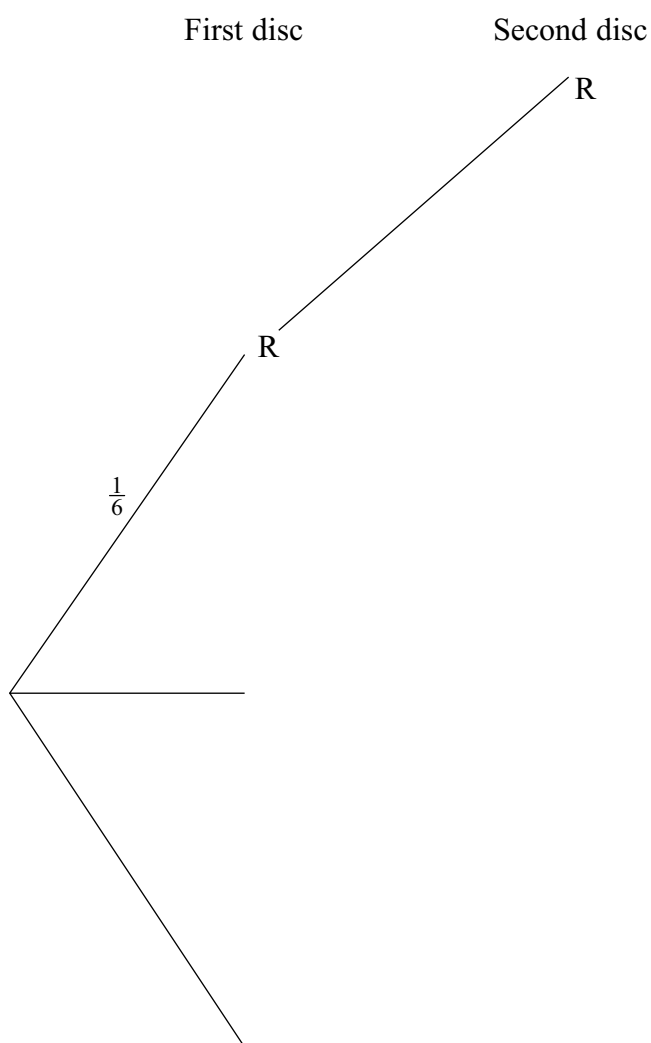


13. A bag contains 1 red disc, 2 blue discs and 3 green discs.



Xanthe chooses a disc at random from the bag. She notes its colour and replaces it. Then Xanthe chooses another disc at random from the bag and notes its colour.

(a) Complete the probability tree diagram showing all the probabilities.



(3)



(b) Calculate the probability that both discs are the same colour.

.....
(3)

(c) Calculate the probability that **neither** disc is red.

.....
(2)

(Total 8 marks)

Q13

14. The volume of oil in a tank is 1000 litres, correct to the nearest 10 litres.
The oil is poured into tins of volume 2.5 litres, correct to one decimal place.

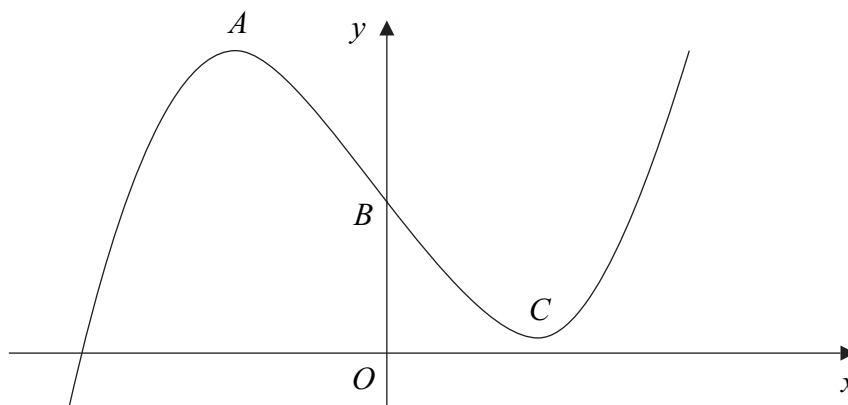
Calculate the upper bound of the number of tins which will be required.

.....
(Total 3 marks)

Q14



15. The diagram shows the graph of $y = x^3 - 12x + 17$
 A is the maximum point on the curve.
 C is the minimum point on the curve.
 The curve crosses the y axis at B .



For the equation $y = x^3 - 12x + 17$

- (a) find $\frac{dy}{dx}$,

.....
(2)

- (b) find the gradient of the curve at B ,

.....
(2)

- (c) find the coordinates of A and C .

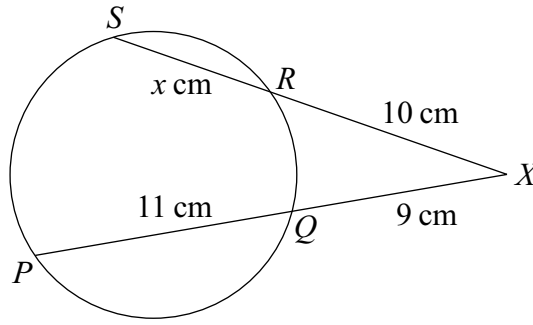
A (..... ,)
 C (..... ,)
(4)

(Total 8 marks)

Q15



16.



The diagram shows a circle, $PQRS$.
 SRX and PQX are straight lines.
 $PQ = 11$ cm. $QX = 9$ cm. $RX = 10$ cm. $SR = x$ cm.

Find the value of x .

$x = \dots\dots\dots$

(Total 3 marks)

Q16



17. Three functions are defined as follows:

$$f: x \mapsto \cos x^\circ \text{ for the domain } 0 \leq x \leq 180$$

$$g: x \mapsto \sin x^\circ \text{ for the domain } 0 \leq x \leq 90$$

$$h: x \mapsto \tan x^\circ \text{ for the domain } p \leq x \leq q$$

(a) Find the range of f.

.....
(2)

(b) Given that the range of h is the same as the range of g, find a value of p and a value of q.

$p = \dots\dots\dots q = \dots\dots\dots$
(3)

(Total 5 marks)

Q17

18. (a) Express $\sqrt{2} + \sqrt{8}$ in the form $a\sqrt{2}$, where a is an integer.

.....
(1)

(b) Express $\left(\frac{1}{\sqrt{2}}\right)^9$ in the form $\frac{\sqrt{b}}{c}$, where b and c are integers.

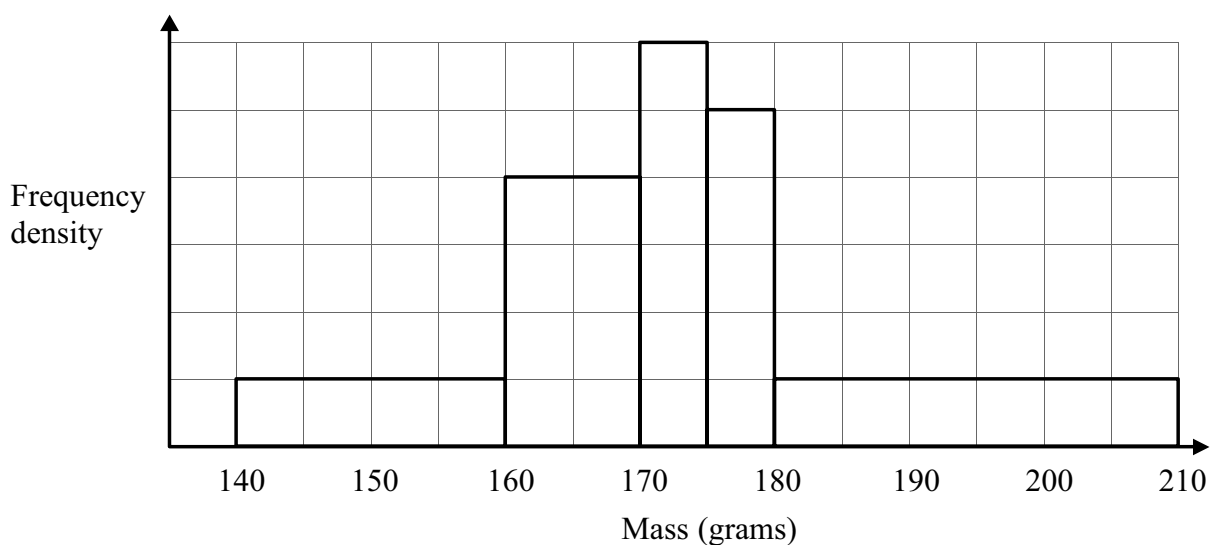
.....
(3)

(Total 4 marks)

Q18



19. The histogram gives information about the masses of some stones.



The number of stones in the 170 g – 175 g class is 24 more than the number of stones in the 140 g – 160 g class.

Calculate the total number of stones.

.....
(Total 3 marks)

Q19

20. A is the point with coordinates $(2, 3)$.

$$\vec{AB} = \begin{pmatrix} 5 \\ -4 \end{pmatrix}.$$

Find the coordinates of B .

(.....,)
(Total 2 marks)

Q20



21.

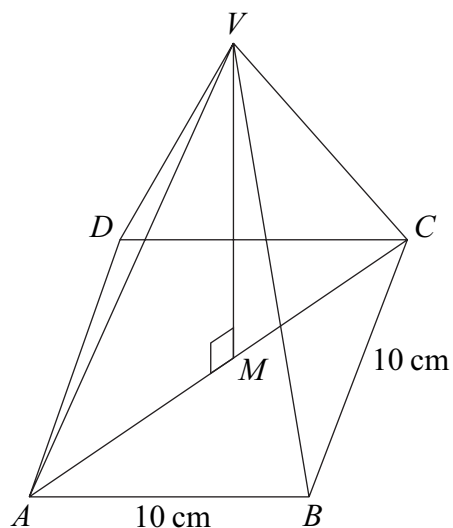


Diagram **NOT** accurately drawn

The diagram shows a pyramid.
 The base, $ABCD$, is a horizontal square of side 10 cm.
 The vertex, V , is vertically above the midpoint, M , of the base.
 $VM = 12$ cm.

Calculate the size of angle VAM .

.....^o
 (Total 4 marks)

Q21

TOTAL FOR PAPER: 100 MARKS

END



IGCSE MATHEMATICS 4400, NOVEMBER 2005 MARK SCHEME

Paper 4H

Q		Working	Answer	Mark		Notes
1	(a)		11, 12, 13, 15	2	B2	one omission B1 one extra prime or mult of 3: B1
	(b)		\emptyset or empty set or nothing or	1	B1	not "0" or "A intersection B"
	(c)		No; 11 isn't a multiple of 3	1	B1	
						Total 4 marks
2	(a)	$250 / 5 \times 3$	150	3	M1 M1 A1	either order
	(b)	$200 / 5 \times 8$	320	3	M1 M1 A1	either order or each x 40, add
						Total 6 marks
3	(a)		$x(x - 5)$	1	B1	
	(b)		$2x^2 + 3xy$	2	B1B1	
	(c)	$x^2 - 4x + 2x - 8$	$x^2 - 2x - 8$	2	M1 A1	3 correct terms or 4 correct terms ignoring signs
						Total 5 marks

4	(a)		$24 \pm 1, 84 \pm 1$	2	B1B1	22 & 82: SC B1
	(b)		home oe	1	B1	not "at destination"
	(c)		0 to 40	1	B1	or range within this
	(d)	5/20 or 5 x 3	14.4 to 15	2	M1 A1	(4.4 to 6) / 20 or other correct
	(e)		84 ± 2	1	B1	ft(a)
						Total 7 marks

5	(a)		220 ± 2	2	B2	B1 for $180 < \text{angle} < 270$
	(b)	four construction arcs seen	line, length $> 4\text{cm}$	2	B1 B1	± 2 mm of correct
	(c)		300	1	B1	
						Total 5 marks

6	(a)		rotation 90° (clockwise) about (2, 0)	3	B1 B1 B1	or 270° anticlockwise any extra transf: B0
	(b)		FTTF	2	B2	B1 for three correct
						Total 5 marks

7	(a)	$1 - (0.25 + 0.25 + 0.1)$	0.4	2	M1 A1	$(1 - 0.51 =) 0.49$: allow M1
	(b)	$0.25 + 0.1$	0.35	2	M1 A1	$(0.25 + 0.1 =) 0.26$: allow M1
						Total 4 marks

8		mid-points attempted Σfx attempted (190) $\div \Sigma f$ (20)	9.5	4	B1 M1 M1 A1	Consistent x in range dep M1
						Total 4 marks

9		$\cos 68 = 4.8/x$ or $4.8 = x \cos 68$ $x = 4.8 / \cos 68$	12.8...	3	M1 M1 A1	
						Total 3 marks

10	(a)		Nigeria	1	B1	
	(b)		1.08×10^8	2	B2	figs 108 : B1
	(c)		4.2×10^7	1	B1	
						Total 4 marks

11	(a)		$x^2 + (x + 2)^2 = (x + 3)^2$	1	B1	oe brackets essential; ISW
	(b)	correctly expand one bracket all terms seen & correct collection		2	B1 B1	allow seen in (a)
	(c)	$x = (2 + \sqrt{(-2)^2 - 4 \times (-5)}) / 2$ oe $x = 3.4$ (or better)	3.4, 5.4, 6.4	3	M1 A1 B1f	ignore other ans, if given ft her 3.4
						Total 6 marks

12	(a)	(i) vertical \div horizontal (ii)	2 hourly charge oe	2 1	M1 A1 B1	
	(b)		$y = 2x + 1$	2	B1B1	B1f: (his 2)x ; B1: +1; -B1 if no 'y ='
	(c)	line through (0,3) grad = 1.5 or	$1 + 2x = 3 + 1.5x$ 4	2	M1 A1	
						Total 7 marks

13	(a)		1/3 & 1/2 oe correct structure all correct	3	B1 B1 B1	correctly placed once just branches including probabilities and labels
	(b)	$(1/6)^2$ or $(1/3)^2$ or $(1/2)^2$ oe add these	7/18 or 0.38(8...) or 0.39 oe	3	M1 M1 A1	
	(c)	$(5/6)^2$	25/36 or 0.69(4...) oe	2	M1 A1	
						Total 8 marks

14		max/min attempted 1005 / 2.45	411	3	M1 M1 A1	410 : sc B2
Total 3 marks						

15	(a)		$3x^2 - 12$	2	B2	B1 each term; -B1 for extra
	(b)	$3 \times 0^2 - 12$	-12	2	M1 A1	
	(c)	(his $3x^2 - 12) = 0$ $(x - 2)(x + 2) = 0$ or $(3x - 6)(x + 2) = 0$ oe $x = 2$ or -2 or $(2, 1)$	A is $(-2, 33)$, C is $(2, 1)$	4	M1 M1 A1 A1	or $x^2 = 4$
Total 8 marks						

16		20 or $(x + 10)$ seen $9 \times 20 = 10(x + 10)$	$x = 8$	3	M1 M1 A1	or $9 \times 20 / 10$ oe
Total 3 marks						

17	(a)		$-1 \leq f(x) \leq 1$	2	B1B1	or -1 to 1 oe
	(b)	range of g : 0 to 1	$p = 0, q = 45$	3	B3	both correct : B3 g : 0 to 1 & one end correct : B2 g : 0 to 1 <u>or</u> one end correct : B1
Total 5 marks						

18	(a)		$3\sqrt{2}$	1	B1	
	(b)	$\frac{1}{16\sqrt{2}}$ or $\frac{\sqrt{2}}{\sqrt{2}} \times \frac{1}{(\sqrt{2})^9}$ $\frac{\sqrt{2}}{\sqrt{2}} \times \frac{1}{16\sqrt{2}}$ or $\frac{\sqrt{2}}{(\sqrt{2})^{10}}$	$\frac{\sqrt{2}}{32}$ or $\frac{\sqrt{512}}{512}$	3	M1 M1 A1	or $\left(\frac{\sqrt{2}}{2}\right)^9$ or $\frac{1}{\sqrt{512}}$ or $\frac{16\sqrt{2}}{512}$ or $\frac{1}{\sqrt{512}} \times \frac{\sqrt{512}}{\sqrt{512}}$
						Total 4 marks
19		sees that 1 square = 12 stones 12 x total no. of squares (29)	348	3	M1 M1 A1	or correct scale shown or correctly uses his scales to find total area
						Total 3 marks
20			(7, -1)	2	B2	B1 each coordinate
						Total 2 marks
21		$5^2 + 5^2$ or $10^2 + 10^2$ $\sqrt{50}$ or $\frac{1}{2} \sqrt{200}$ or 7.07 (...)	59.49(...) or 59.5	4	M1 M1 M1 A1	dep 1 st M1
						Total 4 marks
						PAPER TOTAL 100 MARKS

Answer ALL TWENTY-THREE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. The surface area of the Earth is 510 million km².
The surface area of the Pacific Ocean is 180 million km².

- (a) Express 180 million as a percentage of 510 million.
Give your answer correct to 2 significant figures.

.....%
(2)

The surface area of the Arctic Ocean is 14 million km².
The surface area of the Southern Ocean is 35 million km².

- (b) Find the ratio of the surface area of the Arctic Ocean to the surface area of the Southern Ocean.
Give your ratio in the form 1 : *n*.

1 :
(2)

(Total 4 marks)

Q1

2. Solve $7 - 4x = 10$

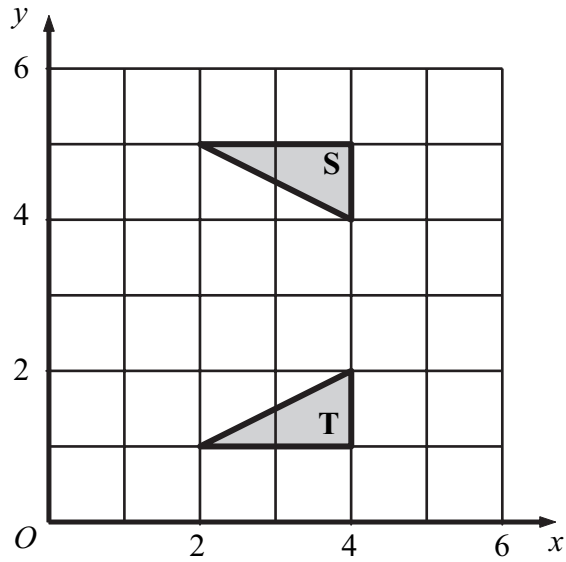
$x =$

(Total 3 marks)

Q2



3.



Describe fully the single transformation that maps triangle **S** onto triangle **T**.

.....

(Total 2 marks)

Q3

4. (a) Work out the value of $y^2 - 4y$ when $y = -3$

.....
(2)

(b) Simplify

(i) $p^3 \times p^5$

.....

(ii) $q^7 \div q$

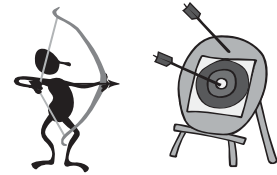
.....
(2)

(Total 4 marks)

Q4



5. Robin fired 15 arrows at a target.
The table shows information about his scores.



Score	Frequency
1	6
2	3
3	1
4	1
5	4

- (a) Find his median score.

.....
(2)

- (b) Work out his mean score.

.....
(3)

(Total 5 marks)

Q5



6. (a) Work out $\frac{2}{15} \times 6$

Give your answer as a fraction in its simplest form.

.....
(2)

(b) Work out $2\frac{2}{3} \div \frac{5}{6}$

Give your answer as a mixed number in its simplest form.

.....
(2)

(Total 4 marks)

Q6

7.

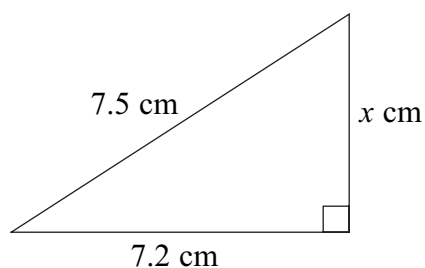


Diagram **NOT** accurately drawn

Work out the value of x .

$x =$

(Total 3 marks)

Q7



8. The perimeter of a triangle is 54 cm.
The lengths of its sides are in the ratios 2 : 3 : 4

Work out the length of the longest side of the triangle.

..... cm

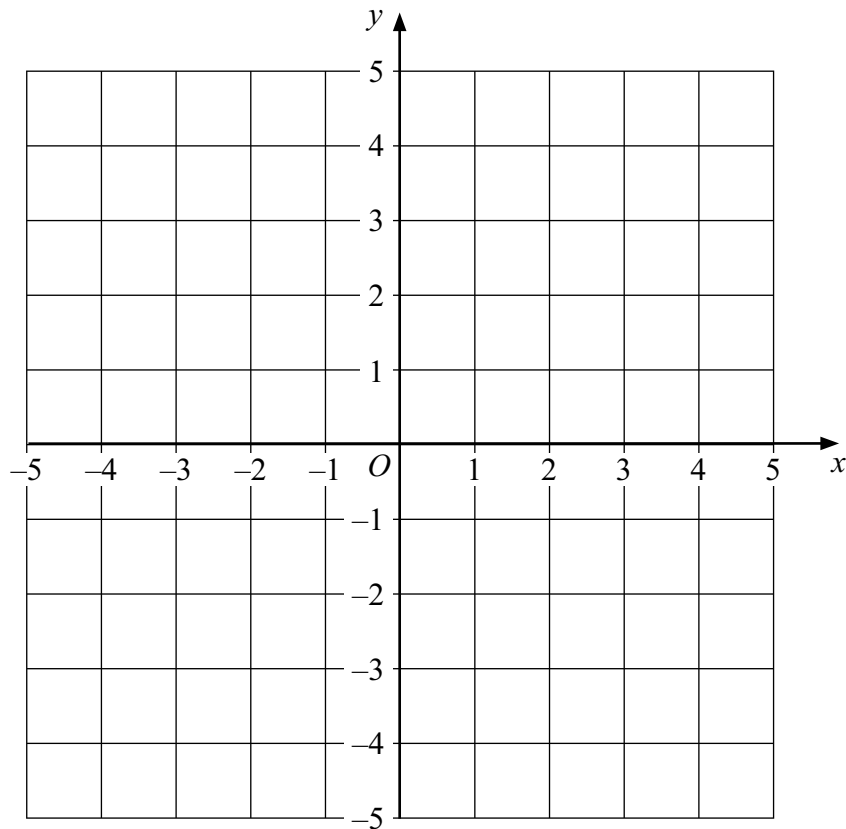
(Total 2 marks)

Q8

9. Show, by shading on the grid, the region which satisfies these inequalities

$$1 \leq x \leq 3 \quad \text{and} \quad -4 \leq y \leq -2$$

Label your region **R**.



(Total 3 marks)

Q9



10.

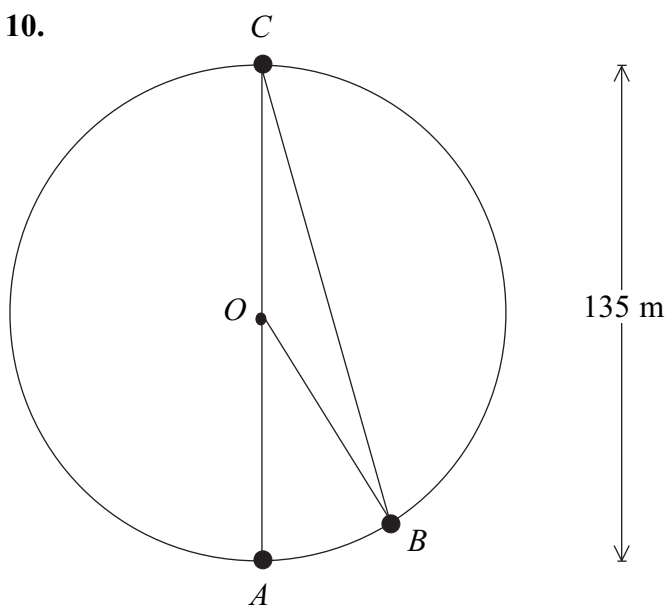


Diagram
NOT
accurately
drawn



The diagram represents part of the London Eye.
 A , B and C are points on a circle, centre O .
 A , B and C represent three capsules.
 The capsules at A and B are next to each other.
 A is at the bottom of the circle and C is at the top.

The London Eye has 32 equally spaced capsules on the circle.

(a) Show that angle $AOB = 11.25^\circ$.

(1)

(b) Find the size of the angle between BC and the horizontal.

.....
 (3)



The capsules move in a circle of diameter 135 m.

- (c) Calculate the distance moved by a capsule in making a complete revolution.
Give your answer correct to 3 significant figures.

..... m
(2)

The capsules move at an average speed of 0.26 m/s.

- (d) Calculate the time taken for a capsule to make a complete revolution.
Give your answer in minutes, correct to the nearest minute.

..... min
(3)

(Total 9 marks)

Q10

11. Write as ordinary numbers

(i) 3.6×10^5

.....

(ii) 2.9×10^{-3}

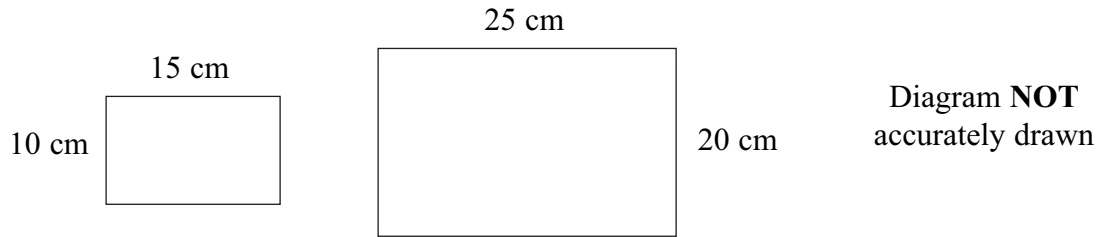
.....

(Total 2 marks)

Q11



12.



Are the two rectangles mathematically similar?
 Tick (✓) the appropriate box.
 You must show working to justify your answer.

Yes

No

Q12

(Total 3 marks)

13. (a) Expand and simplify $(3x - 5)(4x + 7)$

.....
(2)

(b) Simplify $(2p^4)^3$

.....
(2)

(c) Simplify $(64y^6)^{\frac{2}{3}}$

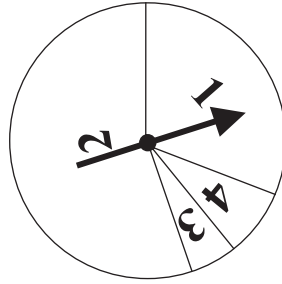
.....
(2)

Q13

(Total 6 marks)



14. Here is a biased spinner.



When the pointer is spun, the score is 1 or 2 or 3 or 4
 The probability that the score is 1 is 0.3
 The probability that the score is 2 is 0.6

Hajra spins the pointer once.

(a) Work out the probability that

(i) the score is 1 or 2

.....

(ii) the score is 3 or 4

.....

(3)

Nassim spins the pointer twice.

(b) Work out the probability that

(i) the score is 1 both times,

.....

(ii) the score is 2 exactly once.

.....

(5)

(Total 8 marks)

Q14



15. $\mathcal{E} = \{1, 2, 3, 4, 5, 6, 7, 8\}$
 $P = \{2, 3, 5, 7\}$

(a) List the members of P'

.....
(1)

The set Q satisfies both the conditions $Q \subset P$ and $n(Q) = 3$

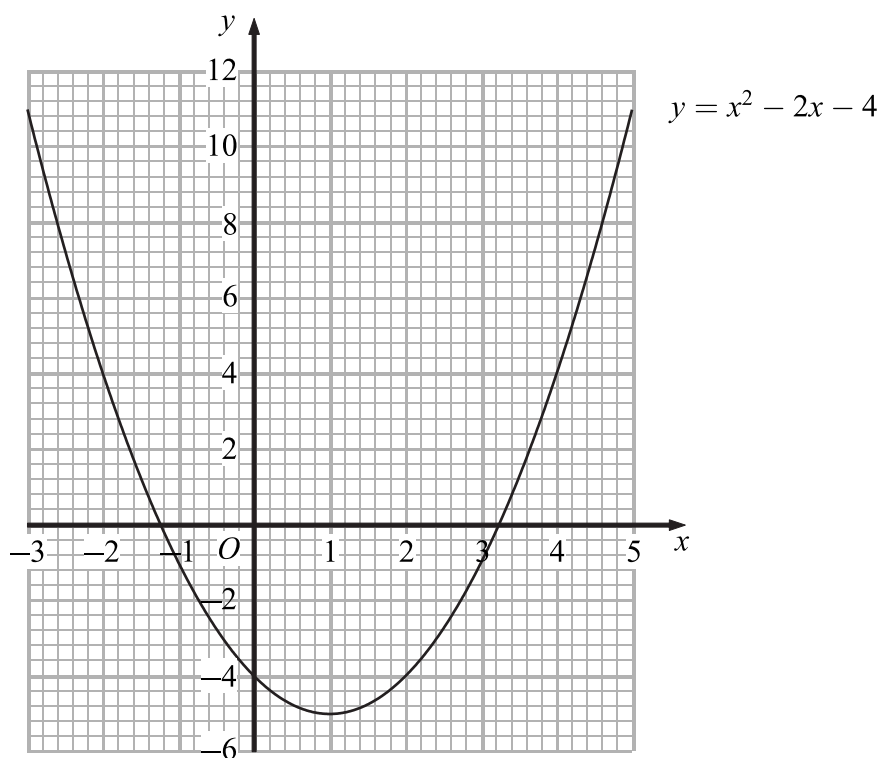
(b) List the members of **one** set Q which satisfies both these conditions.

.....
(2)

(Total 3 marks)

Q15

16. Part of the graph of $y = x^2 - 2x - 4$ is shown on the grid.



(a) Write down the coordinates of the minimum point of the curve.

(..... ,)
(1)

(b) Use the graph to find estimates of the solutions to the equation $x^2 - 2x - 4 = 0$
Give your answers correct to 1 decimal place.

.....
(2)

(c) Draw a suitable straight line on the grid to find estimates of the solutions of the equation $x^2 - 3x - 6 = 0$

.....
(3)

(d) For $y = x^2 - 2x - 4$

(i) find $\frac{dy}{dx}$,

.....

(ii) find the gradient of the curve at the point where $x = 6$

.....
(4)

(Total 10 marks)

Q16

--	--



17. Michael says “When the fraction $\frac{n}{45}$ is converted to a decimal, it never gives a terminating decimal.”

(a) (i) Find a value of n which shows that Michael is wrong.

$n = \dots\dots\dots$

(ii) Write down the name of the type of number n must be, when $\frac{n}{45}$ gives a terminating decimal.

$\dots\dots\dots$
(2)

(b) $\frac{62}{45} < \sqrt{2} < \frac{64}{45}$

Use these bounds to write the value of $\sqrt{2}$ to an appropriate degree of accuracy. You must show your working and explain your answer.

$\dots\dots\dots$
(2)

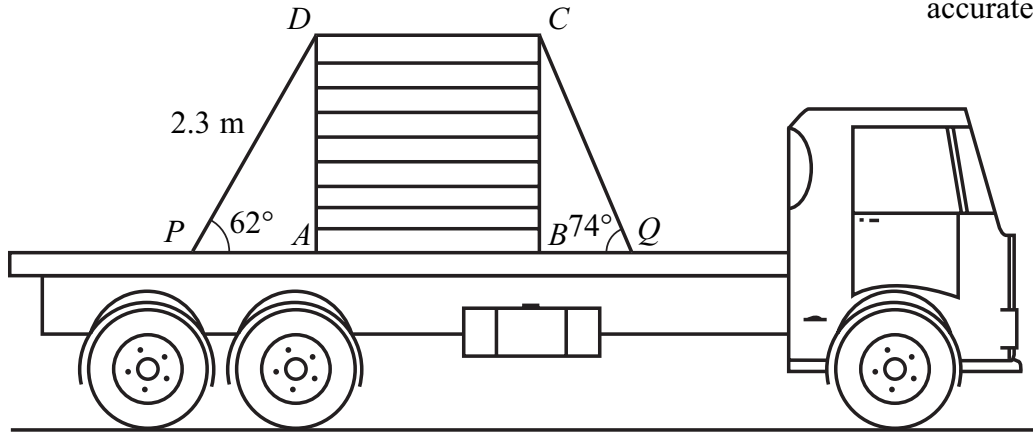
(Total 4 marks)

Q17



18.

Diagram **NOT** accurately drawn



The diagram shows a side view of a rectangular box $ABCD$ on a lorry. The box is held down on the horizontal flat surface of the lorry by a rope. The rope passes over the box and is tied at two points, P and Q , on the flat surface.

$DP = 2.3$ m.

Angle $APD = 62^\circ$.

Angle $BQC = 74^\circ$.

Calculate the length of BQ .

Give your answer correct to 3 significant figures.

..... m

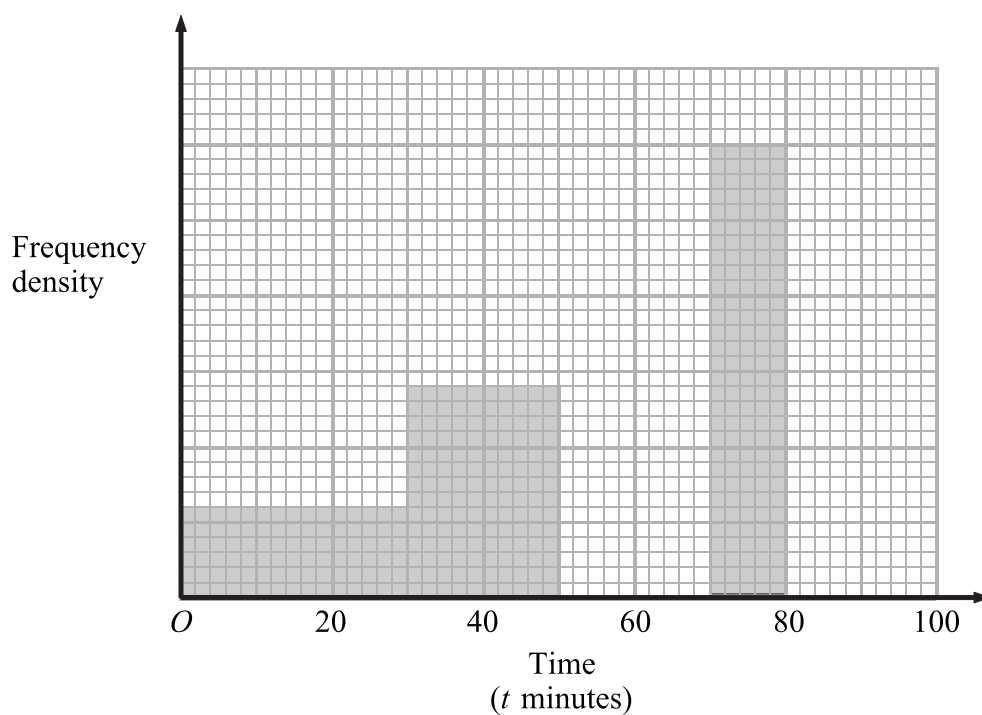
Q18

(Total 5 marks)



19. The unfinished table and histogram give information about the times taken by some students to complete a science test.

Time (t minutes)	Frequency
$0 < t \leq 30$	
$30 < t \leq 50$	70
$50 < t \leq 70$	85
$70 < t \leq 80$	
$80 < t \leq 90$	40



(a) Use the information in the table to complete the histogram. (2)

(b) Use the information in the histogram to complete the table. (2)

(Total 4 marks)

Q19



20. Make R the subject of the formula $A = \pi(R + r)(R - r)$

$R = \dots\dots\dots$

(Total 4 marks)

Q20

21. $(1 + 3\sqrt{5})^2 = p + q\sqrt{5}$ where p and q are integers.
Find the value of p and the value of q .

$p = \dots\dots\dots$

$q = \dots\dots\dots$

(Total 2 marks)

Q21



22.

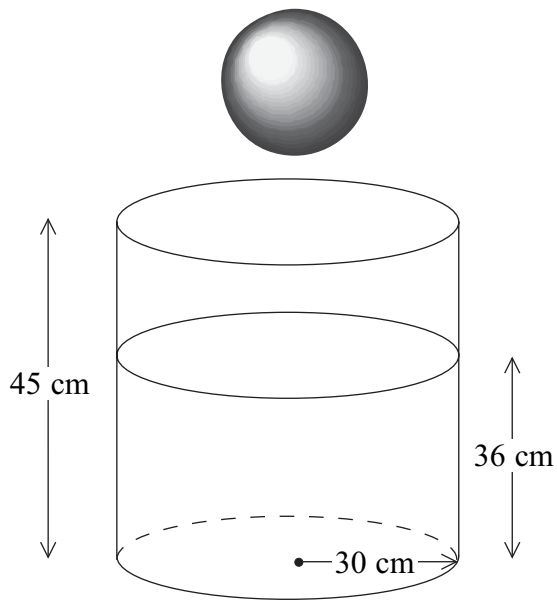


Diagram **NOT** accurately drawn

A cylindrical tank has a radius of 30 cm and a height of 45 cm.
The tank contains water to a depth of 36 cm.

A metal sphere is dropped into the water and is completely covered.
The water level rises by 5 cm.

Calculate the radius of the sphere.

..... cm

(Total 5 marks)

Q22



23.

$$f(x) = x^2$$

$$g(x) = 2x + 3$$

Solve $fg(x) = f(x)$.

.....
Q23

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

END

Edexcel gratefully acknowledges the following source used in the preparation of this paper.

- Photograph of London Eye: www.freefoto.com



4400 IGCSE Mathematics
May 2006
Paper 3H

Q		Working	Answer	Mark		Notes
1.	(a)	$\frac{180}{510} \times 100$	35	2	M1 A1	for $\frac{180}{510}$ or 0.35... for 2 sf or better (35.2941...)
	(b)	$\frac{35}{14}$	2.5	2	M1 A1	for $\frac{35}{14}$ SC Award M1 for 0.4 oe or for 2 : 5 for 2.5 or $2\frac{1}{2}$ or $\frac{5}{2}$
						Total 4 marks
2.		$7 = 4x + 10$ or $-4x = 10 - 7$ $4x = -3$ or $-4x = 3$	$-\frac{3}{4}$ or -0.75	3	M1 M1 A1	may be implied by second M1 Condone $\frac{3}{-4}$
						Total 3 marks
3.			reflection $y = 3$	2	M1 A1	Accept reflect, reflected, reflex etc Accept e.g. 'in dotted line'
						Total 2 marks
4.	(a)	$9 + 12$	21	2	M1 A1	for 9 or + 12 $-9 - 12 = 21$ cao scores M0 A0
	(b)	(i) (ii)	p^8 q^6	2	B1 B1	cao cao
						Total 4 marks

5.	(a)	1,1,1,1,1,1,2,2,2,3,4,5,5,5,5 or $7\frac{1}{2}$ or 8 seen	2	2	M1 A1	cao
	(b)	$1 \times 6 + 2 \times 3 + 3 \times 1 + 4 \times 1 + 5 \times 4$ or $6 + 6 + 3 + 4 + 20$ or 39 “39” $\div 15$	2.6	3	M1 M1 A1	for at least 3 products (need not be evaluated or summed) (dep) for “39” $\div 15$ cao
						Total 5 marks

6.	(a)	$\frac{12}{15}$ or $\frac{2}{5} \times 2$	$\frac{4}{5}$	2	M1 A1	cao Do not accept decimals
	(b)	$\frac{8}{3} \times \frac{6}{5}$	$3\frac{1}{5}$	2	M1 A1	for $\frac{8}{3} \times \frac{6}{5}$ may be implied by $\frac{48}{15}$ or $\frac{16}{5}$ but not by 3.2 cao Do not accept decimals
						Total 4 marks

7.		$7.5^2 - 7.2^2$ or 4.41 $\sqrt{7.5^2 - 7.2^2}$	2.1	3	M1 M1 A1	for squaring and subtracting (dep) for square root cao
						Total 3 marks

8.		$2 + 3 + 4$ or 9 seen	24	2	M1 A1	for $2 + 3 + 4$ or 9 seen or for 6 seen Accept 12 : 18 : 24
						Total 2 marks

9.			R shown	3	B3	B3 for correct R shaded in or out Condone omission of label B2 for single shaded shape with 3 correct boundaries or for parts of both regions unambiguously shown or for 3 or 4 correct lines + 0 incorrect B1 for single shaded shape with 2 correct boundaries or for square parts of both regions ambiguously shown or for 2, 3 or 4 correct lines + one or more incorrect SC B1 for region bounded by $1 \leq y \leq 3$ and $-4 \leq x \leq -2$
						Total 3 marks

10.	(a)		$360 \div 32$ or $32 \times 11.25 = 360$	1	B1	Accept also $\frac{180}{16}$ and $\frac{360}{11.25} = 32$ NB answer 11.25 is given
	(b)	$\frac{11.25}{2}$ or $180 - 11.25 = 168.75$ and $\frac{180 - 168.75}{2}$	5.625 84.375 or 95.625	3	M1 A1 A1	may be stated or shown on diagram 5.625 seen scores M1 A1 Accept 84.4, 84.38, 84.37, 95.6, 95.62, 95.62
	(c)	$\pi \times 135$	424	2	M1 A1	Accept any value rounding to 424
	(d)	"424" \div 0.26 or 1630 "1630" \div 60	27	3	M1 M1 A1	for division for 0.26 (dep on first M1) for division by 60 for 27, 27.2 or answer truncating to 27.1 ft from answer to (c)
						Total 9 marks

11.	(i) (ii)	360 000 0.0029	2	B1 B1	cao Accept $\frac{29}{10000}$
					Total 2 marks

12.	eg $\frac{25}{15} = 1.67$ and $\frac{20}{10} = 2$ $\frac{15}{10} = 1.5$ and $\frac{25}{20} = 1.25$	"No" indicated	3	M1 M1 A1	e.g. for $\frac{25}{15}$ for $\frac{20}{10}$, consistent pairing dep on both M marks, inc. evaluation or simplest forms of ratios
					Total 3 marks

13.	(a)	$12x^2 + 21x - 20x - 35$	2	M1 A1	for 4 correct terms ignoring signs or 3 correct terms with correct signs Accept $12x^2 + 1x - 35$	
	(b)	$8p^{12}$	2	B1 B1	for 8 for p^{12}	B2 for $8 \times p^{12}$ B1 for $8 \pm p^{12}$
	(c)	$16y^4$	2	B1 B1	for 16 for y^4	B2 for $16 \times y^4$ B1 for $16 \pm y^4$
					Total 6 marks	

14.	(a)	(i) $0.3 + 0.6$	0.9	3	M1	ft 1 – “0.9”		
		(ii)	0.1		A1			
	(b)	0.3×0.3	0.09	5	M1	dep on previous M1 ft from “0.1”	The assumption that $P(3) = P(4) = 0.5$ makes the method incorrect and 0.48 cannot gain full marks but $0.6 \times 0.3 \times 2$ still scores M1.	
		0.6×0.4 or $0.6 \times 0.3 + 0.6 \times 0.1$ or 0.24 or $0.6 \times 0.3 \times 2$ or 0.36 or $0.6 \times 0.1 \times 2$ or 0.12 “0.24” $\times 2$ oe	0.48		A1			
		or $1 - (0.6 \times 0.6 + 0.4 \times 0.4)$ or $1 - (0.36 + 0.16)$	0.48		M2			
					A1			
							Total 8 marks	

15.	(a)		1, 4, 6, 8	1	B1	cao
	(b)		2,3,5 or 2,3,7 or 2,5,7 or 3,5,7	2	B2	B1 if one condition satisfied but do not award B1 for 2,3,5,7
						Total 3 marks

16.	(a)		1, -5	1	B1	Allow ± 0.1 for y-coordinate
	(b)	Points of intersection of curve and x-axis indicated	3.2 -1.2	2	M1 A1	May be implied by one correct solution for both values seen Allow ± 0.1 Condone coordinates Allow solutions to $> 1\text{dp}$ unless there is clear evidence that the formula has been used
	(c)	$x^2 - 2x - 4 = x + 2$ or $y = x + 2$ seen line $y = x + 2$ drawn	4.4 -1.4	3	M1 M1 A1	may be implied by 2nd M1 Allow ± 0.1 Do not accept coordinates
	(d)	$2 \times 6 - 2$ (or 10 seen)	$2x - 2$ 10	4	B2 M1 A1	B1 each term (-B1 each extra term) may be awarded if at least B1 above cao
						Total 10 marks

17.	(a)	(i)	e.g. 9	2	B1	Accept any multiple of 9 inc 45, 90, ... Must be positive whole number
		(ii)	multiple of 9		B1	Accept 'in 9 times table' oe
	(b)	1.3777... and 1.4222...	1.4 and agree to 2 sf or 1 dp oe	2	M1 A1	for converting to decimals with at least 2 dp rounded or truncated 1.4 and correct explanation needed
						Total 4 marks

18.	$2.3 \sin 62^\circ$ $2.030\dots$ $\tan 74^\circ = \frac{2.030}{BQ}$ <p>or</p> $\tan 16^\circ = \frac{BQ}{2.030}$ $BQ = \frac{2.030}{\tan 74^\circ}$ <p>or</p> $BQ = 2.030 \tan 16^\circ$	0.582	5	M1 A1 M1 M1 A1	At least 3 sf May be implied by correct final answer for 0.582 or better (0.582316...) Award full marks for 0.58 if all preceding M marks scored ft from "2.030" (ft from $AD = 2 \rightarrow 0.5734\dots$)
Total 5 marks					

19.	(a)		45 75	2	B2	B1 for each
	(b)		bar 17sq high, 10 sq wide bar 16 sq high, 5 sq wide	2	B2	B1 for each NB $80 < t \leq 90$
						Total 4 marks

20.		$A = \pi(R^2 - r^2)$ or $\frac{A}{\pi} = (R + r)(R - r)$ $A = \pi R^2 - \pi r^2$ or $\frac{A}{\pi} = R^2 - r^2$ $R^2 = \frac{A + \pi r^2}{\pi}$ or $R^2 = \frac{A}{\pi} + r^2$		4	M1	for $R^2 - r^2$ seen or division by π
					M1	for $A = \pi R^2 - \pi r^2$ or $\frac{A}{\pi} = R^2 - r^2$
					M1	for $R^2 = \frac{A + \pi r^2}{\pi}$ or $R^2 = \frac{A}{\pi} + r^2$
			$\sqrt{\frac{A + \pi r^2}{\pi}}$ or $\sqrt{\frac{A}{\pi} + r^2}$ oe		A1	Condone omission of \pm Do not award if followed by further incorrect 'simplifying'
						Total 4 marks

21.			46 6	2	B1 B1	Condone $6\sqrt{5}$
						Award B1 + B1 for $46 + 6\sqrt{5}$ seen and isw
						Total 2 marks

22.	$\pi \times 30^2 \times 5$ or $\pi \times 30^2 \times 41 - \pi \times 30^2 \times 36$ or 14123 - 14151 " $\pi \times 30^2 \times 5$ " = $\frac{4}{3}\pi r^3$ $r^3 = \frac{3 \times \pi \times 30^2 \times 5}{4\pi}$ or $\frac{15 \times 30^2}{4}$ $\sqrt[3]{\frac{3 \times \pi \times 30^2 \times 5}{4\pi}}$ oe	15	5	M1	
				M1	dep on previous M1
				M1	dep on previous M1
				M1	dep on previous M1
				A1	for 15 or for answer rounding to 15.0
					Total 5 marks

23.	$(2x + 3)^2 = x^2$ $4x^2 + 12x + 9 = x^2$ or $4x^2 + 6x + 6x + 9 = x^2$ $3x^2 + 12x + 9 = 0$ $(x + 1)(x + 3)$ OR $(2x + 3)^2 = x^2$ $2x + 3 = \pm x$ $x + 3 = 0$ or $3x + 3 = 0$	-1 -3	5	M1	for $(2x + 3)^2$ seen
				M1	
				M1	
				M1	Accept $(3x + 3)(x + 3)$ & $(3x + 9)(x + 1)$ or $\frac{-12 \pm 6}{6}$ or $\frac{-4 \pm 2}{2}$
				A1	for both solutions isw Condone coordinates
			5	M1	
				M2	(M1 for $2x + 3 = x$)
				M1	for both
				A1	for both solutions isw Condone coordinates
					Total 5 marks
					PAPER TOTAL 100 MARKS

Answer ALL EIGHTEEN questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. In the diagram, ABC and ADE are straight lines.
 CE and BD are parallel.
 $AB = AD$.
 Angle $BAD = 38^\circ$.

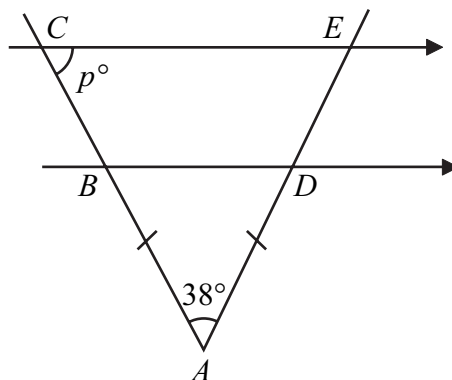


Diagram NOT accurately drawn

Work out the value of p .

Give a reason for each step in your working.

Q1

(Total 4 marks)



2. (a) Factorise $3x^2 - 2x$

.....
(1)

(b) Expand $y^3(y - 4)$

.....
(2)

(c) Here is a formula used in physics.

$$v = u + at$$

Find the value of t when $v = 30$, $u = 5$ and $a = 10$

$t =$
(2)

(Total 5 marks)

Q2

3. Arul had x sweets.
Nikos had four times as many sweets as Arul.

(a) Write down an expression, in terms of x , for the number of sweets Nikos had.

.....
(1)

Nikos gave 6 of his sweets to Arul.
Now they both have the same number of sweets.

(b) Use this information to form an equation in x .

.....
(2)

(c) Solve your equation to find the number of sweets that Arul had at the start.

.....
(2)

(Total 5 marks)

Q3



4. (a) The diagram shows triangle PQR .
 $PQ = 4$ cm.
 $PR = 8$ cm.
 Angle $PQR = 90^\circ$.

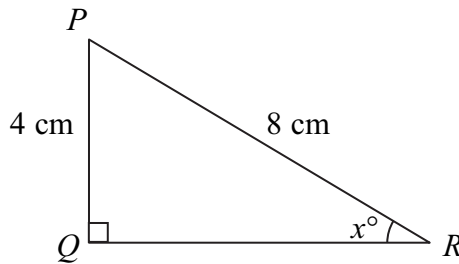


Diagram **NOT** accurately drawn

Calculate the value of x .

$x = \dots\dots\dots$
(3)

- (b) The diagram shows triangle LMN .
 $MN = 12$ cm.
 Angle $LMN = 32^\circ$.
 Angle $MLN = 90^\circ$.

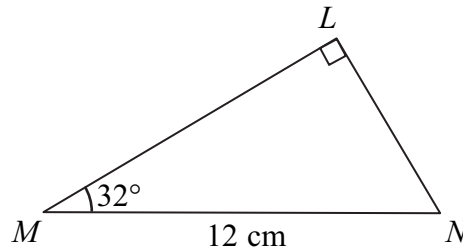


Diagram **NOT** accurately drawn

Calculate the length of ML .
 Give your answer correct to 3 significant figures.

$\dots\dots\dots$ cm
(3)

(Total 6 marks)

Q4



5. (a) $A = \{\text{Quadrilaterals with two pairs of parallel sides}\}$
 $B = \{\text{Quadrilaterals with at least one right angle}\}$

Write down the mathematical name for the quadrilaterals in

(i) A ,

(ii) $A \cap B$

(2)

- (b) The universal set $\mathcal{U} = \{\text{Positive whole numbers}\}$
 $P = \{\text{Multiples of 3 less than 11}\}$
 $Q = \{\text{Multiples of 5 less than 11}\}$

(i) What is $P \cap Q$?

(ii) Is it true that $10 \in P \cup Q$?

Explain your answer.

.....

(2)

(Total 4 marks)

Q5

6.

<u>Symbols</u>					
+	-	×	÷	()

Using only symbols from the box, make the following into true statements.

(a) $2 \quad 3 \quad 4 \quad = \quad 14$ (1)

(b) $2 \quad 3 \quad 4 \quad = \quad 1.25$ (1)

(c) $2 \quad 3 \quad 4 \quad = \quad 2\frac{2}{3}$ (1)

(Total 3 marks)

Q6



7. (a) Four numbers have a mean of 6
 Three of the numbers are 3, 7 and 10
 Find the other number.

.....
 (2)

- (b) Three numbers have a mode of 5 and a mean of 6
 Find the three numbers.

.....
 (2)

- (c) Find four numbers which have a mode of 7 and a median of 6

.....
 (2)

(Total 6 marks)

Q7

8. (a) Solve $3(x + 4) = 27$

$x =$
 (3)

- (b) Solve $y^2 - 2y - 120 = 0$

$y =$
 (3)

(Total 6 marks)

Q8



9. (a) A farmer arranges 90 m of fencing in the form of an isosceles triangle, with two sides of length 35 m and one side of length 20 m.

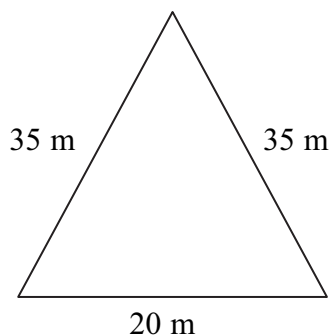


Diagram **NOT** accurately drawn

Calculate the area enclosed by the fencing.
Give your answer correct to 3 significant figures.

..... m²
(4)

- (b) Later, the farmer moves the fencing so that it forms a different triangle, *ABC*.

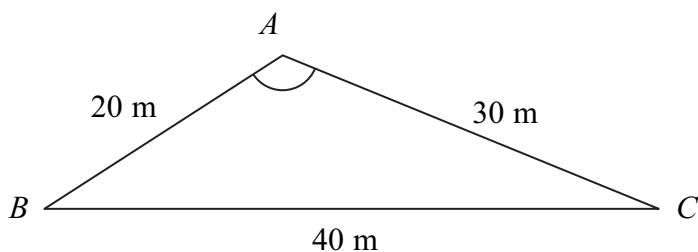


Diagram **NOT** accurately drawn

$AB = 20 \text{ m}$ $BC = 40 \text{ m}$ $CA = 30 \text{ m}$

Calculate the size of angle *BAC*.
Give your answer correct to 1 decimal place.

..... °
(3)

(Total 7 marks)

Q9



10. A mobile phone company makes a special offer.
Usually one minute of call time costs 5 cents.
For the special offer, this call time is increased by 20%.

- (a) Calculate the call time which costs 5 cents during the special offer.
Give your answer in seconds.

..... seconds
(2)

- (b) Calculate the cost per minute for the special offer.

..... cents
(2)

- (c) Calculate the percentage decrease in the cost per minute for the special offer.

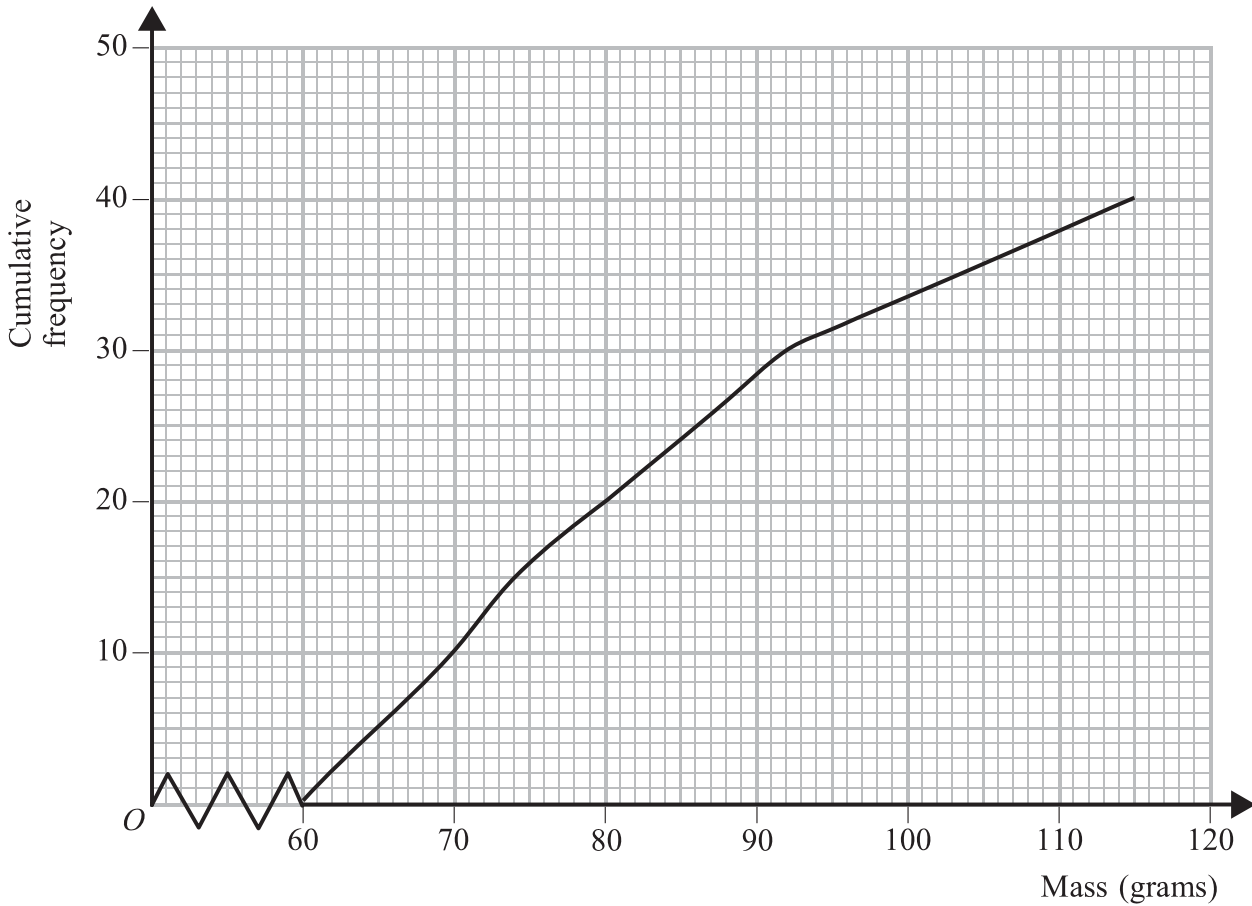
.....%
(3)

(Total 7 marks)

Q10



11. A sample of 40 stones was collected.
The cumulative frequency graph gives information about their masses.



(a) Find an estimate of the median mass.

..... g
(1)

(b) Find an estimate of the interquartile range of the masses.

..... g
(2)

(c) How many stones had masses between the lower quartile and the upper quartile?

.....
(1)

(d) Find an estimate of the number of stones which had masses of more than 100 grams.

.....
(2)

(Total 6 marks)

Q11



12. (a) Factorise completely $10x^2 - 2x$

.....
(2)

(b) Factorise $x^2 - 9$

.....
(1)

(c) Factorise $3x^2 - 13x + 4$

.....
(2)

(Total 5 marks)

Q12

13. (a) Express $8^{\frac{1}{2}}$ as a power of 2

.....
(2)

(b) Express $\sqrt{3}$ as a power of 9

.....
(2)

(c) Express $\frac{1}{4\sqrt{2}}$ as a power of 2

.....
(3)

(Total 7 marks)

Q13



14. $OABC$ is a parallelogram.

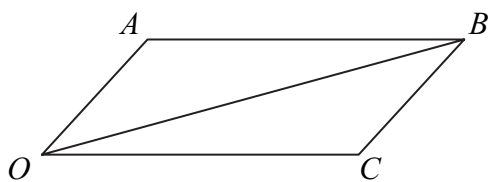


Diagram **NOT** accurately drawn

$$\vec{OA} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}, \quad \vec{OC} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}.$$

(a) Find the vector \vec{OB} as a column vector.

$\begin{pmatrix} \\ \end{pmatrix}$

(1)

X is the point on OB such that $OX = kOB$, where $0 < k < 1$

(b) Find, in terms of k , the vectors

(i) \vec{OX} ,

.....

(ii) \vec{AX} ,

.....

(iii) \vec{XC} .

.....

(3)

(c) Find the value of k for which $\vec{AX} = \vec{XC}$.

.....

(2)

(d) Use your answer to part (c) to show that the diagonals of the parallelogram $OABC$ bisect one another.

.....

.....

.....

(2)

(Total 8 marks)

Q14



15. A ball is dropped from a tower.
After t seconds, the ball has fallen a distance x metres.

x is directly proportional to t^2 .

When $t = 2$, $x = 19.6$

(a) Find an equation connecting x and t .

.....
(3)

(b) Find the value of x when $t = 3$

$x =$
(2)

(c) Find how long the ball takes to fall 10 m.

..... seconds
(3)

(Total 8 marks)

Q15



16. The sides of a fair six-sided dice are numbered from 1 to 6
The dice is thrown three times.
Find the probability that it shows a 1 at least twice.

Q16

.....
(Total 4 marks)

17. Solve the equations

$$y = 2x + 1$$
$$x^2 + y^2 = 13$$

Q17

.....
(Total 6 marks)



18. A particle moves along a line.

For $t \geq 1$, the distance of the particle from O at time t seconds is x metres, where

$$x = \frac{20}{t}$$

Find an expression for the acceleration of the particle.

..... m/s²

(Total 3 marks)

Q18

TOTAL FOR PAPER: 100 MARKS

END



4400 IGCSE Mathematics
May 2006
Paper 4H

1.		$\frac{1}{2}(180 - 38)$	71 seen Isosceles Corresponding	4	M1 A1 B1 B1	Allow on diag or <s on st line & interior <s. Not "F" or vert opp <s & alt <s	Total 4 marks
2.	(a)		$x(3x - 2)$	1	B1		
	(b)		$y^4 - 4y^3$	2	B1B1	Incorr subs wking: - B1. Corr fact'n ISW	
	(c)	$30 = 5 + 10t$	$t = 2.5$	2	M1 A1	or $(30 - 5)/10$	Total 5 marks
3.	(a)	$4x$		1	B1	or $4 \times x$ or $x4$. Ignore "y = ", not "x="	
	(b)	$4x - 6$ or $x + 6$	$4x - 6 = x + 6$	2	M1 A1		
	(c)	$3x - 6 = 6$ or $4x = x + 12$	4	2	M1 A1	correctly collect either xs or consts ft (b) (if ≥ 3 terms, lin = lin): M1 only cao Allow $x = 4$	Total 5 marks
4.	(a)	$4/8$ or 0.5 oe $\sin x^\circ = 4/8$ oe	30	3	M1 M1 A1		
	(b)	$\cos 32^\circ = ML/12$ $12 \times \cos 32^\circ$	$10(.17..)$ or 10.2	3	M1 M1 A1	May be implied or $12^2 - (12\sin 32^\circ)^2$ or $\sqrt{12^2 - (12\sin 32^\circ)^2}$ Allow 10 with working	Total 6 marks

5.	(a)	(i) (ii)	Parallelograms Rectangles	1 1	B1 B1	Allow "Squares & rectangles"
	(b)	(i) (ii)	\emptyset or $\{\}$ or empty oe Yes. $10 \in Q$ or 10 is mult of 5 or 3, 5, 6, 9, 10 listed	1 1	B1 B1	Allow "Intersection of P & Q" oe
						Total 4 marks

6.	(a)		$2 + 3 \times 4$ or $2 \times (3 + 4)$	1	B1	or $2 + (3 \times 4)$ or $2(3 + 4)$
	(b)		$(2 + 3) \div 4$ or $2 - 3 \div 4$	1	B1	or $2 - (3 \div 4)$
	(c)		$2 \div 3 \times 4$ or $2 \div (3 \div 4)$	1	B1	or $(2 \div 3) \times 4$
						Total 3 marks

7.	(a)	$4 \times 6 - (3 + 7 + 10)$	4	2	M1 A1	or $3 + 7 + 10 + x = 4 \times 6$ embedded: M1A0
	(b)		5, 5, 8	2	B2	B1: 3 nos with mode 5 or mean 6 or 5, 5, x: B1
	(c)		7, 7, 5, (any no < 5)	2	B2	B1: 4 nos with mode 7 OR median 6
						Total 6 marks

8.	(a)	$3x + 12 = 27$ $3x = 15$	5	3	M1 A1 A1	$x + 4 = 9$: M1A1
	(b)	$\frac{(y - 12)(y + 10)}{2}$ or $\frac{2 \pm \sqrt{(-2)^2 - 4x(-120)}}{2}$	$y = 12$ or -10	3	M1 A1A1	allow $(y \pm 12)(y \pm 10)$ correct subst'n NB corr ans from inc wking: A0A0 T & I: 3mks or 0 mks
						Total 6 marks

9.	(a)	$35^2 - 10^2$ 33 to 34 $\frac{1}{2} \times 20 \times \text{“ht”}$	335	4	M1 A1 M1 A1	$20^2 = 35^2 + 35^2 - 2 \times 35 \times 35 \times \cos A$ or $\sin x = 10/35$ 33(.2) $\frac{1}{2} \times 35^2 \times \sin \text{“33.2”}$	$35^2 = 35^2 + 20^2 - 2 \times 35 \times 20 \times \cos B$ or $\cos B = 10/35$ 73(.4) $\frac{1}{2} \times 35 \times 20 \times \sin \text{“73.4”}$
	(b)	$40^2 = 20^2 + 30^2 - 2 \times 20 \times 30 \cos x$ $\cos x = \frac{20^2 + 30^2 - 40^2}{2 \times 20 \times 30} (= -0.25)$	104 to 105	3	M1 M1 A1	May be implied or $\cos x = \frac{-300}{1200}$ oe Scale drawing: M0A0	
							Total 7 marks

10.	(a)	60 x 20/100 or 12 sec or 1.2 min seen	72		2	M1 A1	
	(b)	5 / 72 x 60 or 5 / 1.2	4.16 to 4.17		2	M1 A1f	or 5/6 x 5 or 4 or 4.2 with wking (eg 5:72 = x:60) ft only if wking NB!!! 80% of 5 = 4
	(c)	“4.167”/5 x 100 5 - “4.167” 100 - “83.3...” “0.833..”/5 x 100	16.6% to 17%		3	M1 M1 A1	ft M mks only if wking cao
							Total 7 marks

11.	(a)		80 to 81 incl		1	B1	Consistent use of total = 50 in (abc): (a) B0
	(b)	Read graph at 70(±1) & 92 - 94 eg marks on curve or x-axis	21 - 24		2	M1 A1	(b) Read at 72(±1) & 109-111: M1A0
	(c)		20 cao		1	B1	(c) 25 cao: B1
	(d)	Read graph at 100 (±1)	6 or 7		1	M1 A1	eg 34(±1) seen
							Total 6 marks

12.	(a)		$2x(5x - 1)$	2	B2	B1 for $2(5x^2 - x)$ or $x(10x - 2)$
	(b)		$(x - 3)(x + 3)$	1	B1	
	(c)		$(3x - 1)(x - 4)$	2	B2	B1 for $(3x \pm 1)(x \pm 4)$ ISW
						Total 5 marks

13.	(a)	2^3 seen	$2^{3/2}$ or $2^{1.5}$ or $2^{1\frac{1}{2}}$	2	M1 A1	
	(b)	$9^{1/2}$ seen	$9^{1/4}$ or $9^{0.25}$	2	M1 A1	
	(c)	$\frac{1}{2^2 \times 2^{1/2}}$ $\frac{1}{\sqrt{32}}$ $\frac{\sqrt{2}}{8}$ $\frac{1}{2^{5/2}}$ $\frac{1}{\sqrt{2^5}}$ $\frac{2^{0.5}}{2^3}$	$2^{-5/2}$ or etc	3	M1 M1 A1	or $2^{-2} \times 2^{-1/2}$: M2
						Total 7marks

14.	(a)		$\begin{pmatrix} 5 \\ 2 \end{pmatrix}$	1	B1	Ignore fraction lines thro' out
	(b)	(i)	$k \begin{pmatrix} 5 \\ 2 \end{pmatrix}$ oe	1	B1f	or $k\overrightarrow{OB}$ oe
		(ii)	$-\begin{pmatrix} 1 \\ 2 \end{pmatrix} + k \begin{pmatrix} 5 \\ 2 \end{pmatrix}$ oe	1	B1f	or $-\overrightarrow{OA} + k\overrightarrow{OB}$ oe
		(iii)	$\begin{pmatrix} 4 \\ 0 \end{pmatrix} - k \begin{pmatrix} 5 \\ 2 \end{pmatrix}$ oe	1	B1f	or $-\overrightarrow{kOB} + \overrightarrow{OC}$ oe
	(c)	$-\begin{pmatrix} 1 \\ 2 \end{pmatrix} + k \begin{pmatrix} 5 \\ 2 \end{pmatrix} = \begin{pmatrix} 4 \\ 0 \end{pmatrix} - k \begin{pmatrix} 5 \\ 2 \end{pmatrix}$ oe	$k = \frac{1}{2}$	2	M1 A1	or $-1 + 5k = 4 - 5k$ ft(b) for M1 only or $-2 + 2k = -2k$ No wking, $k = 0.5$: M1A1
	(d)		$k = \frac{1}{2} \Rightarrow X$ is midpt of OB		B1	No marks unless (c) 2 mks " $k = \frac{1}{2} \Rightarrow X$ is midpt of OB & AC " or " $k = \frac{1}{2} \Rightarrow X$ is midpt of //m" : B1

			$\overline{AX} = \overline{XC} \Rightarrow X$ is midpt of AC	2	B1	Allow without arrows
Total 8 marks						
15.	(a)	$x = kt^2$ or $19.6 = k \times 2^2$ $k = 4.9$	$x = 4.9t^2$ oe	3	M1 A1 A1	oe Allow $x \propto 4.9t^2$ for A1
	(b)	$3^2 \times 4.9$	$x = 44.1$	2	M1 A1f	Follow her (a) if of form kt^2
	(c)	$10 = 4.9t^2$ $t^2 = 10 / 4.9$ or 2.04...	1.43 or 1.4 with wking	3	M1 M1 A1	Follow her (a) if of form kt^2 cao
Total 8 marks						
16.		$\frac{5}{6} \times \frac{1}{6} \times \frac{1}{6}$ oe $\times 3$ $\frac{1}{6} \times \frac{1}{6} \times \frac{1}{6}$ oe	$\frac{2}{27}$ or $\frac{16}{216}$ or 0.074...	4	M1 M1 M1 A1	Dep on 1 – : $(\frac{5}{6})^2 \times \frac{1}{6}$ $\times 3$ $(\frac{5}{6})^3$ or $15 \times \frac{1}{6} \times \frac{1}{6} \times \frac{1}{6}$: M2 or $16 \times \frac{1}{6} \times \frac{1}{6} \times \frac{1}{6}$: M3
Total 4 marks						

17.	$x^2 + (2x + 1)^2 = 13$ $x^2 + 4x^2 + 2x + 2x + 1 = 13$ $(5x^2 + 4x - 12 = 0)$ $(5x - 6)(x + 2) = 0$ or $x = \frac{-4 \pm \sqrt{4^2 - 4 \times 5 \times (-12)}}{2 \times 5}$ $x = -2$ and $x = 1.2$ Subst two values of x into eqn	$x = -2$ & $y = -3$ $x = 1.2$ & $y = 3.4$	6	M1 M1 M1 A1 M1 A1	or further simplified condone without “= 0” oe must be correct dep M2 For incorr x must see wking paired, eg by alignment or coords T & I: 6 mks or 0 mks Total 6 marks	Follow similar scheme for subst for x
18.	Attempt differentiate once $-20t^{-2}$ or $-20/t^2$	$40t^{-3}$ or $40/t^3$	3	M1 A1 A1	NB $20/t^2$ check whether attempt diff Total 3 marks	
PAPER TOTAL 100 MARKS						

Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4400/3H

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Mathematics

Paper 3H

Higher Tier

Monday 6 November 2006 – Morning

Time: 2 hours

Page Number	Leave Blank
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
Total	

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.

The paper reference is shown at the top of this page. Check that you have the correct question paper.

Answer **ALL** the questions in the spaces provided in this question paper.

Show all the steps in any calculations.

Information for Candidates

There are 24 pages in this question paper. All blank pages are indicated.

The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. (2).

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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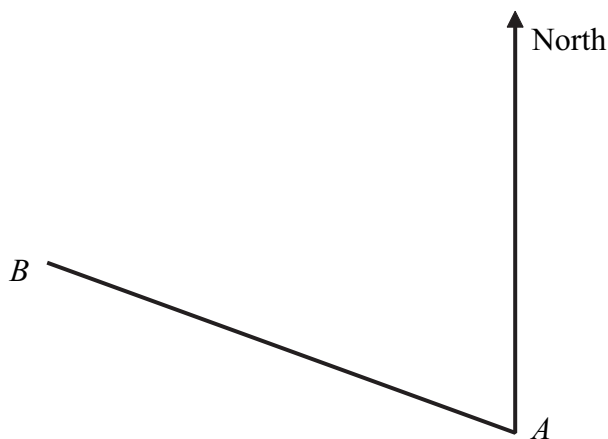
Turn over

Answer ALL TWENTY-ONE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1.



(a) By measurement, find the bearing of B from A .

.....
°
(2)

(b) The bearing of another point, C , from A is 226° .
Work out the bearing of A from C .

.....
°
(2)

(Total 4 marks)

Q1



2. Rectangular tiles have width x cm and height $(x + 7)$ cm.

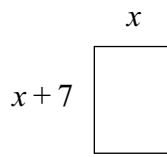


Diagram **NOT** accurately drawn

Some of these tiles are used to form a shape. The shape is 6 tiles wide and 4 tiles high.

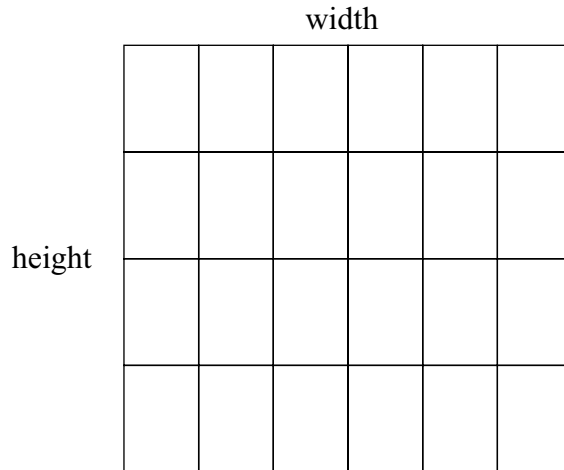


Diagram **NOT** accurately drawn

(a) Write down expressions, in terms of x , for the width and height of this shape.

width = cm

height = cm
(2)

(b) The width and the height of this shape are equal.

(i) Write down an equation in x .

.....

(ii) Solve your equation to find the value of x .

$x =$
(4)

(Total 6 marks)

Q2



3.

Andrea's Café

Delicious cakes
Only \$4.00 each

Andrea buys 100 cakes to sell in her café.
She pays \$1.80 for each cake.

On Monday she sells 60 cakes.
She sells these cakes for \$4.00 each.

On Tuesday she reduces the price of each cake by $\frac{1}{5}$

She sells 35 cakes at this reduced price.

Andrea then gives away the 5 unsold cakes.

Calculate the total profit that Andrea makes on the cakes.

\$.....

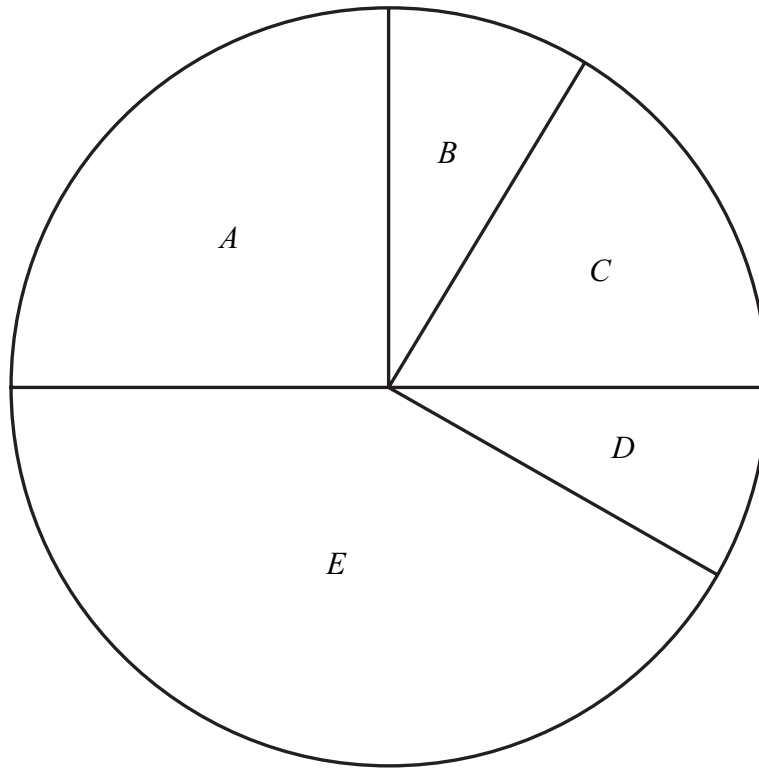
(Total 6 marks)

Q3



4. There are 5 classes in a school.

(a) The pie chart shows information about the number of students in each class. The pie chart is accurately drawn.



A student from the school is chosen at random.
Find the probability that this student is in class *E*.

.....
(2)



(b) The table shows information about the ages of the students.

Age, x years	Frequency
$9 \leq x < 11$	30
$11 \leq x < 13$	12
$13 \leq x < 15$	18
$15 \leq x < 19$	60

Calculate an estimate of the mean age of these students.
Give your answer correct to 3 significant figures.

..... years
(4)

(Total 6 marks)

Q4

5. The number of workers in a factory decreases from 60 to 48
Work out the percentage decrease in the number of workers.

..... %

(Total 3 marks)

Q5



6. Rajesh and Gudi share some money in the ratio 2:5
Rajesh receives £240

Work out the amount of money that Gudi receives.

£

(Total 2 marks)

Q6

7. Solve the inequality $9x - 2 < 5x + 4$

.....

(Total 3 marks)

Q7



8. Four girls run in a race.
The table shows the probability that each of three girls will win the race.

Name	Probability
Angela	0.5
Beverley	0.1
Caris	0.3
Danielle	

Calculate the probability that either Caris or Danielle will win the race.

.....

(Total 3 marks)

Q8



9. ABC is a triangle.
 $AB = AC = 13$ cm.
 $BC = 10$ cm.
 M is the midpoint of BC .
 Angle $AMC = 90^\circ$.

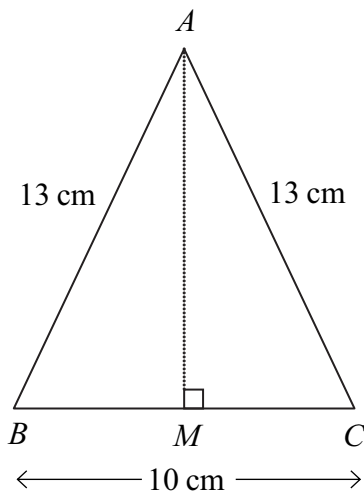


Diagram **NOT** accurately drawn

- (a) Work out the length of AM .

..... cm
(4)



- (b) A solid has five faces.
Four of the faces are triangles identical to triangle ABC .
The base of the solid is a square of side 10 cm.

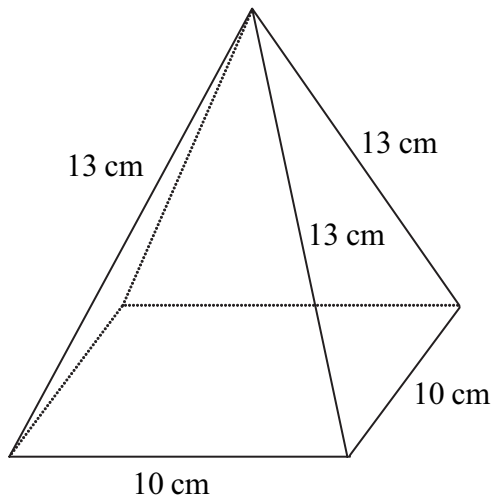


Diagram **NOT** accurately drawn

Calculate the total surface area of this solid.

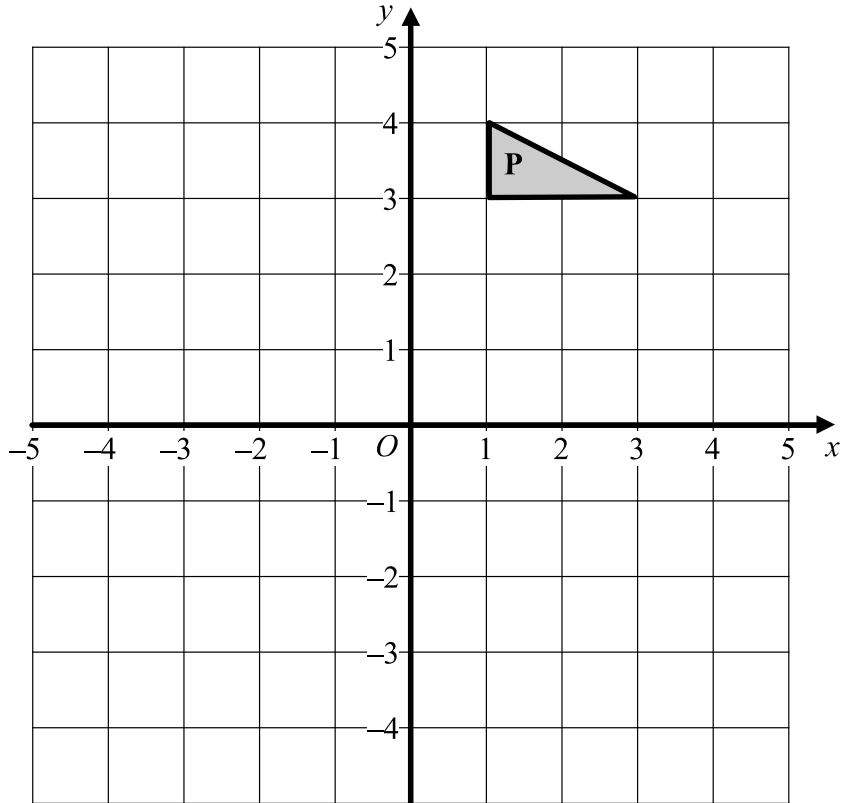
..... cm^2
(4)

(Total 8 marks)

Q9



10.



Reflect triangle **P** in the y -axis to give triangle **Q**.
Then rotate triangle **Q** about O through 90° clockwise to give triangle **R**.

Describe fully the **single** transformation which maps triangle **P** onto triangle **R**.

.....
.....

(Total 4 marks)

Q10



11. There are 15 students in class *A*.

In a test, the students gained these marks.

2 1 2 5 5 6 9 2 5 6 7 5 6 5 6

(a) Find the interquartile range of these marks.

.....
(3)

The students in class *B* took the same test.

Their marks had a median of 7 and an interquartile range of 2

(b) Make **two** comparisons between the marks of the two classes.

(i)

.....

(ii)

.....

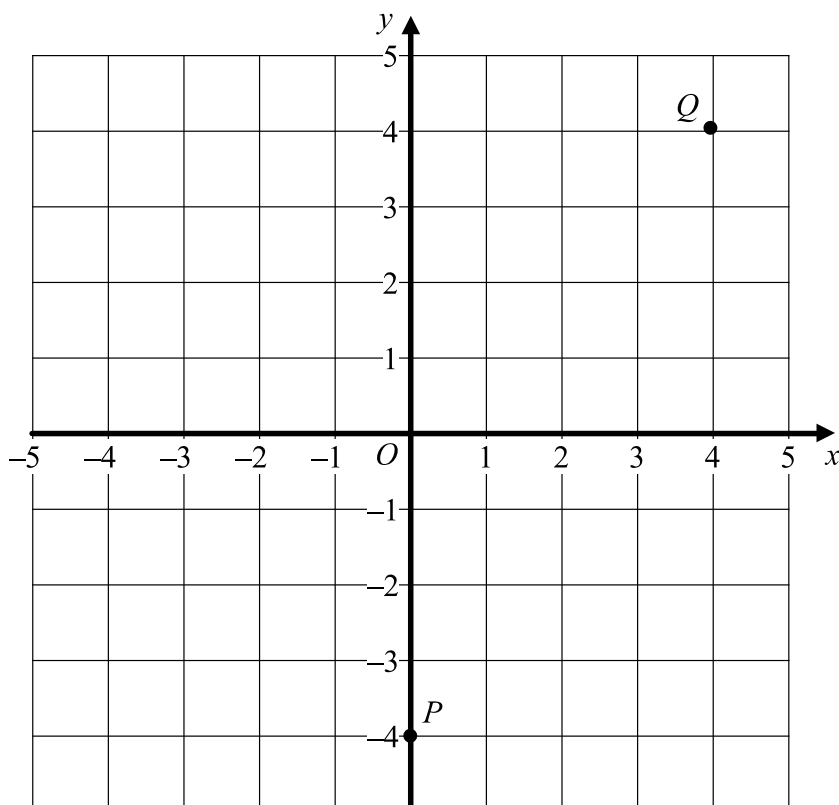
(2)

(Total 5 marks)

Q11



12.



- (a) P and Q are points with coordinates $(0, -4)$ and $(4, 4)$.
Find the equation of the straight line which passes through P and Q .

.....
(4)

- (b) On the grid, draw the line with equation $y = -\frac{1}{2}x + 1$

(3)

Q12

(Total 7 marks)



13. Evaluate the following.
Give your answers as fractions.

(a) 2^{-3}

.....
(1)

(b) $\left(\frac{27}{343}\right)^{\frac{1}{3}}$

.....
(1)

(c) $\left(\sqrt{\frac{3}{8}}\right)^4$

.....
(1)

(Total 3 marks)

Q13



14. (a) For the equation $y = 5000x - 625x^2$, find $\frac{dy}{dx}$.

.....
(2)

(b) Find the coordinates of the turning point on the graph of $y = 5000x - 625x^2$.

(.....,)
(3)

(c) (i) State whether this turning point is a maximum or a minimum.

.....

(ii) Give a reason for your answer.

.....
.....
(2)

(d) A publisher has to set the price for a new book.
The profit, £ y , depends on the price of the book, £ x , where

$$y = 5000x - 625x^2$$

(i) What price would you advise the publisher to set for the book?

£

(ii) Give a reason for your answer.

.....
.....
(2)

(Total 9 marks)

Q14



15.

Maxicool!!

The new ice cream sensation



A Maxicool consists of a cone full of ice cream with a hemisphere of ice cream on top.
The radius of the hemisphere is 3 cm.
The radius of the base of the cone is 3 cm.
The height of the cone is 10 cm.

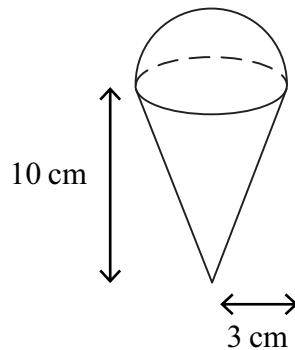


Diagram **NOT** accurately drawn

Calculate the total volume of ice cream in a Maxicool.
Give your answer correct to 3 significant figures.

..... cm³

(Total 4 marks)

Q15

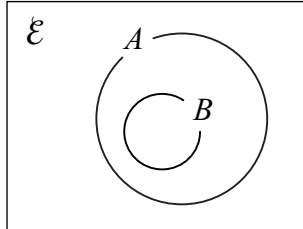


16.

Statements				
$A \subset B$	$B \subset A$	$A \cup B = \mathcal{E}$	$A \cap B = \emptyset$	$A \cap B = A$

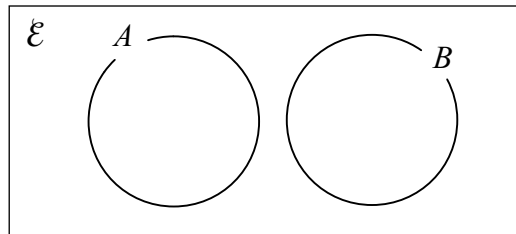
Choose a statement from the box that describes the relationship between sets A and B .

(i)



.....

(ii)



.....

(Total 2 marks)

Q16



17. The function f is defined as $f(x) = \frac{x}{x-1}$.

(a) Find the value of

(i) $f(3)$,

.....

(ii) $f(-3)$.

.....

(2)

(b) State which value(s) of x must be excluded from the domain of f .

.....

(1)

(c) (i) Find $ff(x)$.

Give your answer in its most simple form.

$ff(x) = \dots\dots\dots$

(ii) What does your answer to (c)(i) show about the function f ?

.....

.....

(4)

(Total 7 marks)

Q17



18. Solve the simultaneous equations

$$y = x^2$$
$$y = 2x + 15$$

$x = \dots\dots\dots, y = \dots\dots\dots$

$x = \dots\dots\dots, y = \dots\dots\dots$

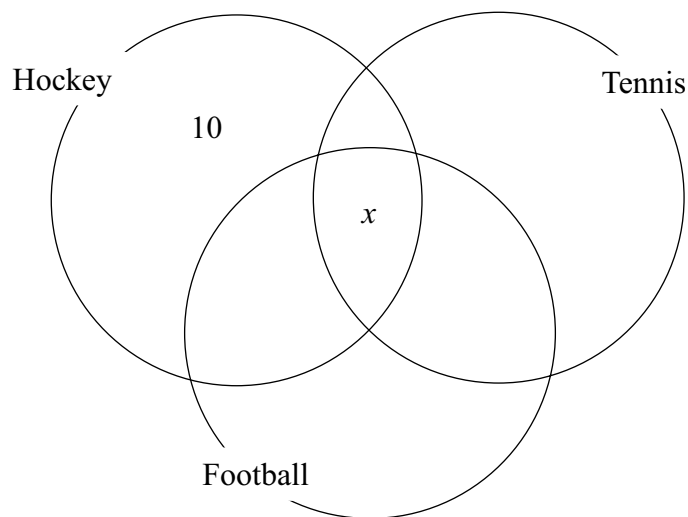
(Total 5 marks)

Q18



19. Each student in a group plays at least one of hockey, tennis and football.

- 10 students play hockey only
- 9 play football only.
- 13 play tennis only.
- 6 play hockey and football but not tennis.
- 7 play hockey and tennis.
- 8 play football and tennis.
- x play all three sports.



(a) Write down an expression, in terms of x , for the number of students who play hockey and tennis, but not football.

.....
(1)

There are 50 students in the group.

(b) Find the value of x .

$x =$
(3)

(Total 4 marks)

Q19



20. (a) The ratio of the areas of two similar triangles is $1:k$.
Write down, in terms of k , the ratio of the lengths of their corresponding sides.

.....
(1)

(b)

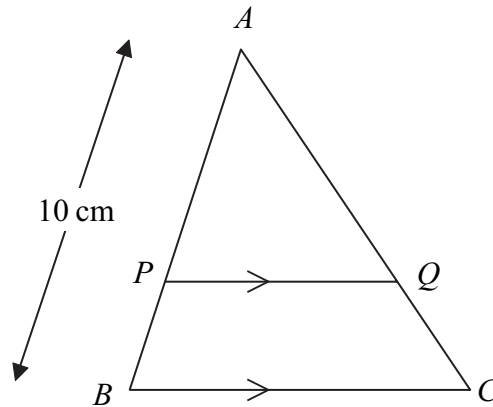


Diagram **NOT** accurately drawn

$AB = 10$ cm.
 PQ is parallel to BC .

The area of triangle APQ is half the area of triangle ABC .

Calculate the length of AP .
Give your answer correct to 2 significant figures.

..... cm
(2)

(Total 3 marks)

Q20



21. $\frac{1}{3}$ of the people in a club are men.

The number of men in the club is n .

(a) Write down an expression, in terms of n , for the number of people in the club.

.....
(1)

Two of the people in the club are chosen at random.

The probability that both these people are men is $\frac{1}{10}$

(b) Calculate the number of people in the club.

.....
(5)

(Total 6 marks)

Q21

TOTAL FOR PAPER: 100 MARKS

END



IGCSE Maths November 2006 - Paper 3H Final Mark Scheme

Question No.	Working	Answer	Mark	Notes
1 a		290 ± 2	2	B2 B1 for 290 ± 5 or $360 - 70$
b	$226 - 180$		2	M1
		046		A1 Condone omission of 0
				Total 4 marks

2 a	$x + x + x + x + x + x$ or $6x$		2	B1
	$x + 7 + x + 7 + x + 7 + x + 7$ or $4(x + 7)$ or $4x + 28$			B1
bi	“ $6x$ ” = “ $4(x + 7)$ ”		4	M1
ii	$6x = 4x + 28$			M1
	$6x - 4x = 28$ oe			M1
		14		A1 cao
				Total 6 marks

3	100×1.80 or 180		6	M1
	60×4.00 or 240			M1
	$4.00 \div 5$ or 0.8(0) or 3.2(0)			M1 may be part of an expression
	35×3.20 or 112			M1
	"240" + "112" – "180"			M1 dep on at least 2 of previous 4 M marks
		172		A1 cao
				Total 6 marks

4	a	$\frac{150 \pm 2}{360}$ oe inc $\frac{5}{12}$, 0.42, 0.416̇, 0.417	2	B1 numerator = 150 ± 2 B1 denominator = 360
	b	$10 \times 30 + 12 \times 12 + 14 \times 18 + 17 \times 60$ or $300 + 144 + 252 + 1020$ or 1716	4	M1 finds products $f \times x$ consistently within intervals (inc end points) & sums them
		use of at least 3 midpoints		M1
		$\frac{"1716"}{120}$		M1 (dep on 1st M1) for division by Σf
		14.3		A1 Accept 14 if all M marks scored
				Total 6 marks

5	$\frac{48}{60}$ or $60 - 48$		3	M1
	80 or $\frac{12}{60}$			M1
		20		A1 cao
				Total 3 marks

6	$240 \times \frac{5}{2}$		2	M1
		600		A1 cao SC B1 for $240 \times \frac{2}{5}$ or 96
				Total 2 marks

7	$4x < 6$ or $-6 < -4x$		3	M1 correctly collects x terms
				M1 correctly collects constants
		$x < 1.5$ oe		A1
				Total 3 marks

8	$0.5 + 0.1$ or $0.5 + 0.1 + 0.3$ or table completed with 0.1		3	M1
	$1 - (0.5 + 0.1)$ or $1 - (0.5 + 0.1 + 0.3) + 0.3$			M1
		0.4		A1
				Total 3 marks

9	a	BM = 5 seen or implied		4	B1	
		$13^2 - 5^2$ or 144			M1	for squaring and subtracting Accept $13^2 - 10^2$ or 69
		$\sqrt{13^2 - 5^2}$			M1	for $\sqrt{13^2 - 5^2}$ only
			12		A1	cao
	b	$\frac{1}{2} \times 10 \times 12$		4	M1	for $\frac{1}{2} \times 10 \times$ their (a)
		$\times 4$			M1	dep on first M1
		10×10 or 100			M1	indep
			340		A1	ft from "12"
						Total 8 marks

10		Q correct		4	B1	
		R correct			B1	ft from Q
			Reflection		B1	ft from R if at least one transformation correct
			$y = x$		B1	
						Total 4 marks

11	a	1 2 2 2 5 5 5 5 5 6 6 6 6 7 9		3	M1
		Attempt to find 4th (or $3\frac{3}{4}$ th) & 12th (or $11\frac{1}{4}$ th) values			M1
			4		A1 cao
	bi	eg B had higher marks than A		2	B1 B0 if median for A seen and $\neq 5$
	ii	eg B less spread or more consistent			B1
					Total 5 marks

12	a	Attempt to find $\frac{\text{vert}}{\text{horiz}}$ for line PQ		4	M1
		(gradient =) 2			A1 $(y =) 2x \Rightarrow$ M1A1
			$y = 2x - 4$		B2 ft from "2" B1 for $2x - 4$ B1 for $y = mx - 4$ where $m \neq 2$
	b	Line through (0, 1)		3	M1
		Attempts grad $-\frac{1}{2}$ or correctly finds coordinates of another point			M1
			Correct line		A1 Passes within 1mm of $(-2, 2)$ and $(2, 0)$
					Total 7 marks

13	a		$\frac{1}{8}$	1	B1	Accept equivalent fractions
	b		$\frac{3}{7}$	1	B1	
	c		$\frac{9}{64}$	1	B1	
						Total 3 marks

14	a		$5000 - 1250x$	2	B2	B1 for 5000 B1 for $-1250x$
	b	$5000 - 1250x = 0$		3	M1	ft from a if at least B1 scored and a is linear
		$x = 4$			M1	
			$4 \quad 10\,000$		A1	
	ci		max	2	B1	independent
	ii	coeff of $x^2 < 0$ or $\frac{dy}{dx} > 0$ for x value < 4 and $\frac{dy}{dx} > 0$ for x value > 4 or $y < 10\,000$ for x value < 4 and for x value > 4 or $\frac{d^2y}{dx^2} = -1250 < 0$				B1
	di		4	2	B1	ft from b if at least 1 scored
	ii		max profit oe		B1	Accept eg largest profit
						Total 9 marks

15	$\frac{4}{3}\pi \times 3^3 \div 2 + \frac{1}{3}\pi \times 3^2 \times 10$		4	M1 for $\frac{4}{3}\pi \times 3^3 \div 2$ or value rounding to 56.5 or 56.6
				M1 for $\frac{1}{3}\pi \times 3^2 \times 10$ or value rounding to 94.2 or 94.3
				M1 for sum (dep on first two M marks)
		151		A1 for 151 or better (150.796...) (3.14 \rightarrow 56.52 + 94.2 = 150.72)
				Total 4 marks

16	i	$B \subset A$	2	B1 cao
	ii	$A \cap B = \emptyset$		B1 cao
				Total 2 marks

17	ai		$1\frac{1}{2}$ oe	2	B1	
	ii		$\frac{3}{4}$ oe		B1	Don't accept $-\frac{3}{4}$
	b		1	1	B1	cao
	ci	$\frac{\frac{x}{x-1}}{\frac{x}{x-1}-1}$		4	M1	
		$\frac{\frac{x}{x-1}}{\frac{x-(x-1)}{x-1}}$ or $\frac{x}{x-(x-1)}$ oe			M1	SC B1 for ff(x) evaluated correctly for two values of x and an answer of x
		x			A1	
	ii	eg f is its own inverse, $f^{-1} = f$			B1	dep on correct ci
						Total 7 marks

18	$x^2 = 2x + 15$			5	M1	$\left(\frac{y-15}{2}\right)^2 = y$
	$x^2 - 2x - 15 = 0$				M1	$y^2 - 34y + 225 = 0$
	$(x+3)(x-5) = 0$ $x = \frac{2 \pm 8}{2}$				M1	$(y-25)(y-9) = 0$
	$x = -3$ or $x = 5$				A1	$y = 9$ or $y = 25$
			$-3, 9$ and $5, 25$		A1	
						Total 5 marks

19	a		$7 - x$	1	B1
	b	$8 - x$ seen or 9, 13, 6 marked correctly on diagram or $50 - (10 + 9 + 13 + 6) = 50 - 38 = 12$ and $8 + 7 = 15$		3	M1
		$10 + 13 + 9 + 6 + (7 - x) + (8 - x) + x = 50$ oe inc $7 - x + 8 - x + x = 12$ or $15 - 12$			M1 equation must be correct
			3		A1
					Total 3 marks

20	a		$1 : \sqrt{k}$	1	B1 Accept \sqrt{k}
	b	$\sqrt{2}$ or $\sqrt{\frac{1}{2}}$ seen		2	M1
			7.1		A1 for 7.1 or better (7.071...) Accept $\sqrt{50}$
					Total 3 marks

21	a		3n oe	1	B1 Accept eg n + 2n
	b	n - 1, 3n - 1 seen		5	B2 B1 for each
		$\frac{1}{3} \times \frac{n-1}{3n-1} = \frac{1}{10}$ oe inc $\frac{n}{3n} \times \frac{n-1}{3n-1} = \frac{1}{10}$			M1 for correct equation
		10(n - 1) = 3(3n - 1) oe inc 10n(n-1) = 3n(3n - 1)			M1 for correctly removing fractions
		(n = 7)	21		A1 cao
					Total 6 marks
					Total 100 marks

Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4400/4H

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Mathematics

Paper 4H

Higher Tier

Wednesday 8 November 2006 – Morning

Time: 2 hours

Page Number	Leave Blank
3	
4	
5	
6	
7	
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10	
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Total	

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.

The paper reference is shown at the top of this page. Check that you have the correct question paper.

Answer **ALL** the questions in the spaces provided in this question paper.

Show all the steps in any calculations.

Information for Candidates

There are 20 pages in this question paper. All blank pages are indicated.

The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. (2).

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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Answer ALL TWENTY-FIVE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Work out the value of $\frac{6.46}{1.8+1.6}$

.....

Q1

(Total 2 marks)

2. (a) Expand $3(2t + 5)$

.....
(1)

(b) Expand $y(y^2 - 3y)$

.....
(2)

(c) Expand and simplify $(x + 3)(x + 7)$

.....
(2)

(d) Simplify $p^4q^2 \times p^3q^6$

.....
(2)

(Total 7 marks)

Q2



3. The total of Kim's age and Pablo's age is 45 years.
The ratio of Kim's age to Pablo's age is 1:4

Work out Kim's age.

..... years

(Total 2 marks)

Q3

4. Here is a pattern of shapes made from centimetre squares.



Shape number 1



Shape number 2



Shape number 3

This rule can be used to find the perimeter of a shape in this pattern.

Add 1 to the Shape number and then multiply your answer by 2

P cm is the perimeter of Shape number n .

- (a) Write down a formula for P in terms of n .

.....
(3)

- (b) Make n the subject of the formula in part (a).

$n =$
(3)

(Total 6 marks)

Q4



5. Bridget flew from the UK to Dubai.
Her flight from the UK to Dubai covered a distance of 5456 km.
The flight time was 7 hours 45 minutes.

Work out the average speed of the flight.

..... km/h

(Total 3 marks)

Q5

6. $\mathcal{E} = \{\text{even numbers less than 19}\}$
 $M = \{\text{multiples of 3}\}$
 $F = \{\text{factors of 12}\}$

(a) (i) Explain why it is **not** true that $9 \in M$.

.....

(ii) List the members of M .

.....
(2)

(b) List the members of $M \cap F$.

.....
(2)

(Total 4 marks)

Q6



7.

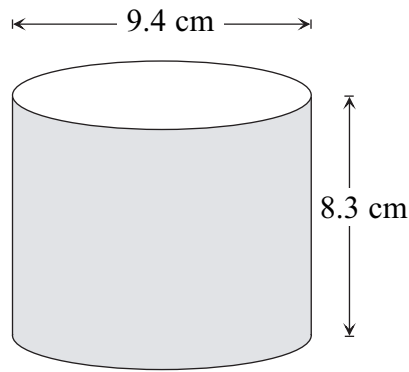


Diagram **NOT** accurately drawn

A solid cylinder has a diameter of 9.4 cm and a height of 8.3 cm.

Work out the volume of the cylinder.
Give your answer correct to 3 significant figures.

..... cm³

(Total 3 marks)

Q7

8. $y = 4x - 1$

Work out the value of x when $y = -7$

$x =$

(Total 2 marks)

Q8



9. There are 48 beads in a bag.
Some of the beads are red and the rest of the beads are blue.
Shan is going to take a bead at random from the bag.

The probability that she will take a red bead is $\frac{3}{8}$

(a) Work out the number of red beads in the bag.

.....
(2)

Shan adds some **red** beads to the 48 beads in the bag.

The probability that she will take a red bead is now $\frac{1}{2}$

(b) Work out the number of red beads she adds.

.....
(2)

(Total 4 marks)

Q9

10. Express 225 as the product of powers of its prime factors.

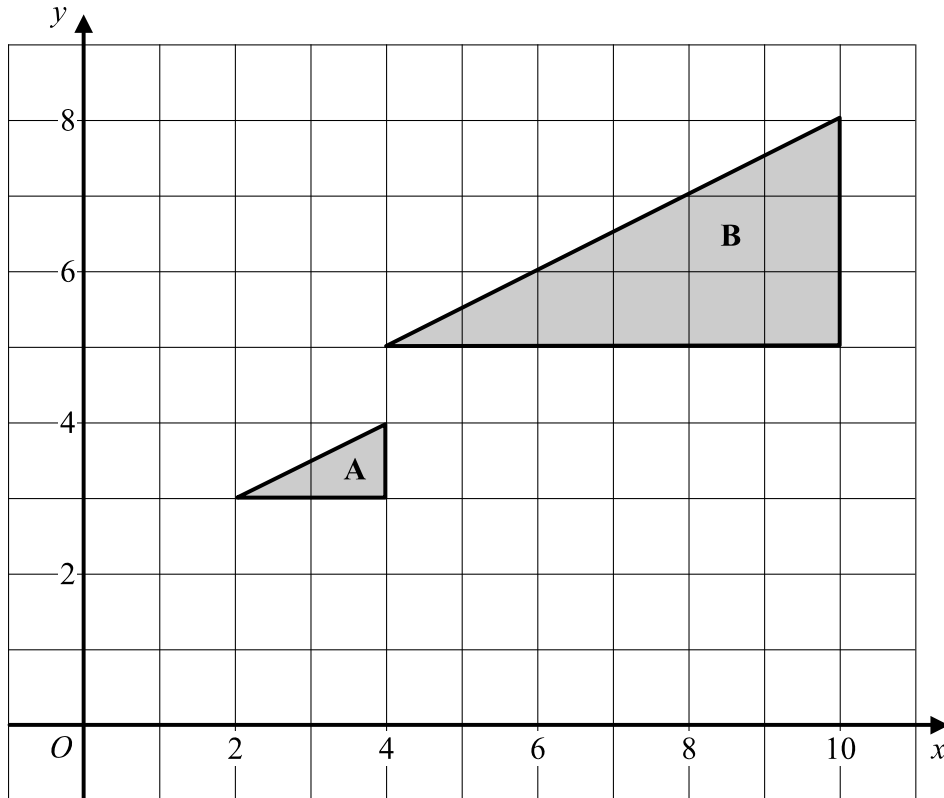
.....

(Total 3 marks)

Q10



11.



(a) Describe fully the **single** transformation which maps triangle **A** onto triangle **B**.

.....

(3)

(b) On the grid, translate triangle **A** by the vector $\begin{pmatrix} -1 \\ 3 \end{pmatrix}$.

Label the new triangle **C**.

(2)

(Total 5 marks)

Q11



12. Solve the simultaneous equations

$$6x + 5y = 5$$

$$3x - 10y = 15$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(Total 3 marks)

Q12

13. (a) Write the number 78 000 000 in standard form.

.....
(1)

(b) Write 4×10^{-3} as an ordinary number.

.....
(1)

(c) Work out the value of $\frac{3 \times 10^{-2}}{8 \times 10^9}$

Give your answer in standard form.

.....
(1)

(Total 3 marks)

Q13



14.

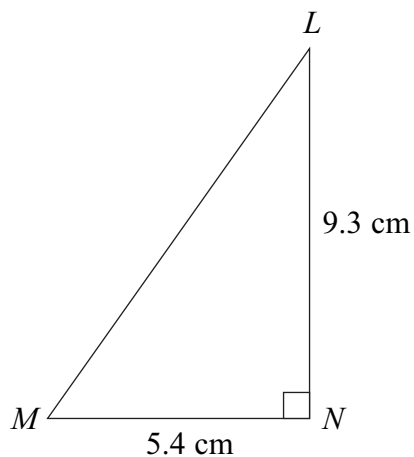


Diagram **NOT** accurately drawn

Triangle LMN is right-angled at N .
 $MN = 5.4$ cm and $LN = 9.3$ cm.

- (a) Work out the size of angle LMN .
 Give your answer correct to 1 decimal place.

.....
 (3)

The length of MN is 5.4 cm, correct to 2 significant figures.

- (b) (i) Write down the upper bound of the length of MN .

..... cm

- (ii) Write down the lower bound of the length of MN .

..... cm
 (2)



The length, 5.4 cm, of MN and the length, 9.3 cm, of LN , are each correct to 2 significant figures.

The line MN is horizontal and the line LN is vertical.

(c) Work out the upper bound for the gradient of the line LM .

.....

(2)

Q14

(Total 7 marks)

15.

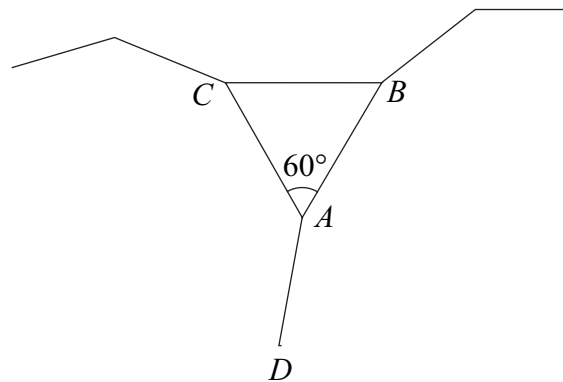


Diagram NOT accurately drawn

The sides of an equilateral triangle ABC and two **regular** polygons meet at the point A .
 AB and AD are adjacent sides of a regular 10-sided polygon.
 AC and AD are adjacent sides of a regular n -sided polygon.

Work out the value of n .

$n =$

Q15

(Total 5 marks)



16. The grouped frequency table gives information about the time spent on the Internet last week by each of 80 students.

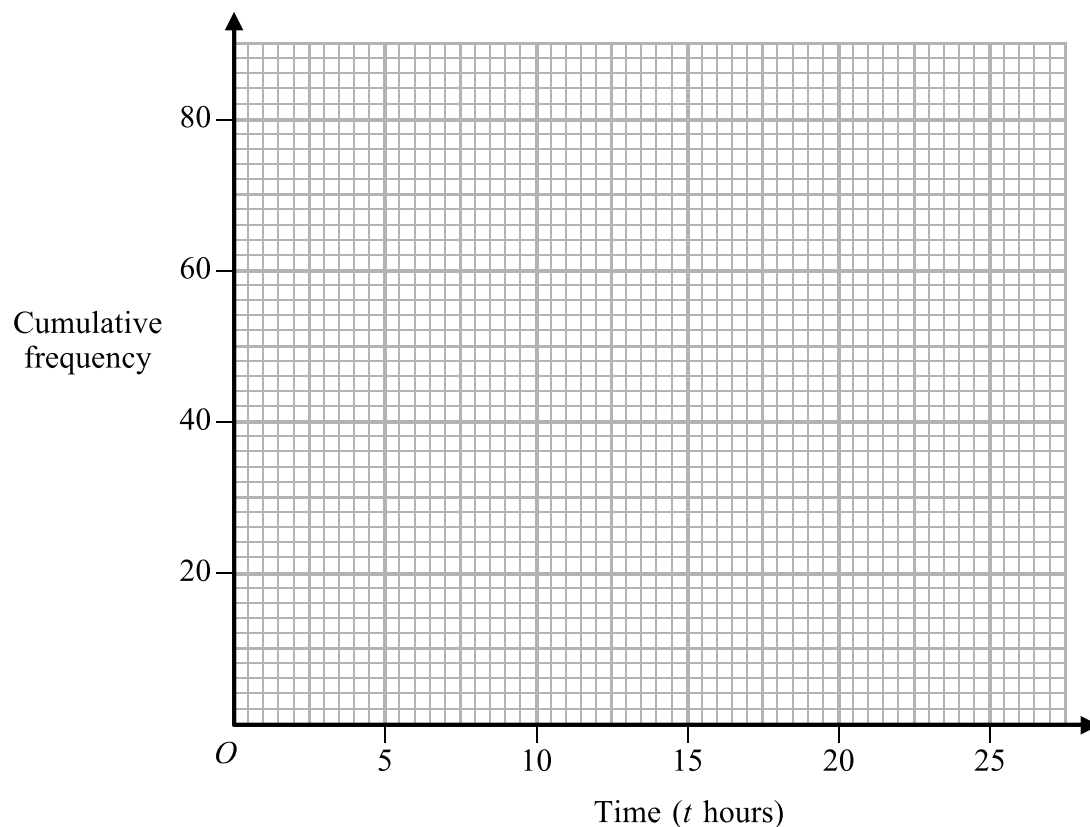
Time (t hours)	Frequency
$0 < t \leq 5$	28
$5 < t \leq 10$	22
$10 < t \leq 15$	14
$15 < t \leq 20$	10
$20 < t \leq 25$	6

(a) Complete the cumulative frequency table.

Time (t hours)	Cumulative frequency
$0 < t \leq 5$	
$0 < t \leq 10$	
$0 < t \leq 15$	
$0 < t \leq 20$	
$0 < t \leq 25$	

(1)

(b) On the grid, draw the cumulative frequency graph for your table.



(2)



(c) Use your graph to find an estimate for the number of students who spent more than 17 hours on the Internet last week.
Show your method clearly.

.....
(2)

Q16

(Total 5 marks)

17.

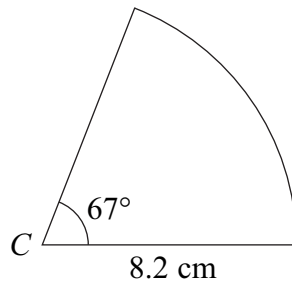


Diagram **NOT** accurately drawn

The diagram shows a sector of a circle, centre C .
The radius of the circle is 8.2 cm.
The angle at the centre of the circle is 67° .

Calculate the area of the sector.
Give your answer correct to 3 significant figures.

..... cm^2

Q17

(Total 3 marks)

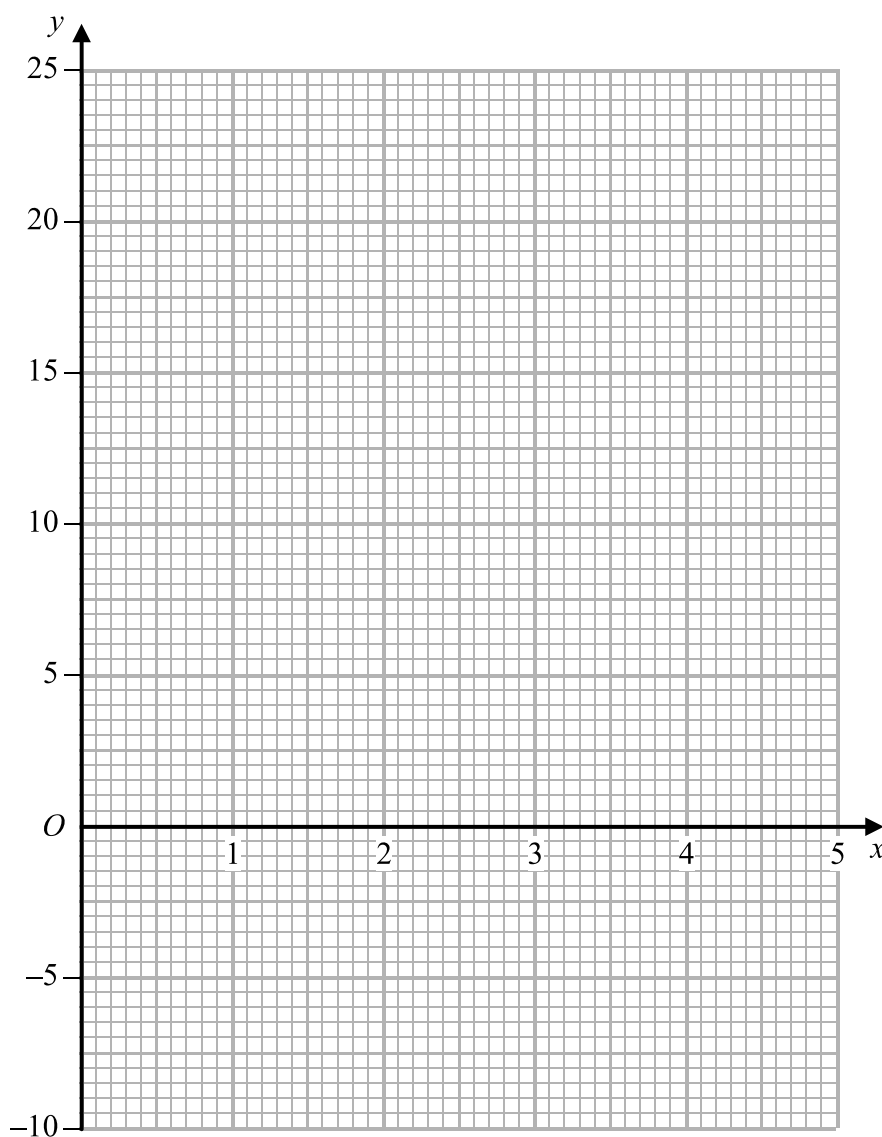


18. (a) Complete the table of values for $y = x^2 - \frac{3}{x}$

x	0.5	1	1.5	2	3	4	5
y	-5.75	-2					24.4

(2)

(b) On the grid, draw the graph of $y = x^2 - \frac{3}{x}$ for $0.5 \leq x \leq 5$



(2)



(c) Use your graph to find an estimate for a solution of the equation

$$x^2 - \frac{3}{x} = 0$$

$x = \dots\dots\dots$
(1)

(d) Draw a suitable straight line on your graph to find an estimate for a solution of the equation

$$x^2 - 2x - \frac{3}{x} = 0$$

$x = \dots\dots\dots$
(2)

(Total 7 marks)

Q18

19. Convert the recurring decimal $0.2\dot{3}$ to a fraction.

$\dots\dots\dots$
(Total 2 marks)

Q19



20.

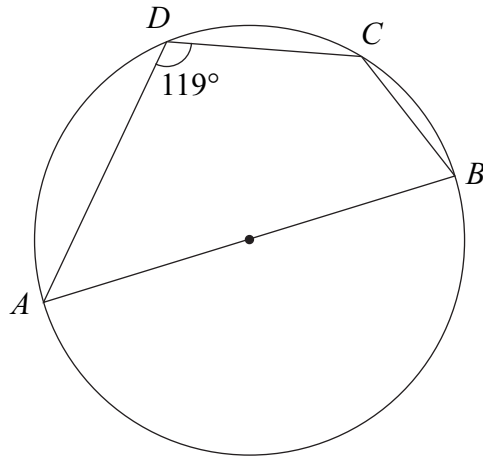


Diagram **NOT** accurately drawn

A, B, C and D are points on the circumference of a circle.
 AB is a diameter of the circle.
 Angle $ADC = 119^\circ$.

(a) (i) Work out the size of angle ABC .

.....
 °

(ii) Give a reason for your answer.

.....

(2)

(b) Work out the size of angle BAC .

.....
 °

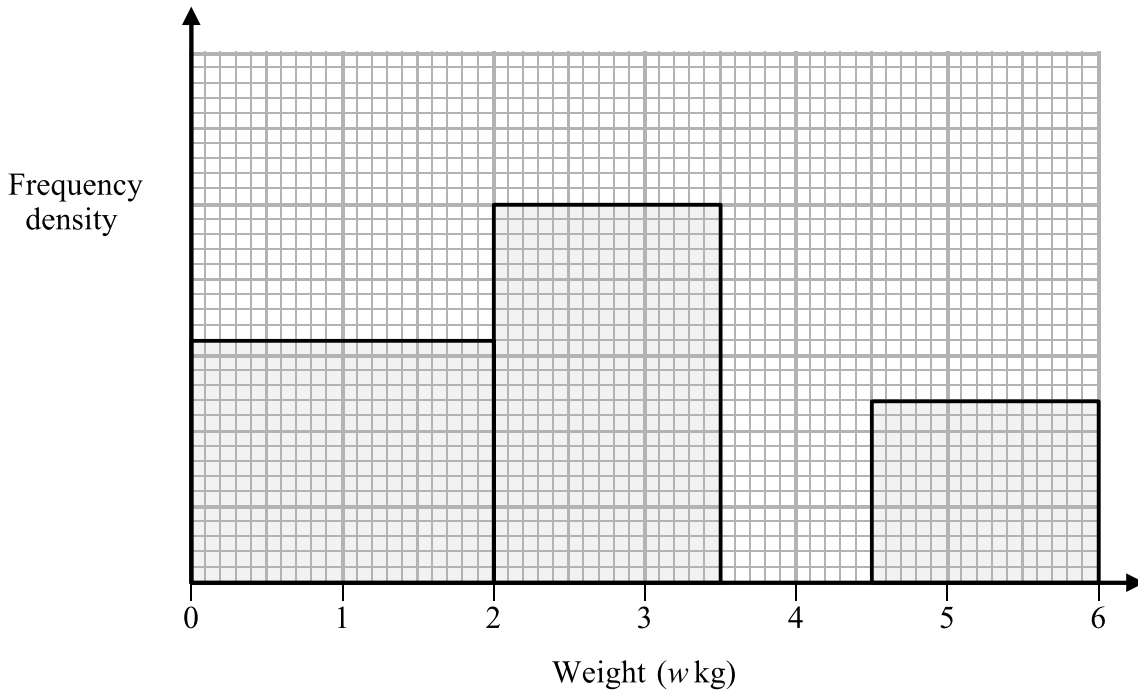
(2)

(Total 4 marks)

Q20



21. The unfinished table and histogram show information about the weights, in kg, of some babies.



Weight (w kg)	Frequency
$0 < w \leq 2$	
$2 < w \leq 3.5$	150
$3.5 < w \leq 4.5$	136
$4.5 < w \leq 6$	

(a) Use the histogram to complete the table.

(2)

(b) Use the table to complete the histogram.

(1)

(Total 3 marks)

Q21



22. Younis spins a biased coin twice.
 The probability that it will come down heads both times is 0.36
 Calculate the probability that it will come down tails both times.

.....
 (Total 3 marks)

Q22

23. Simplify fully $\frac{2x^2 - 5x - 12}{4x^2 - 9}$

.....
 (Total 3 marks)

Q23



24.

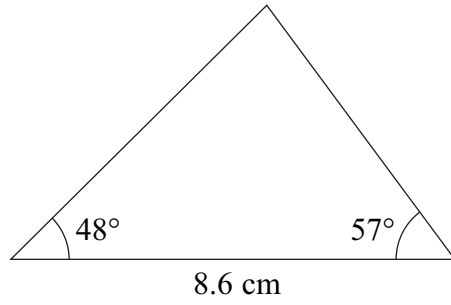


Diagram **NOT** accurately drawn

Calculate the area of the triangle.
Give your answer correct to 3 significant figures.

..... cm²

(Total 4 marks)

Q24

TURN OVER FOR QUESTION 25



25.

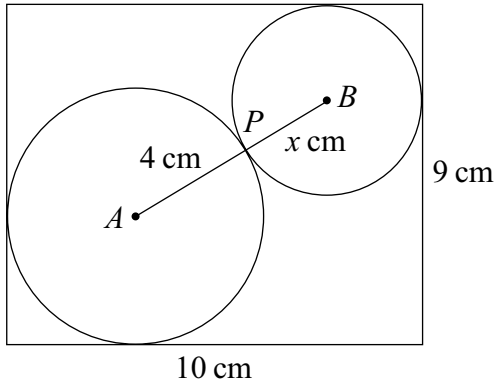


Diagram **NOT** accurately drawn

The diagram shows one disc with centre A and radius 4 cm and another disc with centre B and radius x cm.
 The two discs fit exactly into a rectangular box 10 cm long and 9 cm wide.
 The two discs touch at P .
 APB is a straight line.

(a) Use Pythagoras' Theorem to show that $x^2 - 30x + 45 = 0$

(4)

(b) Find the value of x .
 Give your value correct to 3 significant figures.

$x = \dots\dots\dots$
 (3)

(Total 7 marks)

Q25

TOTAL FOR PAPER: 100 MARKS

END



IGCSE November 2006 - Paper 4H Final Mark Scheme

Question No.	Working	Answer	Mark	Notes	
1	$\frac{6.46}{3.4}$	1.9	2	M1 A1	for 3.4 cao
					Total 2 marks
2 a		$6t + 15$	1	B1	cao
b		$y^3 - 3y^2$	2	B2	B1 for y^3 , B1 for $-3y^2$
c	$x^2 + 7x + 3x + 21$	$x^2 + 10x + 21$	2	M1 A1	Condone 1 error
d		$p^7 q^8$	2	B2	B1 for p^7 , B1 for q^8 . Allow $p^7 \times q^8$
					Total 7 marks
3	$\frac{45}{1+4}$	9	2	M1 A1	36 or 9:36 M1A0 cao
					Total 2 marks

4	a			B3	for $P = 2(n+1)$ oe	(a&b) Ignore units
					B2 for $2(n+1)$ oe or $n = \frac{P}{2} - 1$ oe	
					B2 for $P = 2n+1$ oe or $P = n+1 \times 2$ oe	
					B1 for $P = \text{any } f(n)$ (not $P = n$)	
		$P = 2(n+1)$	3		B1 for $2n+1$ oe or $n+1 \times 2$ oe	
					B0 for muddle eg $n+1 = x \ 2 = P$	
	b	$P = 2n+2$		M1	$2n+2$ seen	or M2 for
		$2n = P-2$		M1		$\frac{P}{2} = n+1$ or $P-2 \div 2$
		$\frac{P-2}{2}$ or $\frac{P}{2} - 1$	3	A1		
					SC ft from $P = 2n+1$ or $2n+1$ only	
					M1 for $2n = P-1$ or $P-1 \div 2$	
					A1 ft for $\frac{P-1}{2}$ oe	
					Total 6 marks	

5				M1	for $\frac{5456}{\text{time}}$	or 732 seen
				B1	for 7.75	or 465 if ...x 60 or "km/m"
		704	3	A1	cao	
					Total 3 marks	

6	ai	eg "9 is not a member of \mathcal{E} ", "It is not an even number" " \mathcal{E} is only even nos", "9 is odd"		1	B1	for either interpreting statement or for giving a reason
	ii	6, 12, 18		1	B1	Condone omission of brackets
	b	6, 12		2	B2	B1 for 6 or 3, 6, 12
					Total 4 marks	

7	$\pi \times 4.7^2 \times 8.3$			M2	for $\pi \times 4.7^2 \times 8.3$
					M1 for $\pi \times 9.4^2 \times 8.3$ or 2303 - 2305
		576	3	A1	for 575.7-576.1
					Total 3 marks

8	$-7 = 4x - 1$			M1	for substituting correctly
		$-1\frac{1}{2}$ oe	2	A1	
					Total 2 marks

9 a	$48 \times \frac{3}{8}$			M1	
		18	2	A1	cao ans $\frac{18}{48}$: M1A0
b	eg $48 - 18 - 18$, $x + 48 = 2(x + 18)$			M1	
		12	2	A1f	ft from "18"
					Total 4 marks

10	eg	$\begin{array}{r} 3 \overline{) 225} \\ \underline{3} \\ 75 \\ \underline{5} \\ 25 \\ \underline{5} \\ 5 \end{array}$			M2	for full systematic method of at least 3 divisions by prime numbers oe (factor trees) Condone 1 error
						Or for $3 \times 3 \times 5 \times 5$ or 3, 3, 5, 5
						M1 for 225 written as correct product with only one non-prime
			$3^2 \times 5^2$	3	A1	
						Total 3 marks

11	a	eg enlargement, (scale factor) 3, (centre) (1,2)			B3	B1 for enlargement Not single trans: B0B0B0
				3		B1 for 3, B1 for (1,2)
	b	Correct triangle		2	B2	B1 for 1 to the left B1 for 3 up
						Total 5 marks

12	$12x + 10y = 10$	$6x - 20y = 30$			M1	Correctly equating coefficients of x or y or rearranging to $x = \dots$ or $y = \dots$
	$(15x = 25)$	$(25y = -25)$				
		$x = 1\frac{2}{3}$ (or 1.7 or better), $y = -1$		3	A1 A1	Condone 1.66 cao
						Total 3 marks

13	a	7.8×10^7	1	B1	cao
	b	0.004 oe	1	B1	cao
	c	3.75×10^{-12}	1	B1	
					Total 3 marks

14	a	$\tan \angle LMN = \frac{9.3}{5.4}$		M1	$\sin LMN = \frac{9.3}{\sqrt{(9.3^2 + 5.4^2)}}$ or cos etc M1A1
		$9.3/5.4$ or 1.722...		A1	
		59.9	3	A1	for 59.85-59.9
	bi	5.45	1	B1	Accept 5.449, 5.4499...
	ii	5.35	1	B1	cao
	c	$\frac{9.35}{"5.35"}$		M1	
		1.74766...	2	A1	for 1.74 or 1.75 or better
					Total 7 marks

15		$\frac{180 \times (10 - 2)}{10}$ or $180 - \frac{360}{10}$		M1	
		144 36		A1	
		$180 - [360 - (60 + 144)]$ or 24 $60 - 36 (= 24)$		M1	$360 - 204 = 156$
		$\frac{360}{"24"}$		M1	$180 \times (n-2)/n = 156$ or $180 - 360/n = 156$ or $2340/15 = 156$
		15	5	A1	cao
					Total 5 marks

16	a		28, 50, 64, 74, 80	1	B1	cao
	b		Points		B1	In (b) incr'ing y's nec'y. Not blocks end pts $\pm \frac{1}{2}$ square ft from sensible table condone one error
			Curve or line segments	2	B1	dep end pts or midpts thro' pts $\pm \frac{1}{2}$ square; ignore $x < 5$ dep on 4 pts correct or ft
	c	cf for time of 17h found from graph			M1	In (c) incr'ing cf graph essential eg line, mark on graph
			~12	2	A1f	12 or consistent with curve
						Total 5 marks
17		$(\frac{67}{360}$ or 0.186...) x...			M1	or ... $\div (\frac{360}{67}$ or 5.37...)
		$\frac{67}{360} \times \pi \times 8.2^2$			M1	or $\pi \times 8.2^2 \div \frac{360}{67}$
			39.3	3	A1	for 39.2 - 39.32
						Total 3 marks
18	a		0.25, 2.5, 8, 15.25	2	B2	Accept rounding or truncating B1 for 2 or 3 correct
	b		Points		B1f	Allow $\pm \frac{1}{2}$ square Condone 1 error or omission ft if at least B1 in (a)
			Curve	2	B1f	ft if at least B1 in (a)
	c		1.4 – 1.47	1	B1	
	d	$x^2 - \frac{3}{x} = 2x$ or indication of $y = 2x$			M1	indication may be mark or line on graph Must see 2x or indic'n of line $y = 2x$
			~2.5	2	A1	ft if at least B1 in (b)
						Total 7 marks

19	$100x = 23.2323\dots$			M1	
		$\frac{23}{99}$	2	A1	
					Total 2 marks

20	ai	61	1	B1	cao
	ii	opp angles of a cyclic quad (add to 180° or are suppl)	1	B1	
	b	$90 - "61"$		M1	$\angle ACB = 90^\circ$ stated or indicated on diagram
		29	2	A1f	
					Total 4 marks

21	a	128, 72	2	B2	B1 for 128 cao B1 for 72 cao
	b	bar correct	1	B1	34 little squares high
					Total 3 marks

22	$\sqrt{0.36}$ or 0.6			M1	
	$(1 - "0.6") \times (1 - "0.6")$ or 0.4×0.4			M1	dep
		0.16	3	A1	for 0.16 oe
					Total 3 marks

23	$\frac{(2x+3)(x-4)}{(2x+3)(2x-3)}$			M1 M1	for $(2x+3)(x-4)$ for $(2x+3)(2x-3)$
		$\frac{x-4}{2x-3}$	3	A1	
					Total 3 marks

24	eg $\frac{8.6}{\sin 75^\circ} = \frac{"a"}{\sin 48^\circ}$ or $\frac{"b"}{\sin 57^\circ}$			M1	
	$\frac{8.6 \sin 48^\circ}{\sin 75^\circ}$ or 6.61(...) or $\frac{8.6 \sin 57^\circ}{\sin 75^\circ}$ or 7.46(...)			A1	
	$\frac{1}{2} \times 8.6 \times "6.616" \times \sin 57^\circ$ or $\frac{1}{2} \times 8.6 \times "7.467" \times \sin 48^\circ$			M1	dep M1 or $\frac{1}{2} \times "6.616" \times "7.467" \times \sin 75^\circ$
		23.9	4	A1	
					Total 4 marks

25	a	$(5-x)^2 + (6-x)^2 = (x+4)^2$ $25 - 10x + x^2 + 36 - 12x + x^2 = x^2 + 8x + 16$	4	B2 B1 B1	two of $(5-x), (6-x), (x+4)$ seen or equiv, eg $(10-x-4)$ B1 for one of these correct equn not expanded correct equn expanded
	b	$\frac{30 \pm \sqrt{30^2 - 4 \times 45}}{2}$	3	M1	Allow -30^2
		$\frac{30 \pm \sqrt{720}}{2}$ or 28.4 & 1.584	1.58	A1 A1	
					Total 4 marks

Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4400/3H

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Mathematics

Paper 3H

Higher Tier

Thursday 17 May 2007 – Morning

Time: 2 hours

Page Number	Leave Blank
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
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Total	

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.

Check that you have the correct question paper.

Answer ALL the questions in the spaces provided in this question paper.

You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.

If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 19 questions in this question paper. The total mark for this paper is 100.

There are 20 pages in this question paper. Any blank pages are indicated.

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

Answer ALL NINETEEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. (a) Use your calculator to work out the value of

$$\frac{(3.7 + 4.6)^2}{2.8 + 6.3}$$

Write down all the figures on your calculator display.

.....
(2)

- (b) Give your answer to part (a) correct to 2 decimal places.

.....
(1)

(Total 3 marks)

Q1

2. (a) Work out the value of $x^2 - 5x$ when $x = -3$

.....
(2)

- (b) Factorise $x^2 - 5x$

.....
(2)

(Total 4 marks)

Q2



3. Hajra counted the numbers of sweets in 20 packets.
The table shows information about her results.

Number of sweets	Frequency
46	3
47	6
48	3
49	5
50	2
51	1

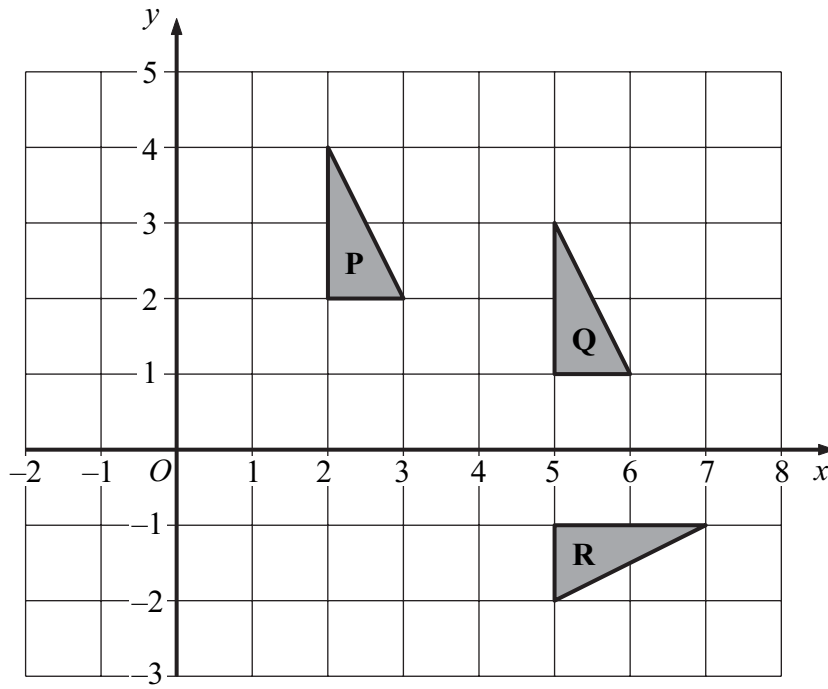
Work out the mean number of sweets in the 20 packets.

.....
(Total 3 marks)

Q3



4.



(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

.....
 (2)

(b) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

.....
 (3)

(Total 5 marks)

Q4



5. (a) Simplify, leaving your answers in index form,

(i) $7^5 \times 7^3$

.....

(ii) $5^9 \div 5^3$

.....

(2)

(b) Solve $\frac{2^9 \times 2^4}{2^n} = 2^8$

$n =$

(2)

Q5

(Total 4 marks)

6. (a) Expand and simplify $3(4x - 5) - 4(2x + 1)$

.....

(2)

(b) Expand and simplify $(y + 8)(y + 3)$

.....

(2)

(c) Expand $p(5p^2 + 4)$

.....

(2)

Q6

(Total 6 marks)



7. A tunnel is 38.5 km long.

(a) A train travels the 38.5 km in 21 minutes.

Work out the average speed of the train.
Give your answer in km/h.

..... km/h
(3)

(b) To make the tunnel, a cylindrical hole 38.5 km long was drilled.
The radius of the cylindrical hole was 4.19 m.

Work out the volume of earth, in m^3 , which was removed to make the hole.
Give your answer correct to 3 significant figures.

..... m^3
(3)

(Total 6 marks)

Q7



8. (a) Shri invested 4500 dollars. After one year, he received 270 dollars interest.
Work out 270 as a percentage of 4500

..... %
(2)

- (b) Kareena invested an amount of money at an interest rate of 4.5% per year.
After one year, she received 117 dollars interest.
Work out the amount of money Kareena invested.

..... dollars
(2)

- (c) Ravi invested an amount of money at an interest rate of 4% per year.
At the end of one year, interest was added to his account and the total amount in his account was then 3328 dollars.
Work out the amount of money Ravi invested.

..... dollars
(3)

(Total 7 marks)

Q8



9. (a) Solve $5x - 4 = 2x + 7$

$x = \dots\dots\dots$
(2)

(b) Solve $\frac{7-2y}{4} = 2y+3$

$y = \dots\dots\dots$
(4)

(Total 6 marks)

Q9



10. Here are five shapes.



Four of the shapes are squares and one of the shapes is a circle.
 One square is black.
 Three squares are white.
 The circle is black.
 The five shapes are put in a bag.

- (a) Jasmine takes a shape at random from the bag 150 times.
 She replaces the shape each time.

Work out an estimate for the number of times she will take a white square.

.....
(3)

- (b) Alec takes a shape at random from the bag and does **not** replace it.
 Bashir then takes a shape at random from the bag.

Work out the probability that

- (i) they both take a square,

.....

- (ii) they take shapes of the same colour.

.....
(5)

(Total 8 marks)

Q10



11.

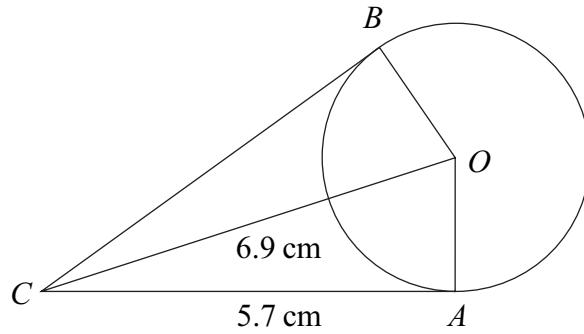


Diagram **NOT** accurately drawn

A and B are points on a circle, centre O .
 The lines CA and CB are tangents to the circle.
 $CA = 5.7$ cm.
 $CO = 6.9$ cm.

(a) Give a reason why angle $CAO = 90^\circ$.

.....

(1)

(b) Calculate the perimeter of the kite $CAOB$.
 Give your answer correct to 3 significant figures.

..... cm
 (5)

(Total 6 marks)

Q11



12. The grouped frequency table gives information about the weights of 60 cows.

Weight (w kg)	Frequency
$100 < w \leq 200$	10
$200 < w \leq 300$	16
$300 < w \leq 400$	15
$400 < w \leq 500$	9
$500 < w \leq 600$	6
$600 < w \leq 700$	4

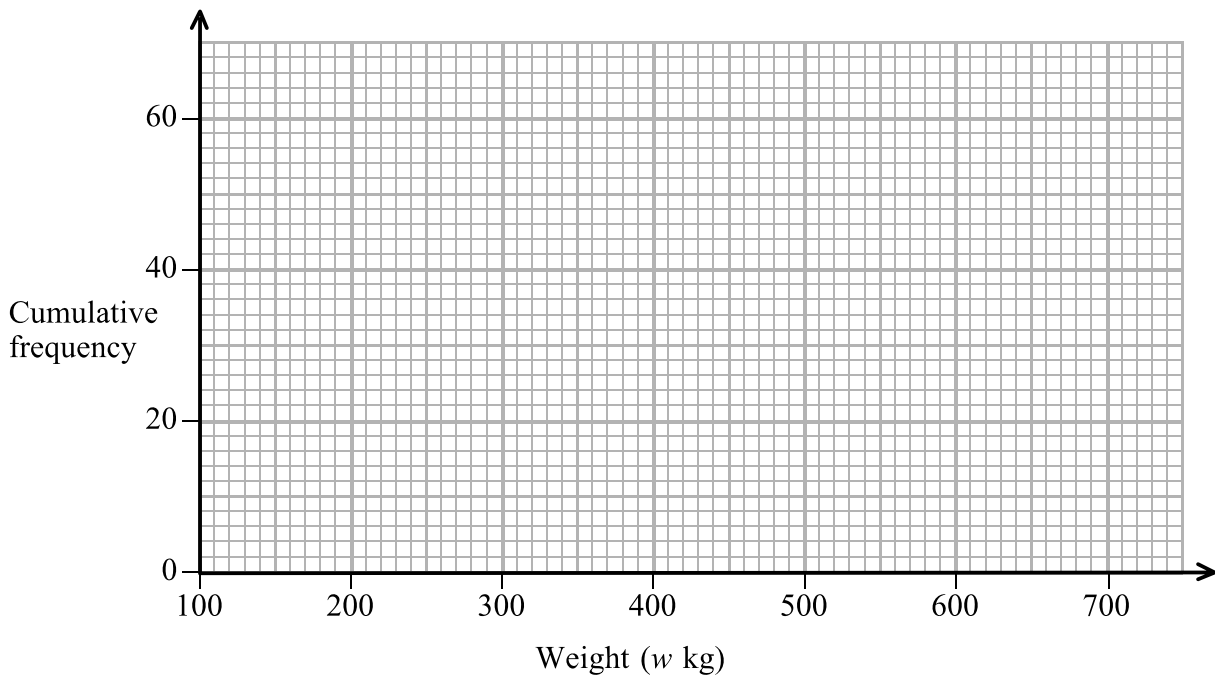
(a) Complete the cumulative frequency table.

Weight (w kg)	Cumulative frequency
$100 < w \leq 200$	
$100 < w \leq 300$	
$100 < w \leq 400$	
$100 < w \leq 500$	
$100 < w \leq 600$	
$100 < w \leq 700$	

(1)



(b) On the grid, draw the cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the number of cows that weighed more than 430 kg.
Show your method clearly.

.....
(2)

(Total 5 marks)

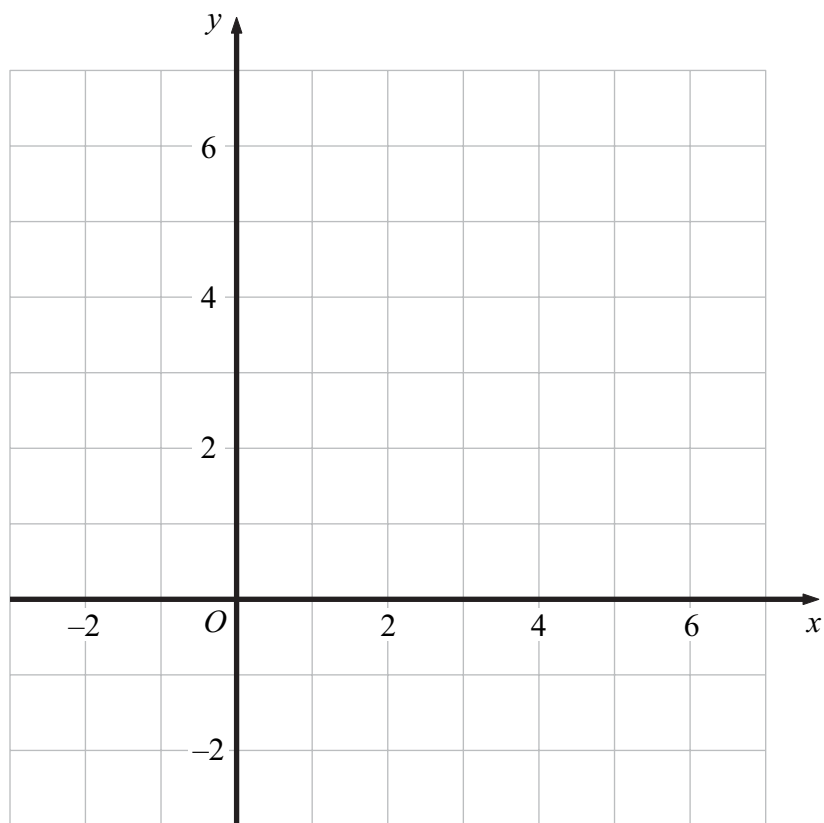
Q12



13. Show, by shading on the grid, the region which satisfies all three of these inequalities.

$$y \leq 5 \quad y \leq 2x \quad y \geq x + 1$$

Label your region **R**.



(Total 4 marks)

Q13



14. (a) Make r the subject of the formula $A = \pi r^2$, where r is positive.

$r = \dots\dots\dots$
(2)

The area of a circle is 14 cm^2 , correct to 2 significant figures.

(b) (i) Work out the lower bound for the radius of the circle.
Write down all the figures on your calculator display.

$\dots\dots\dots \text{ cm}$

(ii) Give the radius of the circle to an appropriate degree of accuracy.
You must show working to explain how you obtained your answer.

$\dots\dots\dots \text{ cm}$
(4)

(Total 6 marks)

Q14



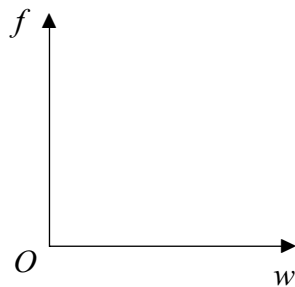
15. The frequency, f kilohertz, of a radio wave is inversely proportional to its wavelength, w metres.

When $w = 200, f = 1500$

(a) (i) Express f in terms of w .

$f = \dots\dots\dots$

(ii) On the axes, sketch the graph of f against w .



(4)

(b) The wavelength of a radio wave is 1250 m. Calculate its frequency.

$\dots\dots\dots$ kilohertz
(2)

(Total 6 marks)

Q15



16. PQR is a triangle.
 E is the point on PR such that $PR = 3PE$.
 F is the point on QR such that $QR = 3QF$.

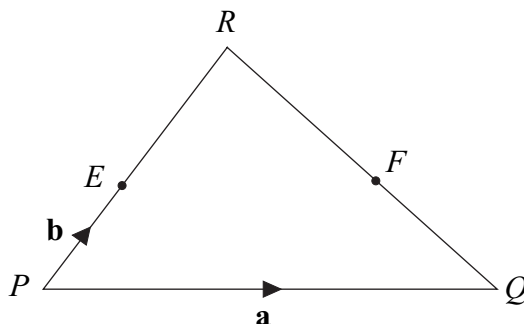


Diagram **NOT** accurately drawn

$\vec{PQ} = \mathbf{a}, \quad \vec{PE} = \mathbf{b}.$

(a) Find, in terms of \mathbf{a} and \mathbf{b} ,

(i) \vec{PR}

.....

(ii) \vec{QR}

.....

(iii) \vec{PF}

.....

(3)

(b) Show that $\vec{EF} = k\vec{PQ}$ where k is an integer.

(2)

(Total 5 marks)

Q16



17. A curve has equation $y = x^2 + \frac{16}{x}$

The curve has one turning point.

Find $\frac{dy}{dx}$ and use your answer to find the coordinates of this turning point.

.....

(Total 4 marks)

Q17



18.

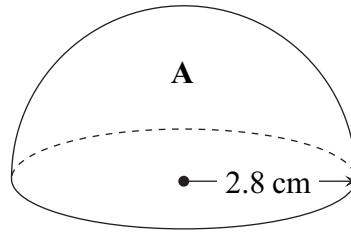


Diagram **NOT** accurately drawn

A solid hemisphere **A** has a radius of 2.8 cm.

- (a) Calculate the **total** surface area of hemisphere **A**.
Give your answer correct to 3 significant figures.

..... cm²
(3)

A larger solid hemisphere **B** has a **volume** which is 125 times the volume of hemisphere **A**.

- (b) Calculate the **total** surface area of hemisphere **B**.
Give your answer correct to 3 significant figures.

..... cm²
(3)

(Total 6 marks)

Q18

PLEASE TURN OVER FOR QUESTION 19



19. Solve the simultaneous equations

$$y = 3x - 1$$

$$x^2 + y^2 = 5$$

.....
Q19

(Total 6 marks)

TOTAL FOR PAPER: 100 MARKS

END



**4400 IGCSE Mathematics
Summer 2007
Paper 3H**

Q	Working	Answer	Mark	Notes
1.	(a) $\frac{68.89}{9.1}$		2	M1 for 8.3, 68.89, 9.1 or 30.90...
		7.5703...		A1 Accept if first 5 figures correct Also accept $7\frac{519}{910}$, $\frac{6889}{910}$
	(b)	7.57	1	B1 ft from (a) if non-trivial ie (a) must have more than 2 d.p.
				Total 3 marks
2.	(a) $(-3)^2 - 5 \times -3$		2	M1 for substn or 9 or 15 seen
		24		A1 cao
	(b)	$x(x-5)$	2	B2 B1 for factors which, when expanded and simplified, give two terms, one of which is correct SC B1 for $x(5-x)$ and for $x(x-5x)$
				Total 4 marks
3.	$46 \times 3 + 47 \times 6 + 48 \times 3 + 49 \times 5 + 50 \times 2 + 51 \times 1$ or $138 + 282 + 144 + 245 + 100 + 51$ or 960		3	M1 for finding at least 4 products and adding
	"960" $\div 20$			M1 (dep) for division by 20
		48		A1 cao
				Total 3 marks

Q	Working	Answer	Mark	Notes
4.	(a)	translation 3 squares to the right and 1 square down	2	B2 B1 for translation Accept translate, translated etc
				B1 for 3 right and 1 down (accept 'across' instead of 'to the right') or $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$ but not (3, -1)
	(b)	rotation of 90° clockwise about (2, -1)	3	B3 B1 for rotation Accept rotate, rotated etc
				B1 for 90° clockwise or -90° or 270°
				B1 for (2, -1)
				Total 5 marks
5.	(ai)		7 ⁸	2 B1 cao
	(ii)		5 ⁶	B1 cao
	(b)	9 + 4 - n = 8 or 13 - n = 8		2 M1 Also award for 2 ⁿ = 2 ⁵ or 2 ⁵ on answer line
			5	A1 cao
				Total 4 marks

Q	Working	Answer	Mark	Notes
6.	(a)	$12x - 15 - 8x - 4$	2	M1 for at least 3 terms correct inc signs
				A1 cao
	(b)	$y^2 + 3y + 8y + 24$	2	M1 for 3 terms correct or $y^2 + 11y$ seen
				A1
	(c)		2	B2 cao B1 for either $5p^3$ or for $+4p$
				Total 6 marks

7.	(a)	$\frac{38.5}{21} \times 60$ or $\frac{21}{60} = 0.35$; $\frac{38.5}{0.35}$	3	M1 for $\frac{38.5}{21}$ or 1.83 or better or $\frac{38.5}{0.21}$ or 183.3 or better or $\frac{21}{60}$ or 0.35
				M1 for '1.8333...' $\times 60$ or $\frac{38.5}{0.35}$
			110	3
	(b)	$\pi \times 4.19^2 \times 38500$		M2 M1 for $\pi \times$ (no with digits 419) ² \times no with digits 385
			2 120 000	A1 for 2 120 000 or for answer which rounds to 2 120 000
				Total 6 marks

Q	Working	Answer	Mark	Notes
8.	(a) $\frac{270}{4500} \times 100$		2	M1 for $\frac{270}{4500}$ or 0.06 or $\frac{4770}{4500}$ or 1.06
		6		A1 cao
	(b) $117 \times \frac{100}{4.5}$		2	M1 for $\frac{117}{4.5}$ or 26 seen
		2600		A1 cao
	(c) $\frac{3328}{1.04}$ or $3328 \times \frac{100}{104}$		3	M2 for $\frac{3328}{1.04}$ or $3328 \times \frac{100}{104}$ M1 for $\frac{3328}{104}$, 104% = 3328 or 32 seen
		3200		A1 cao
				Total 7 marks

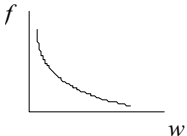
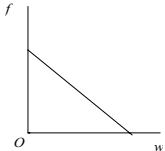
Q	Working	Answer	Mark	Notes
9.	(a) $5x - 2x = 7 + 4$		2	M1 for correct rearrangement
		$\frac{11}{3}, 3\frac{2}{3}$ oe		A1 Also accept 2 or more d.p. rounded or truncated e.g. 3.66, 3.67
	(b) $4 \times \frac{7-2y}{4}$ or $7 - 2y$ $= 4(2y + 3)$		4	M1 for clear intention to multiply both sides by 4 or a multiple of 4 For example, award for $4 \times \frac{7-2y}{4}$ or $7 - 2y$ $= 4 \times 2y + 3$ or $8y + 3$ or $2y + 3 \times 4$ or $2y + 12$
	$7 - 2y = 8y + 12$ or simpler			M1 for correct expansion of brackets (usually $8y + 12$) or for correct rearrangement of correct terms e.g. $8y + 2y = 7 - 12$
	$10y = -5$			A1 for reduction to correct equation of form $ay = b$
		$-\frac{1}{2}$ oe		A1
				Total 6 marks

Q	Working	Answer	Mark	Notes
10.				Accept decimals in parts (a) and (b)
	(a) $150 \times \frac{3}{5}$		3	B1 for $\frac{3}{5}$ seen
				M1 for $150 \times \frac{3}{5}$
		90		A1 cao Do not accept $\frac{90}{150}$
	(bi) $\frac{4}{5} \times \frac{3}{4}$		5	M1 for $\frac{4}{5} \times \frac{3}{4}$ seen
		$\frac{12}{20}$ or $\frac{3}{5}$ oe		A1
	(ii) $\frac{2}{5} \times \frac{1}{4} + \frac{3}{5} \times \frac{2}{4}$			M1 for $\frac{2}{5} \times \frac{1}{4}$ or $\frac{3}{5} \times \frac{2}{4}$ SC M1 for $\frac{2}{5} \times \frac{2}{5}$ or $\frac{3}{5} \times \frac{3}{5}$
				M1 (dep) for adding both above products SC M1 (dep) for adding both above products
		$\frac{8}{20}$ or $\frac{2}{5}$ oe		A1 for $\frac{8}{20}$ or $\frac{2}{5}$ oe
				Total 8 marks

Q	Working	Answer	Mark	Notes
11.	(a)	tangent at any point of a circle and the radius at that point are perpendicular	1	B1 for mention of tangent and radius or line from centre
	(b)	$6.9^2 - 5.7^2$ or $47.61 - 32.49$ or 15.12	5	M1 for squaring and subtracting
		$\sqrt{6.9^2 - 5.7^2}$		M1 (dep) for square root
		3.88844...		A1 for 3.89 or better
		$2 \times 5.7 + 2 \times "3.88844..."$		M1 for $2 \times 5.7 + 2 \times "3.888..."$ only
			19.2	A1 for 19.2 or answer which rounds to 19.2 (19.176888...)
				Total 6 marks

12.	(a)		10, 26, 41, 50, 56, 60	1	B1 cao
	(b)	Points correct		2	B1 $\pm \frac{1}{2}$ sq ft from sensible table
		Curve or line segments			B1 ft if 4 or 5 points correct or if points are plotted consistently within each interval (inc end points) at the correct height
	(c)	Use of $w = 430$ on graph		2	M1 may be shown on graph or implied by 43, 44 or 45 stated
			Approx 16		A1 If M1 scored, ft from cumulative frequency graph If no method shown, ft only from correct curve
					Total 5 marks

Q	Working	Answer	Mark	Notes
13.		lines	4	B3 B1 for each correct line (full or broken) ignore additional lines
		region		B1 for correct region shaded in or out or for correct region labelled R
				Total 4 marks
14.	(a) $r^2 = \frac{A}{\pi}$		2	M1 for $r^2 = \frac{A}{\pi}$ or $r^2 = A \div \pi$
		$\sqrt{\frac{A}{\pi}}$		A1 ignore \pm
	(bi) $\sqrt{\frac{13.5}{\pi}}$	2.07296...	4	M1 for 13.5 seen A1 for answer which rounds to 2.073
	(ii) $\sqrt{\frac{14.5}{\pi}}$ or 2.14836...			M1 for $\sqrt{\frac{14.5}{\pi}}$ or value which rounds to 2.148 or 2.149 cao
		2.1		A1 dep on previous 3 marks in (b)
				Total 6 marks

Q	Working	Answer	Mark	Notes
15.	(ai) $f = \frac{k}{w}$		4	M1 May be implied by $1500 = \frac{k}{200}$
		$f = \frac{300000}{w}$		A1 Also award if answer is $f = \frac{k}{w}$ but k is evaluated as 300 000 in (a) or (b)
	(ii)			B2 B1 for graph with negative gradient (increasing or constant) even if it touches or crosses one or both axes e.g. 
	(b) $f = \frac{300000}{1250}$		2	M1 for substitution in $f = \frac{k}{w}$
			240	A1 ft from k
				Total 6 marks

Q	Working	Answer	Mark	Notes
16.	(ai)	3b	3	B1
	(ii)	3b - a		B1
	(iii)	$\frac{2}{3}\mathbf{a} + \mathbf{b}$ or $\mathbf{a} + \frac{1}{3}(3\mathbf{b} - \mathbf{a})$ or $3\mathbf{b} - \frac{2}{3}(3\mathbf{b} - \mathbf{a})$ oe		B1
	(b)		2	<p>B2 for $\frac{2}{3}\mathbf{a}$ or $\frac{2}{3}\vec{PQ}$ or $k = \frac{2}{3}$ unless clearly obtained by non-vector method</p> <p>or for expression in terms of \mathbf{a} and/or \mathbf{b} (need not be simplified) for \vec{EF} either correct or ft from (a)</p> <p>B1 for correct vector statement with at least 3 terms which includes \vec{EF} (or \vec{FE}) in terms of capital letters and/or \mathbf{a}, \mathbf{b}</p> <p>eg $\vec{PQ} = \vec{PE} + \vec{EF} + \vec{FQ}$</p> <p>$\vec{PF} = \vec{PE} + \vec{EF}$ $\mathbf{a} = \mathbf{b} + \vec{EF} + \vec{FQ}$</p> <p>If an attempt is crossed out and replaced, mark all attempts, including crossed out one, and award best mark.</p>
				Total 5 marks

Q	Working	Answer	Mark	Notes
17.	$\left(\frac{dy}{dx} =\right) 2x - \frac{16}{x^2}$		4	B1 for 2x B1 for $\pm \frac{16}{x^2}$ or $\pm 16x^{-2}$
	" $2x \pm \frac{16}{x^2} = 0$ "			M1
		(2, 12)		A1 cao For answer (2, 12) with no preceding marks scored, award B0 B0 M1 A1
				Total 4 marks

18.	(a)	$\pi \times 2.8^2 + \frac{1}{2} \times 4\pi \times 2.8^2$		3	M2 M1 for each term Also award for values rounding to 24.6 and to 49.2 or 49.3
			73.9		A1 for 73.9 or for answer which rounds to 73.9
	(b)	$\sqrt[3]{125}$ or 5 seen		3	M1
		$25 \times 73.89\dots$			M1 for $25 \times (a)$ or for $\pi \times (2.8 \times 5)^2 + 2\pi \times (2.8 \times 5)^2$ or for substituting $r = 2.8 \times 5$ in the expression used in (a)
			1850		A1 for 1850 or for any value in range 1846.3 - 1847.5 ft from $25 \times (a)$
					Total 6 marks

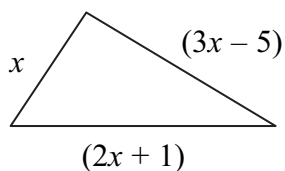
Q	Working	Answer	Mark	Notes
19.	$x^2 + (3x - 1)^2 = 5$		6	M1 for correct substitution
	$x^2 + 9x^2 - 3x - 3x + 1 = 5$ or $x^2 + 9x^2 - 6x + 1 = 5$			B1 (indep) for correct expansion of $(3x - 1)^2$ even if unsimplified
	$10x^2 - 6x - 4 = 0$			B1 for correct simplification
	$(5x + 2)(2x - 2) = 0$ or $(5x + 2)(x - 1) = 0$ or $(10x + 4)(x - 1) = 0$ or $\frac{6 \pm \sqrt{196}}{20}$ or $\frac{3 \pm \sqrt{49}}{10}$ or $\frac{3}{10} \pm \frac{\sqrt{49}}{10}$			B1 for correct factorisation or for correct substitution into the quadratic formula and correct evaluation of ' $b^2 - 4ac$ ' or for using square completion correctly as far as indicated
	$x = -\frac{2}{5}$ or $x = 1$			A1 for both values of x
		$x = -\frac{2}{5}, y = -2\frac{1}{5}$ $x = 1, y = 2$		A1 for complete, correct solutions
				Total 6 marks
				PAPER TOTAL 100 MARKS

Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. The diagram shows the lengths, in cm, of the sides of a triangle.



The perimeter of the triangle is 17 cm.

- (i) Use this information to write an equation in x .

.....

- (ii) Solve your equation.

$x =$

Q1

(Total 3 marks)

2. Anji mixes sand and cement in the ratio 7 : 2 by weight.
The total weight of the mixture is 27 kg.

Calculate the weight of sand in the mixture.

..... kg

Q2

(Total 3 marks)



3. Solve $5(x - 4) = 35$

$x = \dots\dots\dots$

(Total 3 marks)

Q3

4. Julian has to work out $\frac{6.8 \times 47.6}{2.09}$ without using a calculator.

(a) Round each number in Julian's calculation to one significant figure.

$\dots\dots\dots$
(2)

(b) Use your rounded numbers to work out an estimate for $\frac{6.8 \times 47.6}{2.09}$

Give your answer correct to one significant figure.

$\dots\dots\dots$
(2)

(c) Without using your calculator, explain why your answer to part (b) should be larger than the exact answer.

$\dots\dots\dots$
 $\dots\dots\dots$
 $\dots\dots\dots$

(2)

(Total 6 marks)

Q4



5. The diagram shows a wall.

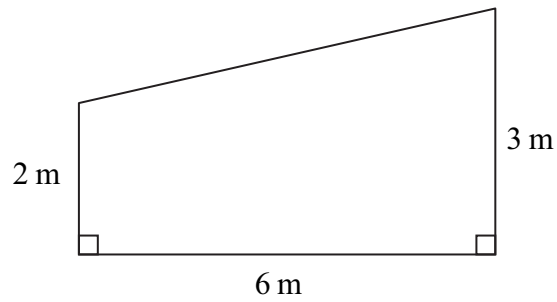


Diagram **NOT** accurately drawn

(a) Calculate the area of the wall.

..... m²
(2)

(b) 1 litre of paint covers an area of 20 m².
Work out the volume of paint needed to cover the wall.
Give your answer in cm³.

..... cm³
(3)

(Total 5 marks)

Q5



6. Solve the simultaneous equations

$$y = x + 3$$
$$y = 7x$$

$x = \dots\dots\dots$

$y = \dots\dots\dots$

(Total 3 marks)

Q6



7. (a)

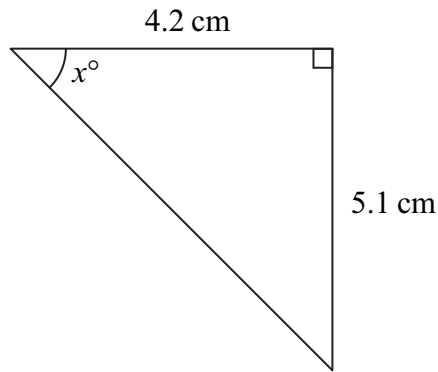


Diagram **NOT** accurately drawn

Calculate the value of x .
Give your answer correct to 3 significant figures.

$x = \dots\dots\dots$
(3)

(b)

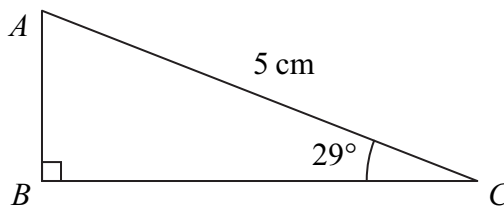


Diagram **NOT** accurately drawn

Calculate the length of AB .
Give your answer correct to 3 significant figures.

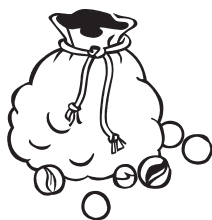
$\dots\dots\dots$ cm
(3)

(Total 6 marks)

Q7



8. A bag contains some marbles.
The colour of each marble is red or blue or green or yellow.



A marble is taken at random from the bag.
The table shows the probability that the marble is red or blue or green.

Colour	Probability
Red	0.1
Blue	0.2
Green	0.1
Yellow	

- (a) Work out the probability that the marble is yellow.

.....
(2)

- (b) Work out the probability that the marble is blue or green.

.....
(2)

The probability that the marble is made of glass is 0.8

- (c) Beryl says “The probability that the marble is green or made of glass is $0.1 + 0.8 = 0.9$ ”

Is Beryl correct?

Give a reason for your answer.

.....
.....
(2)

(Total 6 marks)

Q8



9.

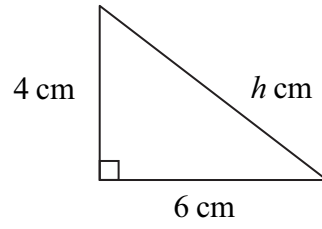


Diagram **NOT** accurately drawn

Calculate the value of h .
Give your answer correct to 3 significant figures.

$h = \dots\dots\dots$

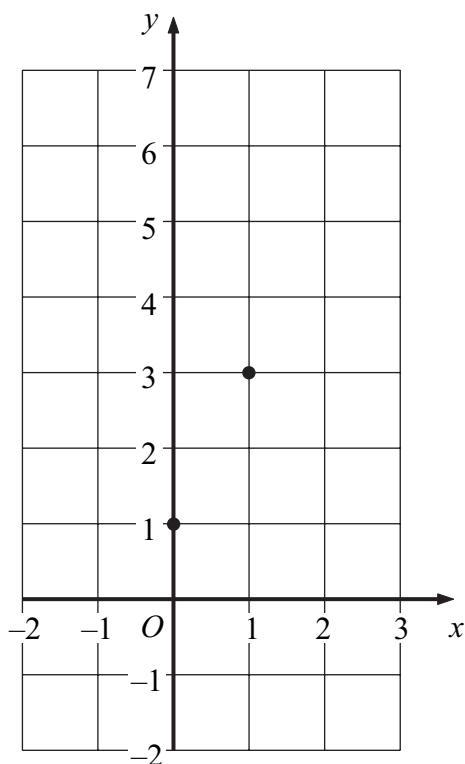
(Total 3 marks)

Q9

PLEASE TURN OVER FOR QUESTION 10



10. (a)



Find the equation of the straight line that passes through the points (0, 1) and (1, 3).

.....
(4)

(b) Write down the equation of a line parallel to the line whose equation is $y = -2x + 5$

.....
(1)

(c) Write down the coordinates of the point of intersection of the two lines whose equations are $y = 3x - 4$ and $y = -2x - 4$

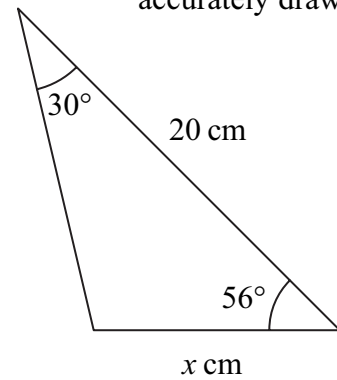
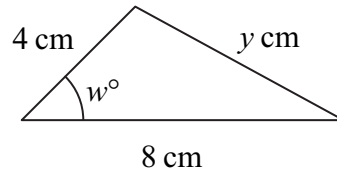
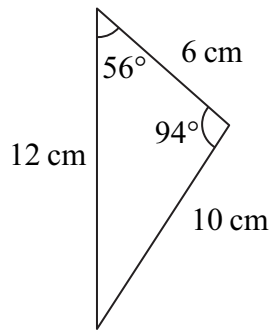
(.....,)
(1)

(Total 6 marks)

Q10



11. Here are three similar triangles.



Diagrams **NOT** accurately drawn

Find the value of

(a) w ,

$w = \dots\dots\dots$
(1)

(b) x ,

$x = \dots\dots\dots$
(2)

(c) y .

$y = \dots\dots\dots$
(2)

(Total 5 marks)

Q11



12. Simplify

(a) $\frac{a^3 \times a^4}{a^2}$

.....
(2)

(b) $(\sqrt{x})^6$

.....
(1)

(c) $\frac{3(x+1)^2}{6(x+1)}$

.....
(2)

(Total 5 marks)

Q12



13. Here are the marks scored in a maths test by the students in two classes.

Class A 2 13 15 16 4 6 19 10 11 4 5 15 4 16 6

Class B 12 11 2 5 19 14 6 6 10 14 9

(a) Work out the interquartile range of the marks for each class.

Class A

Class B

(4)

(b) Use your answers to give one comparison between the marks of Class A and the marks of Class B.

.....

.....

(1)

(Total 5 marks)

Q13

14. Solve

$$\frac{5x-7}{x-1} = x+1$$

.....

(Total 4 marks)

Q14



15. There are 35 students in a group.
 18 students play hockey.
 12 students play both hockey and tennis.
 15 students play neither hockey nor tennis.

Find the number of students who play tennis.

.....

Q15

(Total 4 marks)

16. A triangle has sides of length 5 cm, 6 cm and 9 cm.

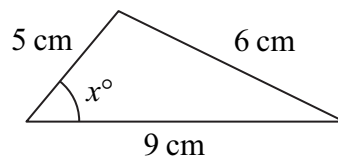


Diagram **NOT** accurately drawn

Calculate the value of x .
 Give your answer correct to 3 significant figures.

$x =$

Q16

(Total 3 marks)



17. The functions f and g are defined as follows.

$$f(x) = \frac{1}{x+2}$$

$$g(x) = \sqrt{x-1}$$

(a) (i) State which value of x cannot be included in the domain of f .

.....

(ii) State which **values** of x cannot be included in the domain of g .

.....

(3)

(b) Calculate $fg(10)$

.....

(3)

(c) Express the inverse function g^{-1} in the form $g^{-1}(x) = \dots$

.....

(4)

(Total 10 marks)

Q17

--	--



18. A fair, 6-sided dice has faces numbered 1, 2, 3, 4, 5 and 6
When the dice is thrown, the number facing up is the score.
The dice is thrown three times.

(a) Calculate the probability that the total score is 18

.....
(2)

(b) Calculate the probability that the score on the third throw is exactly double the **total**
of the scores on the first **two** throws.

.....
(4)

(Total 6 marks)

Q18



19. (a) Calculate the area of an equilateral triangle of side 5 cm.
Give your answer correct to 3 significant figures.

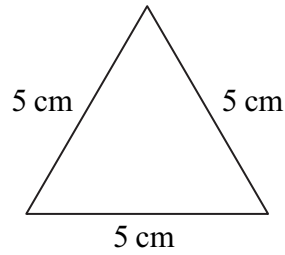


Diagram **NOT** accurately drawn

..... cm²
(2)

- (b) The diagram shows two overlapping circles.
The centre of each circle lies on the circumference of the other circle.
The radius of each circle is 5 cm.
The distance between the centres is 5 cm.

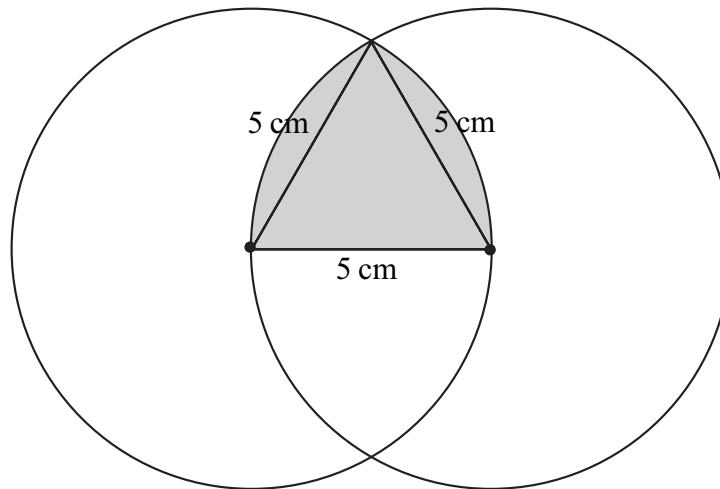


Diagram **NOT** accurately drawn

Calculate the area of the shaded region.
Give your answer correct to 3 significant figures.

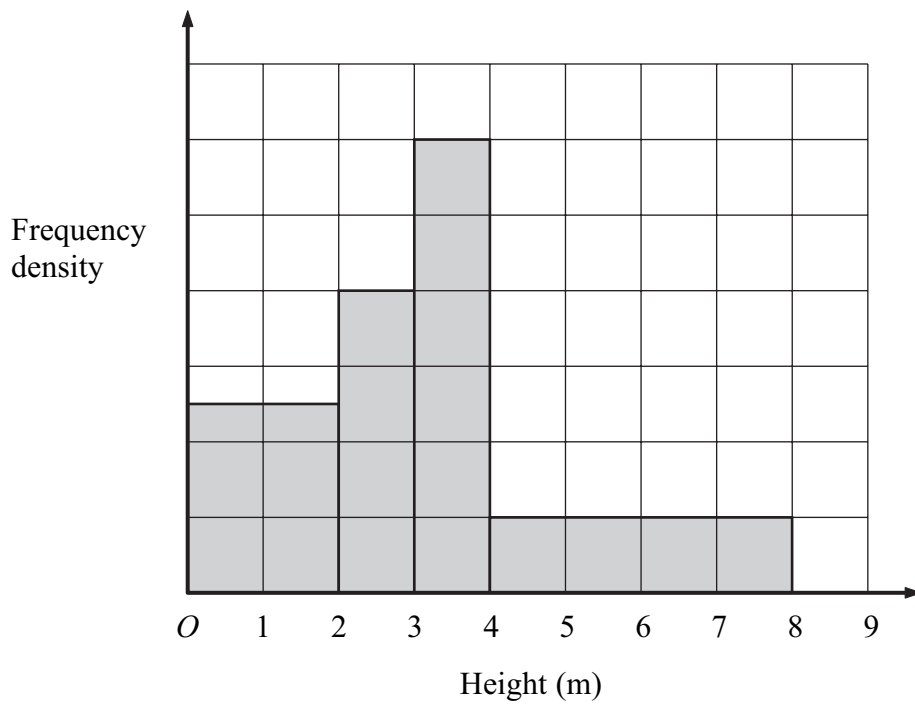
..... cm²
(3)

(Total 5 marks)

Q19



20. The histogram shows information about the height, h metres, of some trees.



The number of trees with heights in the class $2 < h \leq 3$ is 20

Find the number of trees with heights in the class

(i) $4 < h \leq 8$

.....

(ii) $3 < h \leq 4$

.....

(Total 3 marks)

Q20



21. (a) Factorise $16x^2 - 1$

.....
(1)

(b) Hence express as the product of its prime factors

(i) 1599

.....

(ii) 1.599×10^6

.....
(5)

Q21

(Total 6 marks)

TOTAL FOR PAPER: 100 MARKS

END



**4400 IGCSE Mathematics
Summer 2007
Paper 4H**

Q	Working	Answer	Mark	Notes
1. (i) (ii)	$6x = 21$ or $6x - 21 = 0$ etc	$x + 2x + 1 + 3x - 5 = 17$ $x = 3.5$ oe eg $^{21}/_6$	1 2	B1 B1 oe eg $6x - 4 = 17$ ISW not '= p' M1 ft (i) if $6x = c$ A1
				Total 3 marks
2.	9 seen $7/9 \times 27$ or $7 \times 27/9$ oe	21	3	B1 M1 dep B1 A1 21 seen, & ans = 3 B1M1A0
				Total 3 marks
3.	$5x - 20 = 35$ $5x = 55$	11	3	M1 M1 or M2 for $x - 4 = 7$ A1
				Total 3 marks

Q	Working	Answer	Mark	Notes	
4.	(a) $\frac{7 \times 50}{2}$ or 7, 50, 2 (b) 175		2	B1 for 7 and 2 B1 for 50 M1 $\frac{(6or7) \times (48or50)}{2 \text{ or } 3}$ correctly eval'd eg 168	
	(c)	200 or 100 Num incr or 6.8 & 47.6 incr denom decr or 2.09 decr (b) rnded up (not rnd to 1 sf) or '175' rnded to 200	2 2	A1 A1f If no wking: ft (a) B2 any two of these B1 B2 any two of these B1 B1 any one of these Ignore other	
				Total 6 marks	
5.	(a) $(2 + 3)/2 \times 6$ or $2 \times 6 + \frac{1}{2} \times 6 \times 1$ oe (b) $\frac{15}{20} \times 1000$ $\frac{1000}{15} \times 20$ $\frac{1000 \times 15}{20}$		15 750	2 3	M1 A1 M1 or 0.75 M1 ft '15' for M1M1 only A1
				Total 5 marks	

Q	Working	Answer	Mark	Notes
6.	$x + 3 = 7x$ ($6x = 3$ oe) $7y = 7x + 21$ ($6y = 21$)	$x = 1/2, y = 3 1/2$	3	M1 $y = 7(y-3)$ $y = 7y-21$ $0 = 6x -3$ A1 A1
Total 3 marks				
7. (a)	tan used $\tan x = 5.1/4.2$ or $\tan x = 1.2\dots$ oe	$x = 50.5\dots$	3	M1 (sin or cos) & $(\sqrt{4.2^2+5.1^2})$ or (6.61) used M1 $\sin x = 5.1/\sqrt{4.2^2+5.1^2}$ or $\cos x = 4.2/\sqrt{4.2^2+5.1^2}$ A1
(b)	$\sin 29 = AB/5$ or $c/\sin 29 = 5/\sin 90$ $AB = 5\sin 29$	$AB = 2.42\dots$ cm	3	M1 $BC = 5\cos 29$ M1 $AB = \sqrt{(52+(5\cos 29)^2)}$ or $5\cos 29 \times \tan 29$ A1
Total 6 marks				
8. (a)	$1 - (0.1 + 0.2 + 0.1)$ or $1 - 0.4$ oe	0.6	2	M1 or 0.6 in table A1 allow in table if not contrad on line
(b)	$0.2 + 0.1$ or $1 - ('0.6' + 0.1)$	0.3	2	M1 or 0.3 seen A1
(c)		(Poss) overlap or mut excl or doesn't wk for B or Y } No or poss or poss yes }	2	B2 Can't tell & (No or poss) B1 Correct reason only: B1 Incorrect reason: B0 Unqualified Yes: B0
Total 6 marks				

Q	Working	Answer	Mark	Notes
9.	$4^2 + 6^2$ (= 52) $\sqrt{4^2 + 6^2}$ or $\sqrt{52}$ or $2\sqrt{13}$	$h = 7.21\dots$	3	M1 M1 M1 dep A1
				Total 3 marks
10. (a)	V/H in any correct triangle attempted Grad = 2, may be embedded or implied	$y = '2'x + 1$	4	M1 eg $\frac{3-1}{1-0}$ not $\frac{3}{1}$ A1 M1 B2f B1f for grad. B1 for y-int (lin eqn) or B1f for just $'2'x + 1$ No wking, ans $2x + 1$: M1A1 B1
(b)		$y = -2x \pm c$	1	B1 $y = -2x \pm$ any no. (not 5) or letter or $y = -2x$
(c)		(0, -4)	1	B1
				Total 6 marks
11. (a)		56	1	B1
(b)	$x/20 = 6/12$ or $4/8$ oe	10 or 10.0....	2	M1 or $x/\sin 30 = 20/\sin(180-30-56)$ A1
(c)	$y/10 = 4/6$ or $8/12$ oe	6.6 to 6.7 incl oe	2	M1 or $y = \sqrt{4^2+8^2-2 \times 4 \times 8 \times \cos '56'}$ or $y/\sin 56 = 8/\sin(180-30-56)$ A1 (a)(b): ft (a) M-mks only
				Total 5 marks

Q	Working	Answer	Mark	Notes
12. (a)	a^7 / a^2 or $a \times a^4$ or $a^3 \times a^2$			M1
		a^5	2	A1
(b)		x^3	1	B1
(c)	Correctly cancel numbers or $(x + 1)$			M1
		$^{1/2}(x + 1)$ or $0.5(x + 1)$ or $\frac{x+1}{2}$ or $\frac{x}{2} + \frac{1}{2}$ or equiv	2	A1
				Not ISW
				Total 5 marks
13. (a)	Attempt arrange one set in order State or indicate correct 15 & 4 or 14 & 6	A: 11 B: 8	4	M1 M1 NB: IQR for B = 8, check wking
(b)		A more spread or gter dispersion or less consistent than B	1	A1 A1 B1 B1f Consistent with (a). Ignore other. Not: gter "range" or "difference" or "more constant" or "gter IQR" or "gter variance"
				Total 5 marks

Q	Working	Answer	Mark	Notes
14.	$5x - 7 = x^2 - 1$ or $5x - 7 = (x - 1)(x + 1)$ $x^2 - 5x + 6 = 0$ $(x - 2)(x - 3) (= 0)$ or $\frac{5 \pm \sqrt{(-5)^2 - 4 \times 6}}{2}$	$x = 2$ or 3	4	M1 condone $5x - 7 = x - 1 \times x + 1$ M1 allow different order with $= 0$ M1 $(x - 2.5)^2 + 6 - 6.25$ A1 T & I or no wking: 4 mks or 0 mks
				Total 4 marks
15.	2 overlapping circles, 12 in overlap 6 in H only 2 in T only	14	4	M1 M1 or 6 play H only M2 M1 or 20-6, 6+12+x=20, 20-18, 35-33: M3 A1 ans 2: M3A0
				Total 4 marks
16.	$9^2 + 5^2 - 2 \times 5 \times 9 \times \cos x = 6^2$ $90 \cos x = 70$ or $-90 \cos x = -70$ $(\cos x = \frac{70}{90})$	$x = 38.9$ or better	3	M1 or $\cos x = \frac{9^2 + 5^2 - 6^2}{2 \times 5 \times 9}$ M2 M1 A1
				Total 3 marks

Q	Working	Answer	Mark	Notes
17. (ai)		-2	1	B1 or $x \neq -2$ or $x = -2$
(ii)		$x < 1$	2	B2 B1 for $x \leq 1$ or 0, -1, -2, -3 . . .
(b)	$\sqrt{9}$ or $\sqrt{(10 - 1)}$ $\frac{1}{\text{her}\sqrt{9 + 2}}$			M1 or $\frac{1}{\sqrt{x-1+2}}$
(c)	$y = \sqrt{x - 1}$ - 1, $\sqrt{}$ $y^2 = x - 1$ Reverse order $x = y^2 + 1$ squ, + 1	$1/5$ or 0.2	3	A1 ignore ans = -1 M1 M1 $y = \sqrt{x - 1}$ M1 M1dep $x = \sqrt{y - 1}$ condone $\sqrt{x-1}$ if next step correct
		$(g^{-1}(x) =) x^2 + 1$ oe	4	M1 M1 $x^2 = y - 1$ A1 $y^2 + 1$ M3 $y = x^2 + 1$ M3 $x = x^2 + 1$ M3 SC $(g^{-1}(x) =) (x + 1)^2$: B1
				Total 10 marks
18. (a)	$1/6 \times 1/6 \times 1/6$ alone	$1/216$ or 0.0046...	2	M1 0.17^3 or 0.16^3 or better. Not $\times k$ A1
(b)	1,1,4 or 1,2,6 or 2,1,6 seen or implied 1, 1, 4 <u>and</u> 1, 2, 6 (or 2, 1, 6) seen or implied $(1/6)^3 \times 3$	$1/72$ or $3/216$ or 0.014 or better	4	M1 ie one route M1 ie two routes incl 1, 1, 4 M1 ie three routes and correct exp'n A1 $(1/6)^3 \times 2$ or $1/108$, no wking: M0A0
				Total 6 marks

Q	Working	Answer	Mark	Notes
19. (a)	$\frac{1}{2} \times 5 \times 5 \times \sin 60$	10.8...	2	M1 $\frac{1}{2} \times 5 \times \sqrt{(5^2 - (\frac{5}{2})^2)}$ or $\frac{1}{2} \times 5 \times 4.33$ A1 $(25\sqrt{3})/4$ M1A0
(b)	sect = $\frac{1}{6} \times \pi \times 5^2$ or 13.1 "10.8" + $2(\frac{1}{6} \times \pi \times 5^2 - \text{"10.8"})$ or "10.8" + 2×2.26 or $2 \times \frac{1}{6} \times \pi \times 5^2 - \text{"10.8"}$	15.4 cm ²	3	M1 $\Delta + 2(\text{sect} - \Delta)$ M1 or $2 \times \text{sect} - \Delta$ Allow eg $\Delta = \frac{1}{2} \times 5 \times 5$ A1
				Total 5 marks
20 (i)		20	1	M1 B1
(ii)		30	2	A1 B2 or 1 sq reps freq of 5 seen anywhere: B1
				Total 3 marks
21. (a)		$(4x - 1)(4x + 1)$	1	B1
(bi)	$16 \times 10^2 - 1$ seen or implied $(4 \times 10 - 1)(4 \times 10 + 1)$ or 39×41	$3 \times 13 \times 41$	3	M1 13 or 39 or 41 or 123 as factor M1 factors 3, 13, 41 or 39, 41 or 13, 123 A1 Ans 3×533 M0A0
(ii)	1599×10^3 or 1599×1000	' $3 \times 13 \times 41$ ' $\times 2^3 \times 5^3$ oe	2	M1 or tree including 1000 or 10 and 100 A1f ft her (i) $\times 2^3 \times 5^3$
				Total 3 marks

Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4400/3H

Examiner's use only

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London Examinations IGCSE

Team Leader's use only

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Mathematics

Paper 3H

Higher Tier

Monday 5 November 2007 – Afternoon

Time: 2 hours

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.

Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.

If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 21 questions in this question paper. The total mark for this paper is 100.

There are 20 pages in this question paper. Any blank pages are indicated.

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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Answer ALL TWENTY ONE questions.
Write your answers in the spaces provided.
You must write down all stages in your working.

1. The diagram shows a regular 5-sided polygon, with centre O .

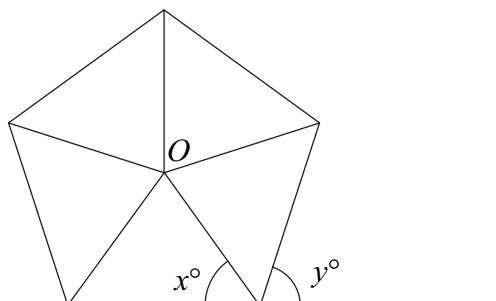


Diagram **NOT** accurately drawn

Work out the value of

- (a) x ,

$x = \dots\dots\dots$
(3)

- (b) y .

$y = \dots\dots\dots$
(2)

(Total 5 marks)

Q1



2. The table shows information about the scores in a game.

Score	Frequency
1	5
2	8
3	3
4	4

Work out the mean score.

.....

(Total 3 marks)

Q2



3. A triangle has two equal sides of length $2x$ cm and one side of length x cm.

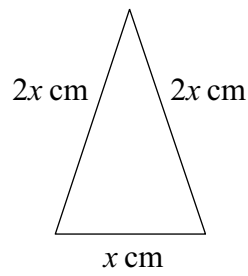


Diagram **NOT** accurately drawn

The perimeter of this triangle is 12 cm.

(i) Use this information to write down an equation in x .

.....

(ii) Solve your equation to find the value of x .

$x =$

(Total 3 marks)

Q3



4. The total number of students in Denton College is 280
160 of the students in Denton College are in Year 1
Express 160 as a percentage of 280
Give your answer correct to 2 significant figures.

.....%

(Total 2 marks)

Q4



5. (a) Calculate the area of a circle of radius 2 m.
Give your answer correct to 3 significant figures.

.....m²
(2)

- (b) A circular pond has a radius of 2 m.
There is a path of width 1 m around the pond.

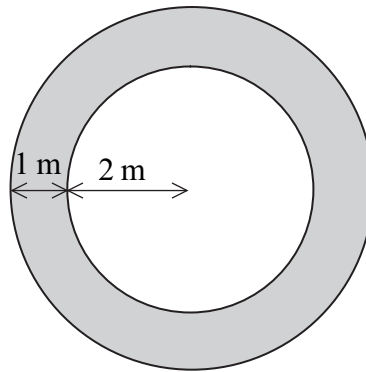


Diagram **NOT** accurately drawn

Calculate the area of the path.
Give your answer correct to 3 significant figures.

.....m²
(2)

- (c) Calculate the outer circumference of the path.
Give your answer correct to 3 significant figures.

.....m
(2)

(Total 6 marks)

Q5



6.

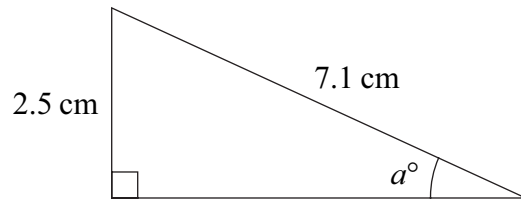


Diagram **NOT** accurately drawn

Calculate the value of a .
Give your answer correct to 3 significant figures.

$a = \dots\dots\dots$

(Total 3 marks)

Q6

7. (a) $A = \{1, 2, 3, 4\}$
 $B = \{2, 4, 6, 8\}$

Write down the members of $A \cup B$.

.....
(2)

- (b) $\mathcal{E} = \{\text{Positive integers less than 10}\}$
 $P = \{3, 4, 5, 6, 7, 8\}$
 $P \cap Q = \emptyset$

Write down all the possible members of Q .

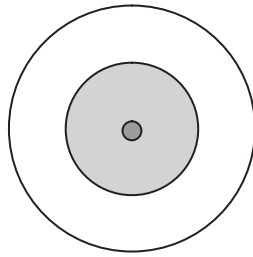
.....
(2)

(Total 4 marks)

Q7



8. Jim fires an arrow at a target.



The table shows all the possible outcomes and the probabilities of three of these outcomes.

Result	Probability
Bull's Eye	
Inner Ring	0.3
Outer Ring	0.4
Miss	0.2

Work out the probability that Jim's arrow will hit either the Bull's Eye **or** the Inner Ring.

.....
(Total 3 marks)

Q8



9. (a) Expand $4(v + 3)$

.....
(1)

(b) Simplify $\frac{w^3 \times w^7}{w^2}$

.....
(2)

(c) Solve the equation $\frac{17-x}{7} = 3$

$x =$
(3)

(d) Solve the inequality $4y - 5 < 6$

.....
(2)

(Total 8 marks)

Q9



10. The table shows the carbon dioxide emissions, in tonnes, produced by each of four regions in 2001.

Country	Carbon dioxide emissions
USA	5.7×10^9
Africa	8.4×10^8
Russia	1.4×10^9
China	3.2×10^9

(a) Which of these regions produced the lowest carbon dioxide emissions?

.....
(1)

(b) Work out the total carbon dioxide emissions produced by these four regions. Give your answer in standard form correct to 3 significant figures.

.....tonnes
(2)

(c) $1.4 \times 10^9 = k \times 8.4 \times 10^8$
Calculate the value of k .

$k =$
(2)

(Total 5 marks)

Q10



11. Make x the subject of $3x - y = x + 7$

$x = \dots\dots\dots$

Q11

(Total 3 marks)

12.

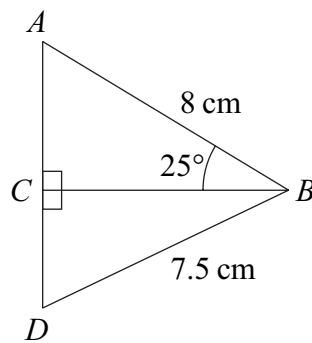


Diagram **NOT** accurately drawn

(i) Calculate the length of BC .

$\dots\dots\dots$ cm

(ii) Calculate the length of CD .
Give your answer correct to 3 significant figures.

$\dots\dots\dots$ cm

(Total 5 marks)

Q12



13. Factorise

(a) $x^2 - 100$

.....
(1)

(b) $x^2 - x - 12$

.....
(2)

(c) $3x^2 + 7x + 2$

.....
(2)

(Total 5 marks)

Q13



14. Solve the simultaneous equations

$$2x + 5y = 16$$

$$4x + 3y = 11$$

$x = \dots\dots\dots$

$y = \dots\dots\dots$

(Total 3 marks)

Q14



15. Work out the area of the shaded sector of the circle.
Give your answer correct to 3 significant figures.

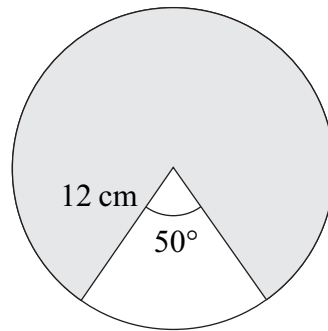


Diagram **NOT** accurately drawn

..... cm²

(Total 4 marks)

Q15

16. Simplify

(a) $\frac{x^2 - 3x}{2x - 6}$

.....
(3)

(b) $\frac{2}{x-1} - \frac{3}{x}$

.....
(3)

(Total 6 marks)

Q16



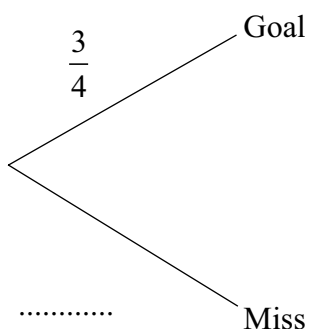
17. Each time Nikos has a shot at goal, the probability that he will score a goal is $\frac{3}{4}$

Nikos takes two shots.

(a) Complete the probability tree diagram.

First shot

Second shot



(2)

(b) Calculate the probability that Nikos will score

(i) two goals,

.....
(2)

(ii) exactly one goal.

.....
(3)



Nikos now takes another three shots.

(c) Calculate the probability that he will score exactly 1 goal or exactly 2 goals.

.....
(3)

Q17

(Total 10 marks)

18. Some cases have to be lifted by a crane.
Each case has a mass of 68 kg, correct to 2 significant figures.

(a) Write down the upper bound of the mass of a case.

..... kg
(1)

A crane can lift safely a load of 1200 kg, correct to 2 significant figures.

(b) Find the greatest number of cases that the crane can lift safely in one load.

.....
(3)

Q18

(Total 4 marks)



19. A wind turbine generates a power of P kilowatts when the wind speed is w m/s.

P is proportional to w^3 .

$P = 300$ when $w = 12$

(a) Find a formula for P in terms of w .

.....
(3)

(b) Calculate the value of P when $w = 7.5$
Give your answer correct to 3 significant figures.

$P =$
(2)

(c) When the wind speed is x m/s, the wind turbine generates twice as much power as it does when the wind speed is 10 m/s.
Calculate the value of x .
Give your answer correct to 3 significant figures.

$x =$
(4)

(Total 9 marks)

Q19



20. (a) Expand $(1 + \sqrt{3})^2$
 Give your answer in the form $a + b\sqrt{3}$ where a and b are integers.

.....
 (2)

(b)

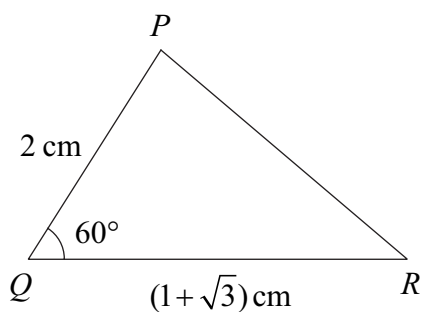


Diagram **NOT** accurately drawn

Calculate the exact length of PR .
 Give your answer as a surd.

..... cm
 (4)

(Total 6 marks)

Q20

PLEASE TURN OVER FOR QUESTION 21



21. A coin is biased so that the probability that it shows heads on any one throw is p .
The coin is thrown twice.

The probability that the coin shows heads exactly once is $\frac{8}{25}$

Show that $25p^2 - 25p + 4 = 0$

Q21

(Total 3 marks)

TOTAL FOR PAPER: 100 MARKS**END**

4400 IGCSE Mathematics
November 2007
Paper 3H

Q		Working	Answer	Mark	Notes
1.	(a)	$360 / 5$ (= 72) $(180 - \text{"72"}) / 2$	54	3	M1 M1 A1 dep or: $3 \times 180 \div 5$ $\div 2$
	(b)	$360 / 5$ or $180 - 2 \times \text{"54"}$	72	2	M1 A1f or 72 seen
					Total 5 marks

2.		$1 \times 5 + 2 \times 8 + 3 \times 3 + 4 \times 4$ (= 46) $/ 20$	2.3	3	M1 M1 A1 dep. Allow / his Σf or 2 if $46/20$ seen
					Total 3 marks

3.	(b)(i)		$2x + 2x + x = 12$	1	B1 oe ISW allow in (ii) if not contrad in (i) ignore units
	(ii)	$5x = 12$	$x = 2.4$	2	M1 A1 allow in (i) if not contrad in (ii) $4x = 12$ SC1 $x = 2.4$, no wking: BOM1A1
					Total 3 marks

4.	(b)	$\frac{160}{280} \times 100$ or $4/7 \times 100$	57(.1...)	2	M1 A1
					Total 2 marks

5.	(a)	$\pi \times 2^2$	12.6	2	M1 A1	12.6 or better
	(b)	$\pi \times 3^2 - (\text{"12.6"} \text{ or } \pi \times 2^2)$	15.7 to 15.8	2	M1 A1	$\pi \times 3^2 - \dots$
	(c)	$2 \times \pi \times 3$	18.8	2	M1 A1	allow $2\pi \times 3 - 2\pi \times 2$ for M1 only 18.8 to 18.9 (incl)
						Total 6 marks

6.		sin 2.5/7.1 or 0.352.....	20.6.....	3	M1 A1 A1	not sin 90
						Total 3 marks

7.	(a)		1, 2, 3, 4, 6, 8	2	B2	no repetitions B1 with repeats or one digit omitted
	(b)		1, 2, 9	2	B2	B1 if one digit is omitted or 1, 2, 9, 10
						Total 4 marks

8.		$0.4 + 0.2$ $1 - (0.4 + 0.2)$	0.4	3	M1 M1 A1	dep $1 - (0.3 + 0.4 + 0.2)$ or 0.1 in table "0.1" + 0.3
						Total 3 marks

9.	(a)		$4v + 12$	1	B1	
	(b)		w^8	2	B2	w^{10} seen: B1
	(c)	$17 - x = 3 \times 7$ $17 = 21 + x$ or $-x = 4$	$x = -4$	3	M1 M1 A1	or $17 = 3 \times 7 + x$
	(d)	$4y < 6 + 5$	$y < 2.75$	2	M1 A1	allow "=" only if ans incl "y <" or $y < 11/4$ or $y < 2^{3/4}$ on line
						Total 8 marks

10.	(a)		Africa	1	B1	or 8.4×10^8
	(b)		1.11×10^{10} or 1.114×10^{10}	2	M1 A1	M1 for figs 111 or 1114
	(c)		1.66... or 1.7 or 1.67 or 1.66 or $5/3$ or $1^{2/3}$	2	B2	B1 for figs 166... or 17 or 167 or 166
						Total 5 marks

11.		$2x - y = 7$ or $3x = x + y + 7$ $2x = y + 7$	$(y + 7)/2$	3	M1 M1 A1	correctly collect x terms correctly add y to bs or $1/2(y + 7)$ or $y/2 + 3.5$ etc
						Total 3 marks

12.	(a)	$BC/8 = \cos 25$ or $= 8 \cos 25$	7.25(046..)	2	M1 A1	
	(b)	$7.5^2 - "7.25046..."^2$ $\sqrt{7.5^2 - "7.25046..."^2}$	1.92...	3	M1 M1 A1f	dep ft (a)
						Total 5 marks

13.	(a)		$(x + 10)(x - 10)$	1	B1	or $(x - 10)(x + 10)$ ignore "solutions"
	(b)	$(x \pm 4)(x \pm 3)$	$(x - 4)(x + 3)$	2	M1 A1	ignore "solutions"
	(c)	$(3x\dots)(x\dots)$ or $(\dots + 1)(\dots + 2)$	$(3x + 1)(x + 2)$	2	M1 A1	ignore "solutions"
						Total 5 marks

14.		$4x + 10y = 32$ or $x = (16-5y)/2$ or similar			M1	Mult so coeffs of x or y are equal or make x or y subject Allow error in constant term
			$x = \frac{1}{2}, y = 3$	3	A1A1	
						Total 3 marks

15.		$\frac{360 - 50}{360}$ or 0.861 $\frac{310}{360} \times \pi \times 12^2$			M1 M1 M1 A1	$\frac{50}{360} \times \pi \times 12^2$ $\pi \times 12^2 - \frac{50}{360} \times \pi \times 12^2$
			389 to 390	4		
						Total 4 marks

16.	(a)	$x(x - 3), 2(x - 3)$	$\frac{x}{2}$	3	M1M1 A1	
	(b)	$2x - 3(x - 1)$ or $2x - 3x + 3$ oe $(x - 1)x$ or $x^2 - x$	$\frac{3-x}{x(x-1)}$ or $\frac{3-x}{x^2-x}$	3	M1 M1 A1	in denom
						Total 6 marks

17.	(a)		All correct	2	B2	ignore branches for 3 rd shot correct structure & labels <u>or</u> probs: B1
	(b)(i)	$(\frac{3}{4})^2$	$\frac{9}{16}$ or 0.5625	2	M1 A1	or 0.563
	(ii)	$\frac{3}{4} \times \frac{1}{4}$ $\frac{3}{4} \times \frac{1}{4} + \frac{1}{4} \times \frac{3}{4}$	$\frac{3}{8}$ or $\frac{6}{16}$ or 0.375	3	M1 M1 A1	
	(c)	$(\frac{3}{4})^3$ or $(\frac{1}{4})^3$ $1 - ((\frac{3}{4})^3 + (\frac{1}{4})^3)$	$\frac{9}{16}$ or 0.5625	3	M1 M1 A1	$(\frac{3}{4})^2 \times (\frac{1}{4})$ or $(\frac{1}{4})^2 \times \frac{3}{4}$ $3 \times (\frac{3}{4})^2 \times (\frac{1}{4}) + 3 \times (\frac{1}{4})^2 \times \frac{3}{4}$ or 0.563 $(\frac{3}{4})^2 \times (\frac{1}{4})^3$ or $(\frac{1}{4})^4 \times \frac{3}{4}$ M1 $10 \times (\frac{3}{4})^2 \times (\frac{1}{4})^3 + 5 \times (\frac{1}{4})^4 \times \frac{3}{4}$ M1 $\frac{105}{1024}$ A1
						Total 10 marks

18.	(a)		68.5	1	B1	or 68.4 $\dot{9}$ (with dot) or 68.499 (at least two 9's) or 68.49.....
	(b)	1150/"68.5" 16.8	16	3	M1 A1 A1	
						Total 4 marks

19.	(a)	$P = kw^3$ $300 = k \times 12^3$	$P = \frac{25}{144} w^3$	3	M1 M1 A1	or $P = 0.174w^3$ oe
	(b)	$\frac{25}{144} \times 7.5^3$	73.2	2	M1 A1f	
	(c)	$\frac{25}{144} \times 10^3$ (= 174) $2 \times \frac{25}{144} \times 10^3 = \frac{25}{144} \times w^3$ $\sqrt[3]{2000}$	12.6	4	M1 M1 M1 A1	$\frac{25}{144}$ can be k $2 \times "174" = "0.174" \times w^3$ or $2000 = w^3$ or $10 \times \sqrt[3]{2}$ M3
						Total 9 marks

20.	(a)	$1 + \sqrt{3} + \sqrt{3} + 3$	$4 + 2\sqrt{3}$	2	M1 A1	oe
	(b)	$2^2 + (1 + \sqrt{3})^2 - 2 \times 2 \times (1 + \sqrt{3}) \cos 60$ $= 4 + "4 + 2\sqrt{3}" - 2(1 + \sqrt{3})$ $= 6$	$\sqrt{6}$	4	M1 M1 A1 A1	oe allow $2^2 + 2.73^2 - 2 \times 2 \times 2.73 \cos 60$ oe oe ft (a), as long as in form $a + \sqrt{b}$ must have exp'd bracket & subst'd cos60 not ISW decimals can score only 1 st M1
Total 6 marks						

21.	(a)	$2p(1 - p) = \frac{8}{25}$ $p(1 - p) = \frac{4}{25}$ or $p - p^2 = \frac{4}{25}$ $25p(1 - p) = 4$ or $25(p - p^2) = 4$		3	M1 M1 A1	allow $p(1 - p) = \frac{8}{25}$ for M1 only or $50p(1 - p) = 8$ or $50(p - p^2) = 8$ or $25p - 25p^2 = 4$ oe, no fracs & 2 canc'ld
					Alt 1 $2p(1 - p) = \frac{8}{25}$ oe M1 $p = \frac{1}{5}$ or $\frac{4}{5}$ M1 $(p - \frac{1}{5})(p - \frac{4}{5}) = 0$ or $(5p - 1)(5p - 4) = 0$ A1	Alt 2 solve equn M1 $2 \times \frac{1}{5} \times \frac{4}{5}$ M1 $= \frac{8}{25}$ A1
					$p = \frac{1}{5}$ or $\frac{4}{5}$ seen without $2p(1 - p) = \frac{8}{25}$ or $2 \times \frac{1}{5} \times \frac{4}{5}$: MOMOAO	
Total 3 marks						

Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4400/4H

Examiner's use only

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London Examinations IGCSE

Team Leader's use only

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Mathematics

Paper 4H

Higher Tier

Wednesday 7 November 2007 – Afternoon

Time: 2 hours

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.

Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.

If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 26 questions in this question paper. The total mark for this paper is 100.

There are 20 pages in this question paper. Any blank pages are indicated.

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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Answer ALL TWENTY SIX questions.
Write your answers in the spaces provided.
You must write down all stages in your working.

1. Work out $\frac{5.9 - 4.3}{1.3 + 1.2}$

.....
(Total 2 marks)

Q1

2. (a) Factorise $5x - 20$

.....
(1)

(b) Factorise $y^2 + 6y$

.....
(2)

(Total 3 marks)

Q2

3.

£1 = 2.61 New Zealand dollars
£1 = 1.45 euros

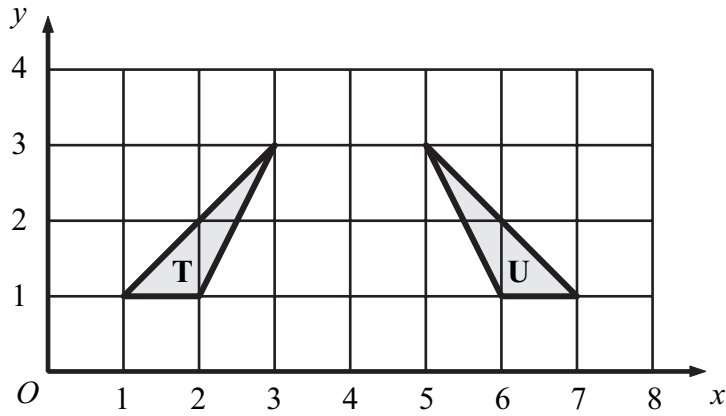
Change 630 New Zealand dollars to euros.

..... euros
(Total 2 marks)

Q3



4.



Describe fully the single transformation which maps triangle **T** onto triangle **U**.

.....

(Total 2 marks)

Q4

5. In 2004, the ratio of the number of planes in Air China's fleet to the number of planes in Malaysian Airlines' fleet was 6 : 7
There were 72 planes in Air China's fleet.

Work out the number of planes in Malaysian Airlines' fleet.

.....

(Total 2 marks)

Q5



6.

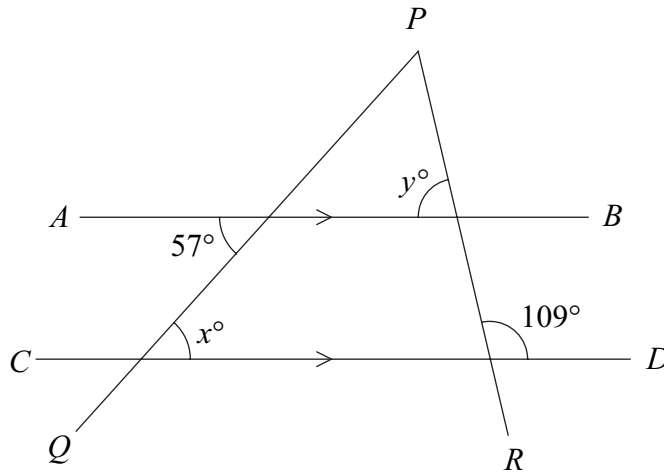


Diagram **NOT** accurately drawn

AB and *CD* are parallel straight lines.
PQ and *PR* are straight lines.

(a) (i) Find the value of x .

$x = \dots\dots\dots$

(ii) Give a reason for your answer.

..... (2)

(b) Find the value of y .
 Give a reason for each step in your working.

$y = \dots\dots\dots$ (2)

(Total 4 marks)

Q6



7. There are four grades of egg.
The table shows how many eggs of each grade were laid by a hen last year.

Grade	Number of eggs
Extra large	55
Large	48
Medium	35
Small	12

- (a) In the first four months of this year, the hen laid 60 eggs.

Work out an estimate for the number of Extra large eggs the hen laid in these four months.

.....
(3)

- (b) The table below shows how the grade of an egg is related to its weight.

Grade	Weight (w grams)
Extra large	$w \geq 73$
Large	$63 \leq w < 73$
Medium	$53 \leq w < 63$
Small	$w < 53$

Work out an estimate for the total weight of 48 Large eggs and 35 Medium eggs.

..... g
(3)

- (c) Jody wants to use the information in the table to work out an estimate for the total weight of all the eggs laid by the hen last year.

Explain why it is difficult to do this.

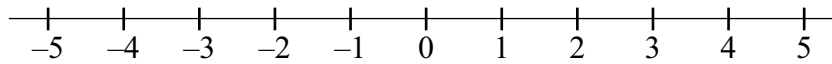
.....
(1)

(Total 7 marks)

Q7



8. (a) On the number line, show the inequality $-2 < x \leq 3$



(2)

(b) n is an integer.

Write down all the possible values of n which satisfy the inequality

$$-1 \leq n < 4$$

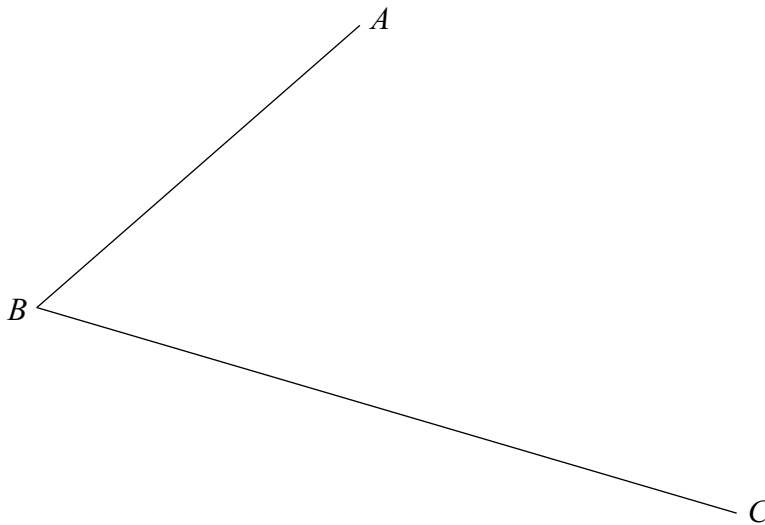
.....

(2)

Q8

(Total 4 marks)

9. Use ruler and compasses to construct the bisector of angle ABC .
You must show all construction lines.



Q9

(Total 2 marks)

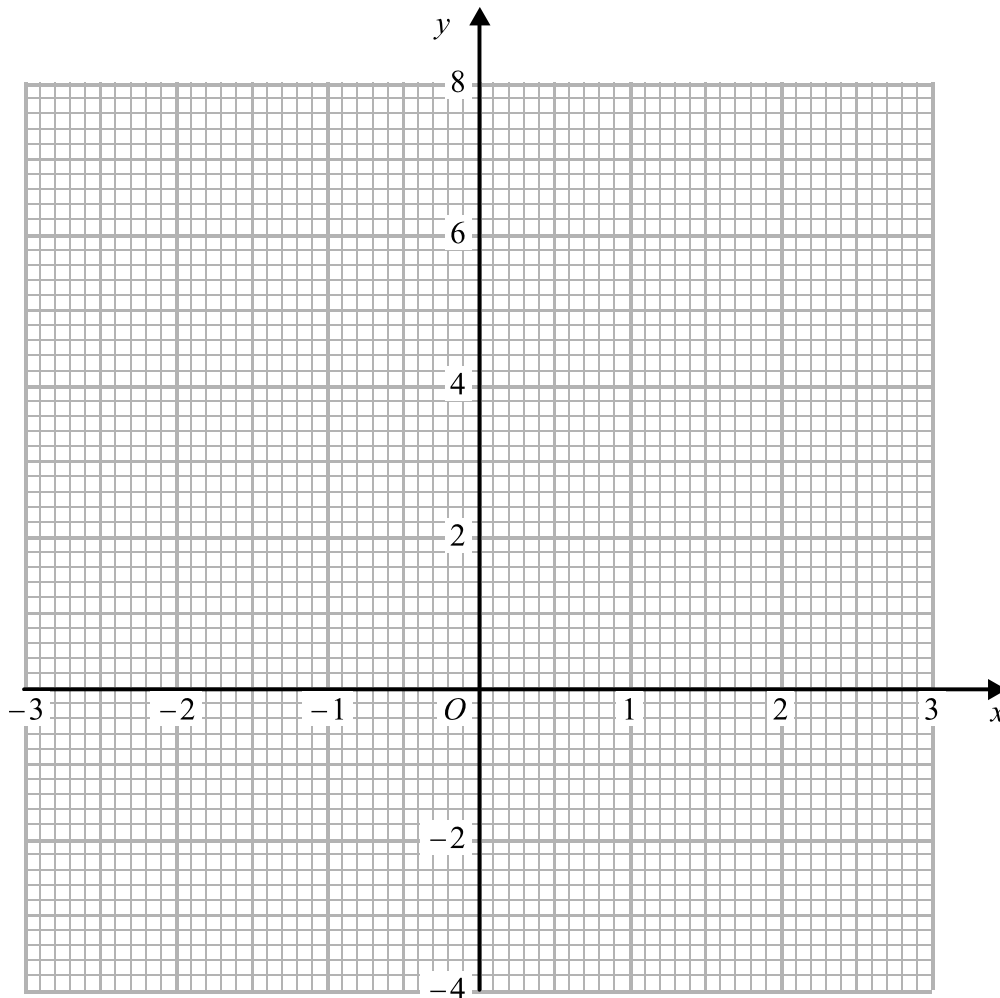


10. (a) Complete the table of values for $y = x^2 - 2$

x	-3	-2	-1	0	1	2	3
y			-1				

(2)

(b) On the grid, draw the graph of $y = x^2 - 2$



(2)

Q10

(Total 4 marks)



11. 56% of the students in a school are girls.
There are 420 girl students in the school.

Work out the number of students in the school.

.....
(Total 3 marks)

Q11

12.

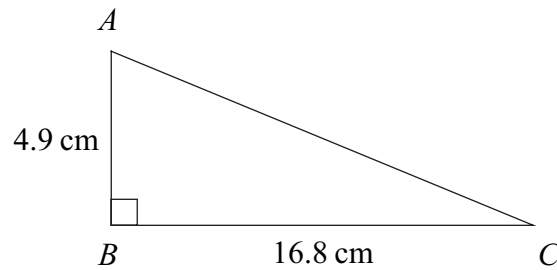


Diagram **NOT** accurately drawn

ABC is a triangle.
Angle $ABC = 90^\circ$.
 $AB = 4.9$ cm.
 $BC = 16.8$ cm.

Calculate the length of AC .

..... cm
(Total 3 marks)

Q12



13. The distance Jamila drove in 2006 was 14% more than the distance she drove in 2005
She drove 20 805 km in 2006
Calculate the distance she drove in 2005

..... km

(Total 3 marks)

Q13

14. (a) Simplify $2n \times 3n$

.....
(1)

(b) Simplify $\frac{3x^4y^5}{xy^3}$

.....
(2)

(c) Simplify $(t^3)^4$

.....
(1)

(d) Simplify $(2p^{-2})^{-3}$

.....
(2)

(Total 6 marks)

Q14



15.

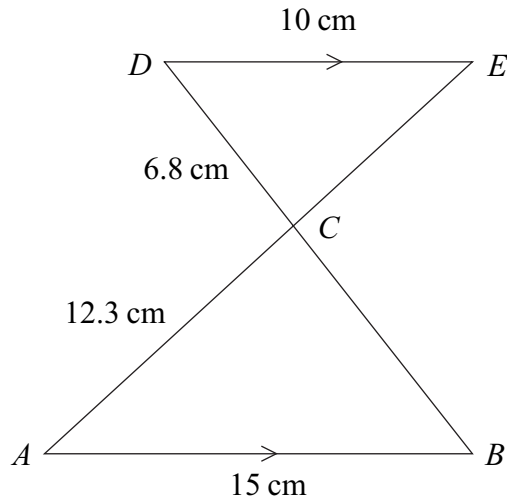


Diagram **NOT** accurately drawn

AB is parallel to DE .
 The lines AE and BD intersect at the point C .
 $AB = 15$ cm, $AC = 12.3$ cm, $CD = 6.8$ cm, $DE = 10$ cm.

(a) Work out the length of BC .

..... cm
(2)

(b) Work out the length of CE .

..... cm
(2)

(c) $\frac{\text{Area of triangle } ABC}{\text{Area of triangle } CDE} = k$

Work out the value of k .

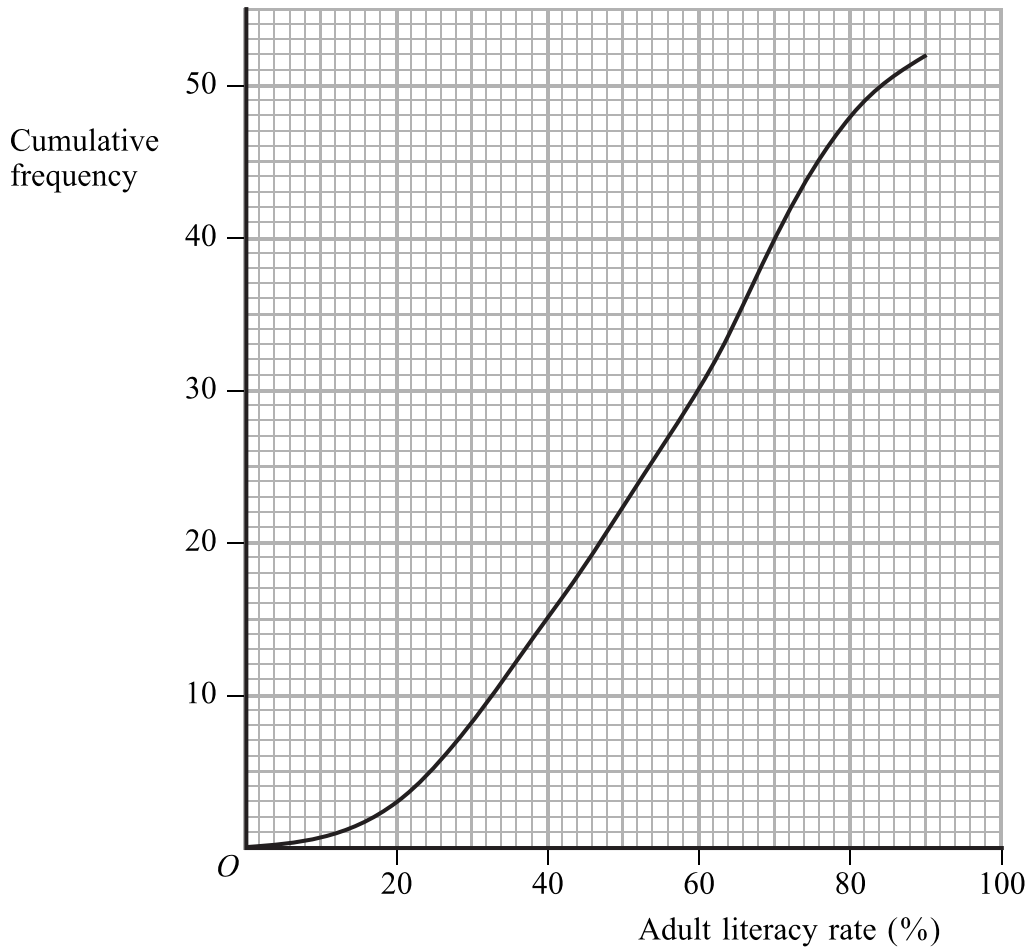
$k =$
(2)

(Total 6 marks)

Q15



16. The cumulative frequency graph gives information about the adult literacy rates of 52 countries in Africa. The adult literacy rates are expressed as percentages of the adults in the countries.



(a) Use the cumulative frequency graph to find an estimate for the number of these 52 countries which have an adult literacy rate of

(i) less than 40%,

.....

(ii) more than 75%.

.....

(2)

(b) Find an estimate for the median adult literacy rate for these 52 countries.

.....%

(2)

(Total 4 marks)

Q16



17. (a) Find the Highest Common Factor of 72 and 90

.....
(2)

(b) Find the Lowest Common Multiple of 72 and 90

.....
(2)

(Total 4 marks)

Q17

18. (a) The equation of a line **L** is $x + 2y = 6$
Find the gradient of **L**.

.....
(3)

(b) Write down the equation of the line which is parallel to **L** and which passes through the point (0, 5).

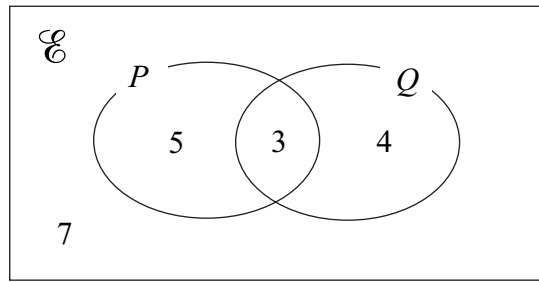
.....
(1)

(Total 4 marks)

Q18



19.



The numbers are the **number** of elements in each part of the Venn Diagram.

(i) Find $n(P)$

.....

(ii) Find $n(Q')$

.....

(iii) Find $n(P \cap Q \cap Q')$

.....

(iv) Find $n(P' \cup Q')$

.....

(Total 4 marks)

Q19

20. A curve has equation $y = x^3 - 5x^2 + 8x - 7$

(a) Find the gradient of the curve at $(2, -3)$.

.....

(4)

(b) What does your answer to part (a) tell you about the point $(2, -3)$?

.....

(1)

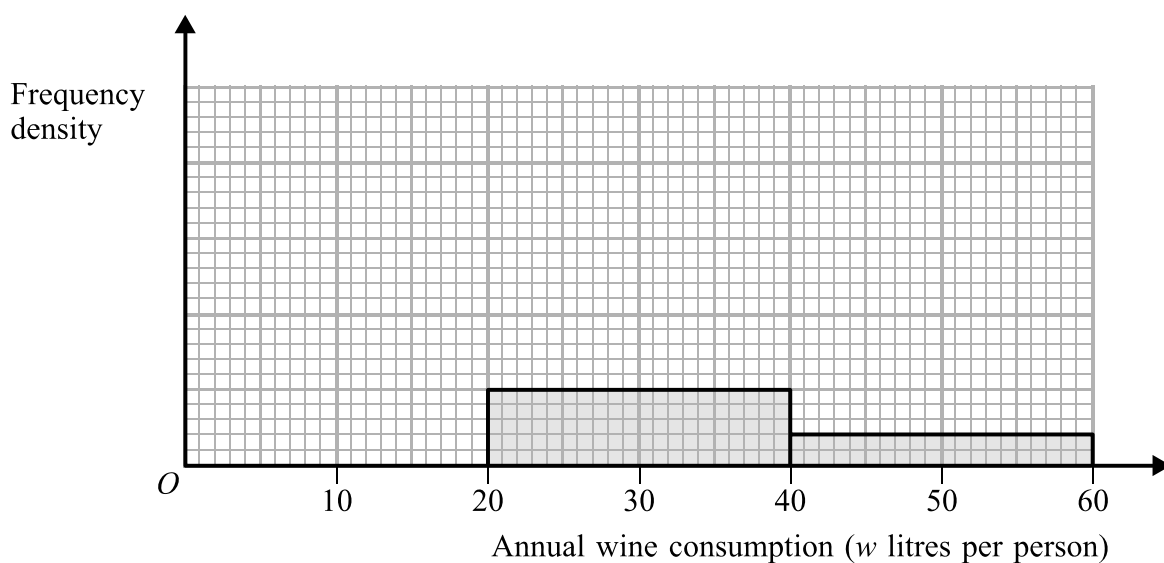
(Total 5 marks)

Q20



21. The unfinished table and histogram show information about the annual wine consumption, in litres per person, in some countries.

Annual wine consumption (w litres per person)	Frequency
$0 < w \leq 5$	21
$5 < w \leq 20$	18
$20 < w \leq 40$	20
$40 < w \leq 60$	



(a) Use the information in the table to complete the histogram.

(2)

(b) Use the information in the histogram to complete the table.

(1)

(Total 3 marks)

Q21



22.

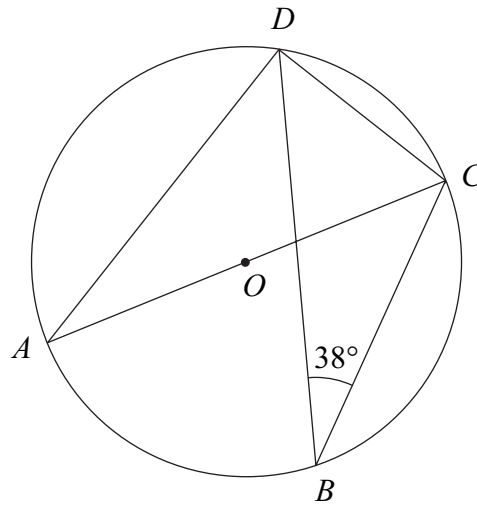


Diagram **NOT** accurately drawn

A, B, C and D are points on a circle, centre O .
 AC is a diameter of the circle.
 Angle $CBD = 38^\circ$.

(a) (i) Find the size of angle DAC .

.....
 °

(ii) Give a reason for your answer.

.....

(2)

(b) Find the size of angle ACD .

.....
 °

(2)

(Total 4 marks)

Q22



23. $f : x \mapsto 3x + 2$ $g : x \mapsto 2x - 5$

- (a) Express the composite function fg in the form $fg : x \mapsto \dots$
Give your answer as simply as possible.

$fg : x \mapsto \dots$
(2)

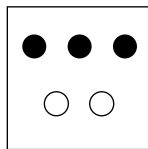
- (b) Express the inverse function f^{-1} in the form $f^{-1} : x \mapsto \dots$

$f^{-1} : x \mapsto \dots$
(2)

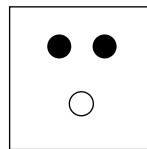
(Total 4 marks)

Q23

24.



Box A



Box B

In Box A, there are 3 black counters and 2 white counters.
In Box B, there are 2 black counters and 1 white counter.

Farah takes at random a counter from Box A and puts it in Box B.
She then takes at random a counter from Box B.

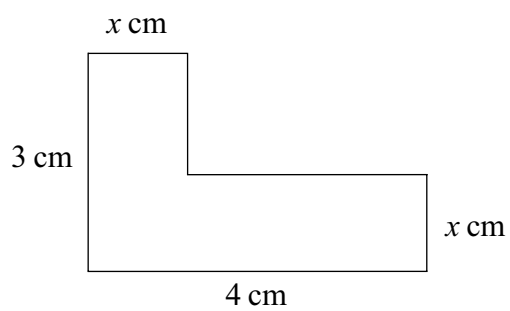
Work out the probability that the counter she takes from Box B will be a black counter.

.....
(Total 3 marks)

Q24



25.

Diagram **NOT**
accurately drawn

The diagram shows a shape.
All the corners are right angles.
The area of the shape is 11 cm^2 .

(a) Show that $x^2 - 7x + 11 = 0$

(2)

(b) Solve $y^2 - 7y + 11 = 0$
Give your solutions correct to 3 significant figures.

.....
(3)

(c) (i) Use your answer to part (b) to find the value of x in the diagram.

.....

(ii) Give a reason for your answer to (i).

.....

.....

(2)

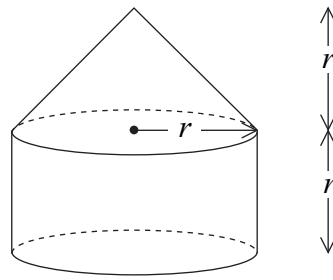
Q25

(Total 7 marks)

PLEASE TURN OVER FOR QUESTION 26



26.



The diagram shows a solid made from a cone and a cylinder.
 The cylinder has radius r and height r .
 The cone has base radius r and height r .

- (a) Show that the total volume of the solid is equal to the volume of a sphere of radius r .

(2)

The curved surface area of a cylinder with base radius r and height h is $2\pi rh$.
 The curved surface area of a cone with base radius r and slant height l is πrl .

- (b) Show that the **total** surface area of the above solid is greater than the surface area of a sphere of radius r .

(3)

Q26

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

END



**4400 IGCSE Mathematics
November 2007
Paper 4H**

Q		Working	Answer	Mark	Notes
1.		$\frac{1.6}{2.5}$		2	M1 for 1.6 or 2.5 seen or for 2.430...
			0.64	A1	Accept $\frac{16}{25}$
					Total 2 marks

2.	(a)		$5(x - 4)$	1	B1	cao
	(b)		$y(y + 6)$	2	B2	B1 for factors, which, when expanded and simplified, give two terms, one of which is correct except $(y + 6)(y - 6)$ and similar SC B1 for $y(y + 6y)$
						Total 3 marks


3.		$630 \times 1.45 \div 2.61$		2	M1	for $\frac{630}{2.61}$ or 241.38 or better or 241.37 or 630×1.45 or 913.5 or 0.55... seen or 1.8 seen
			350	A1	Accept 349.99 or 350	
					Total 2 marks	

4.		Reflection in $x = 4$	2	B1	for reflection, reflect
				B1	for $x = 4$ stated or eg 'in dotted line'
					Total 2 marks

5.		$72 \div 6$ or 12 seen		2	M1	
			84		A1	cao
						Total 2 marks

6.	(a)(i)		57	2	B1	cao
	(ii)	alternate angles			B1	
	(b)	corresponding angles and sum of angles on a straight line is 180° or allied or co-interior angles and (vertically) opposite angles or alternate angles and sum of angles on a straight line is 180°		2	B1	for one pair
			71		B1	cao
						Total 4 marks

7.	(a)	$\frac{55}{150} \times 60$		3	B1	for $\frac{55}{150}$ oe or $\frac{60}{150}$ oe seen
					M1	for $\frac{55}{150} \times 60$
			22		A1	cao
	(b)	$68 \times 48 + 58 \times 35$ $= 3264 + 2030$		3	M1	2 products $m \times f$ where m is within each interval and consistent (inc end points)
					M1	(dep) for use of halfway values
			5294		A1	Accept 5300 or 5290 if M1 + M1 scored
	(c)	eg no upper limit for extra large, no lower limit for small, don't know midpoints for XL, S		1	B1	
						Total 7 marks

8.	(a)			2	B2	B1 for either open circle at -2 or solid circle at 3
	(b)		-1 0 1 2 3	2	B2	B1 for all correct + 1 wrong or for four correct and none wrong
						Total 4 marks

9.		arc centre B cutting AB and AC at (say) P and Q		2	B1	
		arcs centre P and Q of equal radii which intersect at R (say) and BR joined			B1	(dep) bisector within tolerance
						Total 2 marks

10.	(a)	7 2 (-1) -2 -1 2 7	2	B2	B1 for 4 correct
	(b)		2	B2	B1 for 5 points plotted correctly $\pm \frac{1}{2}$ sq ft from (a) if at least B1 scored B1 for correct curve or, if there are 1 or 2 errors in (a) and no plotting errors, award for a curve passing through the 7 points from their table.
					Total 4 marks

11.		$420 \times \frac{100}{56}$	3	M1	for $420 \div 56$ or 7.5 seen
				M1	(dep) for $\times 100$
		750		A1	cao
					Total 3 marks

12.		$4.9^2 + 16.8^2$ or $24.01 + 282.24$ or 306.25	3	M1	for squaring and adding
		$\sqrt{4.9^2 + 16.8^2}$		M1	(dep) for square root
		17.5		A1	cao
					Total 3 marks

13.		$\frac{20805}{1.14}$ or $20805 \times \frac{100}{114}$		3	M2	for $\frac{20805}{1.14}$ or $20805 \times \frac{100}{114}$ M1 for $\frac{20805}{114}$, 114% = 20805 or 182.5 seen
			18 250		A1	cao
						Total 4 marks

14.	(a)		$6n^2$	1	B1	cao
	(b)		$3x^3y^2$	2	B2	B1 for x^3 or y^2
	(c)		t^{12}	1	B1	cao
	(d)		$\frac{p^6}{8}$	2	B2	B1 for $\frac{1}{8}$ oe or for p^6
						Total 6 marks

15.	(a)	$6.8 \times \frac{15}{10}$		2	M1	
			10.2		A1	cao
	(b)	$12.3 \times \frac{10}{15}$		2	M1	
			8.2		A1	cao
	(c)	$\frac{15}{10}$ or 1.5 oe		2	M1	<p>for $\frac{15}{10}$ or 1.5 oe</p> <p>or for $\left(\frac{10}{15}\right)^2$ or $\frac{4}{9}$ or 0.4 oe</p> <p>or for correct expression which, if accurately evaluated, gives the correct answer</p> <p>or for the area of one of the triangles evaluated correctly</p> <p>Area $\triangle ABC$ rounds to 62.3 (62.2700...) NOT 62.73</p> <p>Area $\triangle CDE$ rounds to 27.7 (27.6755...) NOT 27.88</p> <p>Note: the angles of the triangle are 42.5°, 54.5° and 83.1°.</p>
			2.25 oe		A1	<p>for 2.25 or $2\frac{1}{4}$ or $\frac{9}{4}$</p> <p>or for answer rounding to 2.25</p> <p>Even if M1 awarded, do not award A1 for a correct answer, if there are any errors in the working.</p>
						Total 6 marks

16.	(a)(i)		15	2	B1	cao
	(ii)		7 or 8		B1	
	(b)	26 or 26½		2	M1	may be stated or indicated on graph
			54 - 55 inc		A1	
						Total 4 marks

17.	(a)	72 = 2 ³ × 3 ² and 90 = 2 × 3 ² × 5 or 2 × 3 ² or 1,2,3,4,6,8,9,12,18, 24, 36,72 and 1,2,3,5,6,9,10,15,18,30,45,90		2	M1	Need not be products of powers; accept products or lists ie 2,2,2,3,3 and 2,3,3,5 Prime factors may be shown as factor trees
			18		A1	cao
	(b)	2 ³ × 3 ² × 5 or 72, 144, 216, 288, 360 and 90, 180, 270, 360		2	M1	
			360		A1	cao
						Total 4 marks

18.	(a)	$2y = 6 - x$		3	M1	for $2y = 6 - x$ or for stating coordinates of 2 points on line
		$y = 3 - \frac{x}{2}$ or $y = \frac{6 - x}{2}$			M1	for correct rearrangement of equation with y as subject or for attempt to find gradient of line joining two stated points
			$-\frac{1}{2}$		A1	for $-\frac{1}{2}$ oe dep only on first M1 SC if M0, award B1 for correct ft from incorrect rearrangement
	(b)		$y = -\frac{1}{2}x + 5$ oe	1	B1	correct answer or ft from (a) Equivalent equations include $x + 2y = 10$
						Total 4 marks

19.	(i)		8	4	B1	cao
	(ii)		12		B1	cao
	(iii)		0		B1	cao
	(iv)		16		B1	cao
						Total 4 marks

20.	(a)	$\frac{dy}{dx} = 3x^2 - 10x + 8$		4	B2	B1 for 2 correct terms
		$3 \times 2^2 - 10 \times 2 + 8$			M1	(dep on at least B1) for substituting $x = 2$
			0		A1	cao
	(b)	(could be) turning point, max or min, (is) stationary point tangent is parallel to the x-axis		1	B1	
						Total 5 marks

21.	(a)	bar height 21 little squares		2	B1	Allow $\pm \frac{1}{2}$ sq
		bar height 6 little squares			B1	Allow $\pm \frac{1}{2}$ sq
	(b)		8	1	B1	cao
						Total 3 marks

22.	(a)(i)		38	2	B1	cao
	(ii)	Angles in the same segment oe			B1	Award if 'same segment', 'same arc' or 'same chord' stated or implied
	(b)		52	2	B2	B1 for $\angle ADC = 90^\circ$ or $\angle COD = 76^\circ$ stated or indicated on diagram
						Total 4 marks

23.	(a)	$3(2x - 5) + 2$ or $6x - 15 + 2$		2	M1	
			$6x - 13$		A1	
	(b)	eg $\times 3 \rightarrow +2$ $\div 3 \leftarrow -2$ or attempt to make x the subject of $y = 3x + 2$ or $x = 3y + 2$			M1	
			$\frac{x-2}{3}$ oe		A1	
						Total 4 marks

24.		$\frac{3}{5} \times \frac{3}{4} + \frac{2}{5} \times \frac{2}{4}$		3	M2	for sum of both products (M1 if one correct product seen)
			$\frac{13}{20}$		A1	
						Total 3 marks

25.	(a)	$3x + x(4 - x) = 11$ or $4x + x(3 - x) = 11$ or $(4 - x)(3 - x) = 1$ or $12 - (4 - x)(3 - x) = 11$		2	M1		Award M1 A1 for $4x + 3x - x^2 = 11$
		$3x + 4x - x^2 = 11$ or $4x + 3x - x^2 = 11$ or $12 - 4x - 3x + x^2 = 1$ or $12 - 12 + 4x + 3x - x^2 = 11$			A1		
	(b)	$\frac{7 \pm \sqrt{(-7)^2 - 4 \times 11}}{2}$		3	M1	for correct substitution Condone omission of brackets	
		$\frac{7 \pm \sqrt{5}}{2}$			M1	for correct simplification	
			4.62, 2.38		A1	for 3 sf or better (4.61803... , 2.38196...)	
	(c)(i)		2.38	2	B1	for 2.38 or better	
	(ii)		eg $x < 3$		B1		
							Total 7 marks

26.	(a)	$\frac{1}{3}\pi r^2 \times r + \pi r^2 \times r$ or $\frac{1}{3}\pi r^3 + \pi r^3$		2	M1	
			$\frac{4}{3}\pi r^3$		A1	dep on M1
	(b)	$\pi r l + 2\pi r^2 + \pi r^2$ oe		3	M1	
		$l > r$ or $l = r\sqrt{2}$ oe			M1	
			$> 4\pi r^2$		A1	
						Total 5 marks

Centre No.						Paper Reference					Surname	Initial(s)		
Candidate No.						4	4	0	0	/	3	H	Signature	

Paper Reference(s)

4400/3H

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Thursday 15 May 2008 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

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Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.

If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 22 questions in this question paper. The total mark for this paper is 100.

There are 24 pages in this question paper. Any blank pages are indicated.

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

Without sufficient working, correct answers may be awarded no marks.

1. Find the value of $\frac{3.6 \times 4.8}{5.6 - 3.2}$

.....

(Total 2 marks)

Q1

2. A bag contains red discs, black discs and white discs.
 The number of black discs is equal to the number of white discs.
 Selina is going to take a disc at random from the bag.
 The probability that she will take a red disc is 0.6

Work out the probability that she will take a black disc.

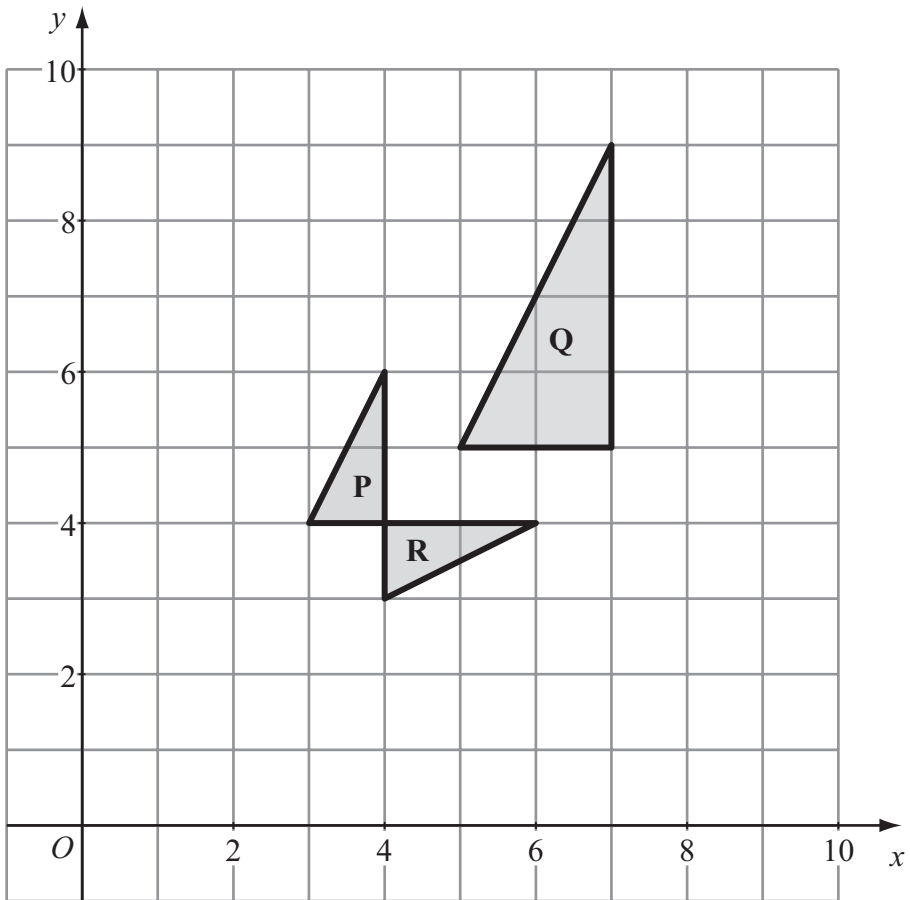
.....

(Total 2 marks)

Q2



3.



(a) Describe fully the single transformation that maps triangle **P** onto triangle **Q**.

..... (3)

(b) Describe fully the single transformation that maps triangle **P** onto triangle **R**.

..... (2)

(Total 5 marks)

Q3



4. Bronze is made from copper and tin.
The ratio of the weight of copper to the weight of tin is 3 : 1

Work out the weight of copper in 280 grams of bronze.

..... grams

(Total 2 marks)

Q4

5. $\mathcal{E} = \{\text{odd numbers}\}$
 $A = \{1, 5, 9, 13, 17\}$
 $B = \{1, 9, 17, 25, 33\}$
 $C = \{7, 11, 15\}$

(a) List the members of the set

(i) $A \cap B$,

.....

(ii) $A \cup B$.

.....

(2)

(b) Explain why $A \cap C = \emptyset$

.....

.....

(1)

(Total 3 marks)

Q5



6.

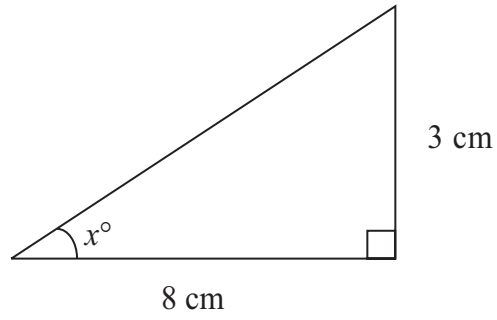


Diagram **NOT** accurately drawn

Work out the value of x .
Give your value correct to 1 decimal place.

$x = \dots\dots\dots$

(Total 3 marks)

Q6

7. The diameter of a circle is 7.8 cm.

Calculate the circumference of the circle.
Give your answer correct to 3 significant figures.

$\dots\dots\dots$ cm

(Total 2 marks)

Q7



8. Here are some patterns made from sticks.



Pattern number 1



Pattern number 2



Pattern number 3

This rule can be used to find the number of sticks in one of these patterns.

Multiply the pattern number by 2 and then add 1

- (a) n is the number of sticks in Pattern number p .
Write down a formula for n in terms of p .

.....
(3)

- (b) Make p the subject of your formula.

$p =$
(2)

(Total 5 marks)

Q8



9. (a) Solve $7(x - 1) = 5 - 2x$
 You must show sufficient working.

$x = \dots\dots\dots$
(3)

- (b) (i) Solve the inequality $4x + 5 \leq 21$

$\dots\dots\dots$

- (ii) n is a positive integer.

Write down all the values of n which satisfy $4n + 5 \leq 21$

$\dots\dots\dots$
(4)

(Total 7 marks)

Q9



10. Cara's salary was increased from \$28 250 to \$29 832

(a) Work out the percentage increase in Cara's salary.

..... %
(3)

Pedro's salary was increased by 5.2%.
After the increase, his salary was \$28 141

(b) Work out his salary before the increase.

\$
(3)

(Total 6 marks)

Q10



11. The table shows information about the pulse rates of 60 people, when they were resting.

Pulse rate (p beats/min)	Frequency
$50 < p \leq 60$	7
$60 < p \leq 70$	21
$70 < p \leq 80$	15
$80 < p \leq 90$	14
$90 < p \leq 100$	3

(a) Write down the modal class.

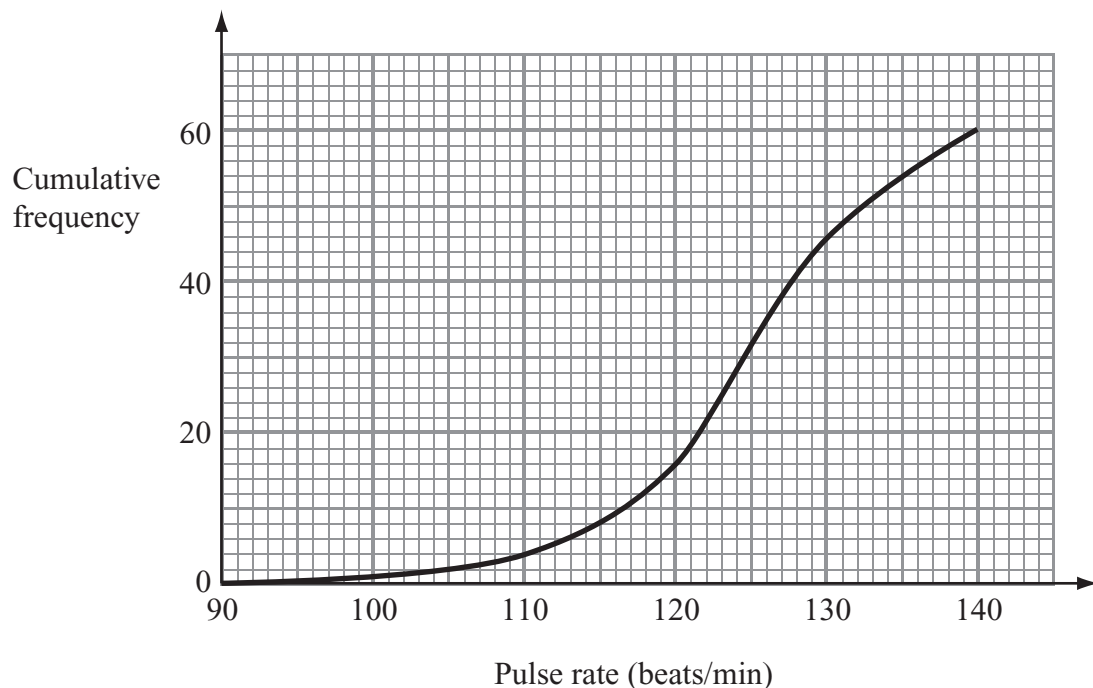
.....
(1)

(b) Work out an estimate for the mean pulse rate of the 60 people.

..... beats/min
(4)



The cumulative frequency graph gives information about the pulse rates of the same 60 people, after they have exercised for ten minutes.



(c) Use the graph to find an estimate for the median pulse rate of the 60 people.

..... beats/min
(2)

(d) Use the graph to find an estimate for the number of people with a pulse rate of more than 131 beats/min.

.....
(2)

(Total 9 marks)

Q11



12.

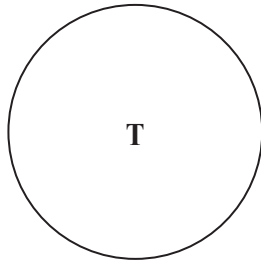
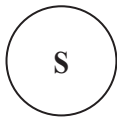


Diagram **NOT** accurately drawn

The area of circle **S** is 4 cm^2 .

The radius of circle **T** is 3 times the radius of circle **S**.

Work out the area of circle **T**.

..... cm^2

(Total 2 marks)

Q12



13.

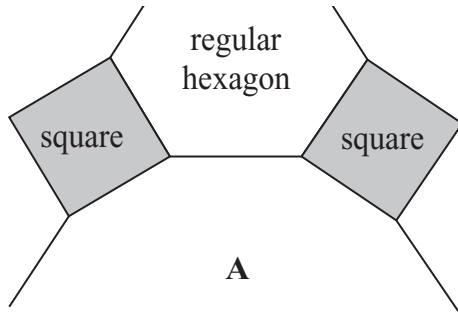


Diagram **NOT** accurately drawn

The diagram shows part of a tiling pattern.
 The tiling pattern is made from three shapes.
 Two of the shapes are squares and regular hexagons.
 The third shape is a regular n -sided polygon **A**.

Work out the value of n .

$n = \dots\dots\dots$

(Total 5 marks)

Q13



14. (a) Factorise $10y - 15$

.....
(1)

(b) Factorise completely $9p^2q + 12pq^2$

.....
(2)

(c) (i) Factorise $x^2 + 6x - 16$

.....

(ii) Solve $x^2 + 6x - 16 = 0$

.....
(3)

(Total 6 marks)

Q14

15. Mia's weight is 57 kg, correct to the nearest kilogram.

(a) Write down

(i) the upper bound of her weight,

..... kg

(ii) the lower bound of her weight.

..... kg
(2)

Alice's weight is 62 kg, correct to the nearest kilogram.

(b) Work out the upper bound for the difference between Alice's weight and Mia's weight.

..... kg
(2)

(Total 4 marks)

Q15



16. Here are 9 cards.
Each card has a number on it.



Lee takes a card at random.
He records the number which is on the card and replaces the card.
He then takes a second card at random and records the number which is on the card.

(a) Calculate the probability that he will take two even numbers.

.....
(2)

(b) Calculate the probability that he will take two numbers with a sum of 43

.....
(3)

(Total 5 marks)

Q16



17. The distance, d kilometres, of the horizon from a person is directly proportional to the square root of the person's height, h metres, above sea level.

When $h = 225$, $d = 54$

(a) Find a formula for d in terms of h .

$$d = \dots\dots\dots$$

(3)

(b) Calculate the distance of the horizon from a person whose height above sea level is 64 metres.

$$\dots\dots\dots \text{ kilometres}$$

(1)

(c) Calculate the height above sea level of a person, when the distance of the horizon is 61.2 kilometres.

$$\dots\dots\dots \text{ metres}$$

(2)

(Total 6 marks)

Q17



18.

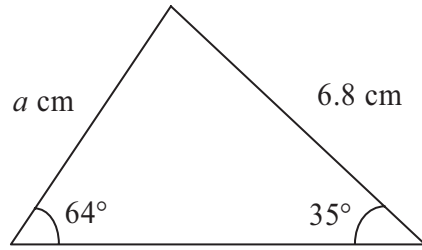


Diagram **NOT** accurately drawn

Calculate the value of a .
Give your value correct to 3 significant figures.

$a = \dots\dots\dots$

Q18

(Total 3 marks)

19. Show that $\frac{12}{\sqrt{8}} = 3\sqrt{2}$

Q19

(Total 2 marks)



20.

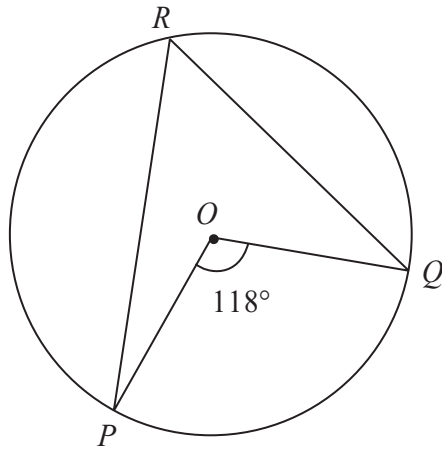


Diagram **NOT** accurately drawn

P , Q and R are points on a circle, centre O .

(a) (i) Find the size of angle PRQ .

.....
o

(ii) Give a reason for your answer.

.....
.....

(2)



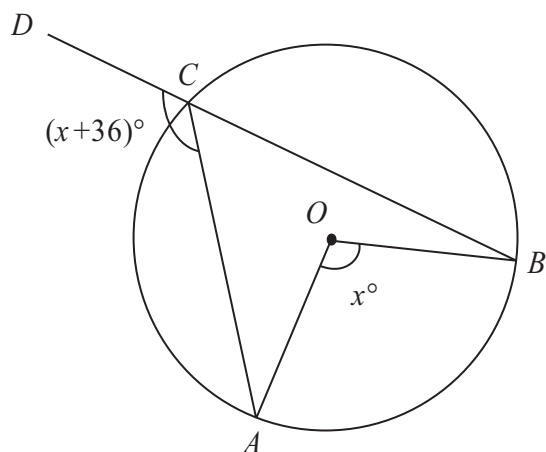


Diagram **NOT** accurately drawn

A , B and C are points on a circle, centre O .
 BCD is a straight line.

(b) Find the value of x .

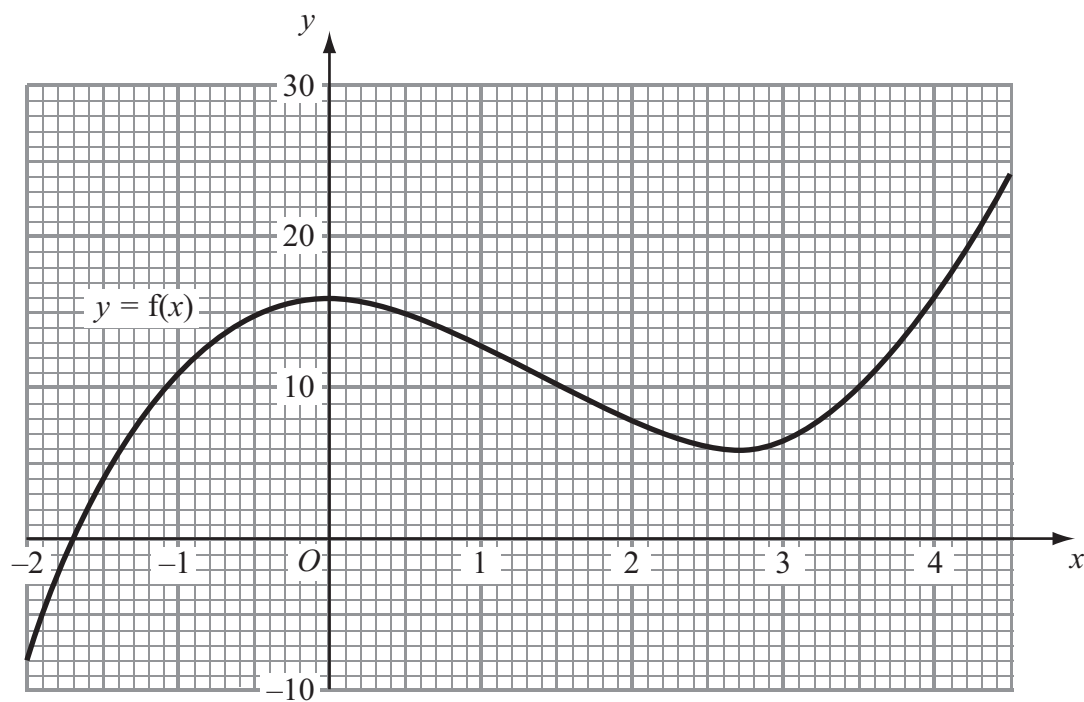
$x = \dots\dots\dots$
(5)

(Total 7 marks)

Q20



21. The diagram shows part of the graph of $y = f(x)$.



(a) Calculate an estimate for the gradient of the curve at the point where $x = 3$

.....
(3)



(b) Find an estimate for the solution of the equation $f(x) = 0$

$x = \dots\dots\dots$
(1)

The equation $f(x) = mx + c$ where m and c are numbers, has three solutions. Two of the solutions are $x = -1$ and $x = 1$

(c) (i) Find the value of c .

$c = \dots\dots\dots$

(ii) Find the third solution of the equation $f(x) = mx + c$.

$x = \dots\dots\dots$
(4)

(Total 8 marks)

Q21



22.

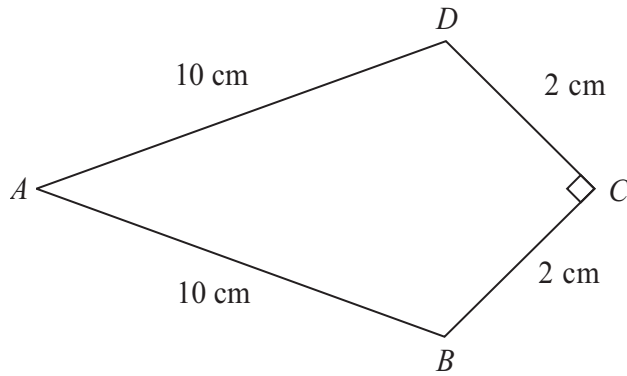


Diagram **NOT** accurately drawn

The diagram shows a kite $ABCD$.

$AB = AD = 10$ cm.

$CB = CD = 2$ cm.

Angle $BCD = 90^\circ$.

Calculate the area of the kite.

..... cm²

Q22

(Total 6 marks)

TOTAL FOR PAPER: 100 MARKS

END



Summer 2008 IGCSE Maths Mark Scheme - Paper 3H

Q	Working	Answer	Mark	Notes
1.	$\frac{17.28}{2.4}$		2	M1 for 17.28 or 2.4 or - 0.114... seen
		7.2		A1 for 7.2 oe inc $7\frac{1}{5}$ and $\frac{36}{5}$
				Total 2 marks

2.	$\frac{1-0.6}{2}$		2	M1 for 1 - 0.6 or 0.4 seen or $\frac{x}{2}$ where $0 < x < 1$
		0.2 oe		A1 for 0.2 oe
				Total 2 marks

3. (a)	Enlargement scale factor 2 centre (1, 3)	3	B3 B1 for enlargement, enlarge etc B1 for 2, $\times 2$, two, $\frac{2}{1}$, 1 : 2, 2 : 1 B1 for (1, 3) Condone omission of brackets but do not accept $\begin{pmatrix} 1 \\ 3 \end{pmatrix}$	These marks are independent but award no marks if answer is not a single transformation
(b)	Reflection in the line $y = x$	2	B2 B1 for reflection, reflect etc B1 for $y = x$ oe inc eg 'in line from (2,2) to (5,5)', 'in dotted line shown'	
				Total 5 marks

4.	3 + 1 or 4 seen		2	M1 for 3 + 1 or 4 seen	
		210		A1 for 210 cao	
					Total 2 marks

5.	(a)(i)		1, 9, 17	2	B1 cao	Brackets not necessary
	(ii)		1, 5, 9, 13, 17, 25, 33		B1 cao (B0 if 1, 9 or 17 repeated)	
	(b)	eg No members in common. The intersection is empty. None of the members of A & C are the same. They don't have the same numbers. No numbers are in both A and C.		1	B1	
						Total 3 marks

6.	$\tan x^\circ = \frac{3}{8} = 0.375$		3	M1 for tan A1 for $\frac{3}{8}$ or 0.375	or M1 for sin and $\frac{3}{\sqrt{73}}$ following correct Pythagoras and A1 for 0.3511... or M1 for cos and $\frac{8}{\sqrt{73}}$ following correct Pythagoras and A1 for 0.9363...
		20.6		A1 for 20.6 or better (Accept 20.55604... rounded or truncated to 4 sig figs or more)	
					Total 3 marks

7.	$\pi \times 7.8$ or $2\pi \times 3.9$		2	M1 for $\pi \times 7.8$ or $2\pi \times 3.9$	
		24.5		A1 for 24.5 or for answer which rounds to 24.49, 24.50 or 24.51 ($\pi \rightarrow 24.5044...$ $3.14 \rightarrow 24.492$ $3.142 \rightarrow 24.5076$)	
					Total 2 marks

8. (a)		$n = 2p + 1$ oe	3	B3 for $n = 2p + 1$ oe eg $n = p2 + 1$, $1 + p \times 2 = n$, $n = p + p + 1$ B2 for $2p + 1$ oe B1 for $n =$ linear function of p eg $n = p + 1$
(b)	$2p = n - 1$ or $\frac{n}{2} = p + \frac{1}{2}$		2	M1 for $2p = n - 1$ or $\frac{n}{2} = p + \frac{1}{2}$
		$\frac{n-1}{2}$ oe		A1 for $\frac{n-1}{2}$ oe inc $\frac{n}{2} - \frac{1}{2}$
				Total 5 marks

9. (a)	$7x - 7 = 5 - 2x$ $7x + 2x = 5 + 7$ or $9x = 12$		3	M1 for $7x - 7$ seen M1 for $7x + 2x = 5 + 7$ or $9x = 12$ or for $7x + 2x = 5 + 1$ or $9x = 6$ following $7x - 1 = 5 - 2x$
		$1\frac{1}{3}$ oe		A1 for $1\frac{1}{3}$ oe inc $\frac{4}{3}$, $\frac{12}{9}$, $1.\dot{3}$, 1.33
(b)(i)	$4x \leq 16$		4	M1 for $4x \leq 16$
		$x \leq 4$		A1 for $x \leq 4$
(ii)		1 2 3 4		B2 B1 for 3 correct and none wrong or for 4 correct and 1 wrong
				Total 7 marks

10. (a)	29 832 – 28 250 or 1582 seen		3	M1 M1 for $\frac{1582}{28250}$ or $\frac{1582}{29832}$ or 0.056 or 0.053...	or M1 for $\frac{29832}{28250}$ or 1.056 or 105.6 M1 for “1.056” – 1 or “105.6” – 100	or M1 for $\frac{28250}{29832}$ or 0.9469... or 94.69... M1 for 1 – “0.9469” or 100 – “94.69”
		5.6		A1 cao (Do NOT award for 5.3)		
(b)	$\frac{28141}{1.052}$ or $28141 \times \frac{100}{105.2}$		3	M2 for $\frac{28141}{1.052}$ or $28141 \times \frac{100}{105.2}$ M1 for $\frac{28141}{105.2}$, 105.2%=28141 or 267.5(0) seen		
		26 750		A1 cao		
						Total 6 marks

11. (a)		$60 < p \leq 70$	1	B1 Accept 60-70
(b)	$55 \times 7 + 65 \times 21 + 75 \times 15 + 85 \times 14 + 95 \times 3$ or $385 + 1365 + 1125 + 1190 + 285$ or 4350		4	M1 for finding at least four products $f \times x$ consistently within intervals (inc end points) and summing them
				M1 (dep) for use of halfway values (55, 65, ...) or (55.5, 65.5, ...)
	$\frac{"4350"}{60}$			M1 $\frac{"4350"}{60}$ (dep on 1st M1) for division by 60 or for $\frac{"4380"}{60}$ if 55.5, 65.5, ... used
		72.5		A1 for 72.5 Award 4 marks for 73 if first two M marks awarded
(c)	30 (or $30\frac{1}{2}$) indicated on graph or stated		2	M1 for 30 (or $30\frac{1}{2}$) indicated on graph or stated
		124 or 125		A1 Accept any value in range 124-125 inc eg 124, 124.5, 125
(d)	Use of $p = 131$ on graph		2	M1 for use of $p = 131$ shown on graph or implied by 47, 48 or 49 stated
		≈ 12		A1 Accept any value in range 11-13 inc
				Total 9 marks

12.	3^2 or 9 or value which rounds to 3.39 seen		2	M1 for 3^2 or 9 or value which rounds to 3.39 seen
		36		A1 for 36 cao
				Total 2 marks

13.	finds int angle of hexagon $\frac{(6-2) \times 180}{6}$	finds ext angle of hexagon $\frac{360}{6}$		5	M1 for $\frac{(6-2) \times 180}{6}$ or $\frac{360}{6}$	Award M1 A1 for int angle of hexagon shown as 120° or ext angle shown as 60° on printed diagram or on candidate's own diagram	If there is <i>clear</i> evidence the candidate thinks the <i>interior</i> angle is 60° or the <i>exterior</i> angle is 120° , do not award these two marks.
	120	60		A1 for 120 or 60			
	int angle of polygon = 150 or ext angle of polygon = 30				B1 int angle of polygon = 150 or ext angle of polygon = 30	Award B1 for int angle of polygon shown as 150° or ext angle shown as 30° on printed diagram or on candidate's own diagram	
	$\frac{360}{30}$ or $\frac{180(n-2)}{n} = 150$ oe				M1 for $\frac{360}{30}$ or $\frac{180(n-2)}{n} = 150$ oe		
			12		A1 for 12 cao Award no marks for an answer of 12 with no working. Award 5 marks for an answer of 12 if at least 2 of the previous 4 marks scored.		
					Total 5 marks		

14.	(a)	$5(2y - 3)$	1	B1	cao
	(b)	$3pq(3p + 4q)$	2	B2	B1 for $3pq(\dots)$ or $\dots(3p + 4q)$ or $3p(3pq + 4q^2)$ or $3q(3p^2 + 4pq)$ or $pq(9p + 12q)$ or $3(3p^2q + 4pq^2)$ ie for two factors, one of which is $3pq$ or $(3p + 4q)$, or for correct, but incomplete, factorisation
	(c)(i)	$(x - 2)(x + 8)$	3	B2	B1 for one correct factor or $(x + 2)(x - 8)$
	(ii)	2, -8		B1	ft from (i) if two linear factors
					Total 6 marks

15.	(a)(i)	57.5	2	B1	for 57.5, 57.49, 57.499, 57.4999 etc but <i>NOT</i> for 57.49
	(ii)	56.5		B1	for 56.5 Also accept 56.50
	(b)	62.5 - "56.5"	2	M1	for 62.5 - "56.5" Accept 62.49, 62.499, 62.4999 etc instead of 62.5
		6		A1	for 6, 5.9, 5.999 etc ft from "56.5"
					Total 4 marks

16. (a)	$\frac{5}{9} \times \frac{5}{9}$		2	M1 for $\frac{5}{9} \times \frac{5}{9}$	Sample space method - award 2 marks for a correct answer, otherwise no marks
		$\frac{25}{81}$		A1 for $\frac{25}{81}$ or 0.31 or better	
(b)	$\frac{1}{9} \times \frac{1}{9}$ or $\frac{1}{81}$		3	M1 for $\frac{1}{9} \times \frac{1}{9}$ or $\frac{1}{81}$	Sample space method - award 3 marks for a correct answer, otherwise no marks
	$\frac{1}{9} \times \frac{1}{9} \times 4$ oe			M1 for $\frac{1}{9} \times \frac{1}{9} \times 4$ oe	
		$\frac{4}{81}$		A1 for $\frac{4}{81}$ or 0.05 or better	
Total 5 marks					

17. (a)	$d = k\sqrt{h}$		3	M1 for $d = k\sqrt{h}$ but not for $d = \sqrt{h}$ Also award for $d = \text{some numerical value} \times \sqrt{h}$
	$54 = 15k$			M1 for $54 = 15k$ Also award for $54 = k\sqrt{225}$
		$3.6\sqrt{h}$ oe		A1 for $3.6\sqrt{h}$ oe Award 3 marks if answer is $d = k\sqrt{h}$ but k is evaluated as 3.6 oe in <i>any</i> part
(b)		28.8	1	B1 ft from "3.6" $\times 8$ except for $k = 1$, if at least M1 scored in (a) (1 d.p. accuracy or better in follow through)
(c)	$\sqrt{h} = \frac{61.2}{\text{"3.6"}}$		2	M1 for $\sqrt{h} = \frac{61.2}{\text{"3.6"}}$ except for $k = 1$
		289		A1 cao
Total 6 marks				

18.	$\frac{a}{\sin 35^\circ} = \frac{6.8}{\sin 64^\circ}$		3	M1 for correct statement of Sine rule
	$a = \frac{6.8 \sin 35^\circ}{\sin 64^\circ}$			M1 for correct rearrangement
		4.34		A1 for 4.34 or 4.3395... rounded or truncated to 4 figures or more
				Total 3 marks

19.	<p>eg $\frac{12}{\sqrt{8}} = \frac{12}{2\sqrt{2}} = \frac{12}{2\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{12\sqrt{2}}{4}$</p> <p>$\frac{12}{\sqrt{8}} = \frac{12}{2\sqrt{2}} = \frac{6}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{6\sqrt{2}}{2}$</p> <p>$\frac{12}{\sqrt{8}} = \frac{12}{\sqrt{8}} \times \frac{\sqrt{8}}{\sqrt{8}} = \frac{12\sqrt{8}}{8} = \frac{3 \times 2\sqrt{2}}{2}$</p> <p>$\frac{12}{\sqrt{8}} = \frac{12}{\sqrt{8}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{12\sqrt{2}}{\sqrt{16}}$</p>		2	<p>B1 for use of $\sqrt{8} = 2\sqrt{2}$ or $\sqrt{8} \times \sqrt{2} = \sqrt{16}$</p> <p>B1 for multiplication of numerator and denominator by $\sqrt{2}$ or $\sqrt{8}$ (in either order)</p> <p>SC B1 for $12 = 3\sqrt{16}$</p> <p>or for both $\left(\frac{12}{\sqrt{8}}\right)^2 = \frac{144}{8} = 18$</p> <p>and $(3\sqrt{2})^2 = 9 \times 2 = 18$</p> <p>NB only total of 1 mark for either of these approaches</p>
				Total 2 marks

20.	(a)(i)	59	2	B1	cao
	(ii)	<p>angle at the centre = twice angle at the circumference or angle at the circumference = half the angle at the centre</p>		B1	<p>Three key points must be mentioned</p> <ol style="list-style-type: none"> 1. angle at centre/middle/<i>O</i>/origin 2. twice/double/2× or half/ $\frac{1}{2}$ as appropriate 3. angle at circumference/edge/perimeter (<i>NOT</i> e.g. angle <i>R</i>, angle <i>PRQ</i>, angle at top, angle at outside)

20. (b)	180 - (x + 36) oe seen (possibly marked on diagram as size of $\angle ACB$)		5	B1	for 180 - (x + 36) oe seen, either on its own or as part of an equation (This mark may still be scored, even if brackets are later removed incorrectly.)	
						SC (Max of 2 M marks) for omission of brackets in -(x + 36) or their incorrect removal
	$x = 2(180 - (x + 36))$ or $x = 2(180 - x - 36)$ or $180 - (x + 36) = \frac{x}{2}$ or $180 - x - 36 = \frac{1}{2}x$			M1	$x = 2(180 - (x + 36))$ or $x = 2(180 - x + 36)$ or $180 - x + 36 = \frac{1}{2}x$ or $180 - 36 + x = \frac{1}{2}x$	M1
	$x = 360 - 2x - 72$ or $x + \frac{1}{2}x = 180 - 36$			M1	$x = 360 - 2x + 72$ or $x + \frac{1}{2}x = 180 + 36$ (Note - incorrect simplification results in an answer of $x = 144$)	M1
	$3x = 360 - 72$ or $3x = 288$ or $\frac{3}{2}x = 180 - 36$ or $\frac{3}{2}x = 144$			M1		
		96		A1	cao	

Please note that there is an alternative method on the next page.

20. (b)	OR			
	$\frac{x}{2}$ oe seen (possibly marked on diagram as size of $\angle ACB$)		5	B1
	$x + 36 + \frac{x}{2} = 180$			M1
		96		A1 cao
				Total 7 marks

21. (a)	tan drawn at (3, 6.5)		3	M1	tan or tan produced passes between points (2, $0 \leq y \leq 4$) and (4, $9 \leq y \leq 12$)
	$\frac{\text{vertical difference}}{\text{horizontal difference}}$			M1	finds their $\frac{\text{vertical difference}}{\text{horizontal difference}}$ for two points on tan or finds their $\frac{\text{vertical difference}}{\text{horizontal difference}}$ for two points on curve, where one of the points has an x-coordinate between 2.5 and 3 inc and the other point has an x-coordinate between 3 and 3.5 inc
		2.5-6.5 inc		A1	dep on both M marks
(b)		-1.7	1	B1	Accept answer in range -1.7 - -1.65
(c)(i)	line joining (-1,11) & (1,13)		4	M1	
		12		A1	cao
(ii)	produces line to cut curve again			M1	
		4		A1	ft from line
					Total 8 marks

first part - finds area of $\triangle BCD$ and/or length of BD

22.	Area of $\triangle BCD = 2$		6	B1 for area of triangle BCD
	$(BD^2 \Rightarrow) 2^2 + 2^2$ or $\left(\frac{BD}{2}\right)^2 + \left(\frac{BD}{2}\right)^2 = 2^2$ or $\frac{BD/2}{2} = \cos 45^\circ$ or $\sin 45^\circ$ or $\frac{BD}{2} = 2 \cos 45^\circ$ or $2 \sin 45^\circ$			M1 for correct start to Pythagoras or trig for finding BD or $\left(\frac{BD}{2}\right)$
	$(BD \Rightarrow) \sqrt{8}$ or $2\sqrt{2}$ or 2.83 or better (2.8284...) or $\left(\frac{BD}{2}\right) = \sqrt{2}$ or $\frac{\sqrt{8}}{2}$ or 1.41 or better (1.4142...)			A1 for lengths BD or $\left(\frac{BD}{2}\right)$ correct

second part method 1 - uses Pythagoras to find AM , where M is midpoint of BD

	$AM^2 = 10^2 - \left(\frac{BD}{2}\right)^2$			M1
	$AM = \sqrt{98}$ or $7\sqrt{2}$ or 9.90 or better (9.8994...)			A1 for $\sqrt{98}$ or $7\sqrt{2}$ 9.90 or better
		16		A1 for 16 or answer rounding to 16.0
				Total 6 marks

second part method 2 - finds angle A either using Cosine Rule or by first finding $\frac{A}{2}$ using trig

	$\cos A = \frac{10^2 + 10^2 - BD^2}{2 \times 10 \times 10} \text{ or } \frac{192}{200} \text{ or } 0.96$ $\text{or } \sin \frac{A}{2} = \frac{BD/2}{10} \text{ or } \frac{\sqrt{8}}{20} \text{ or } 0.141 \text{ or better}$ <p style="text-align: right;">(0.14142...)</p>			M1
	(A =) 16.3 or better (16.2602...)			A1 for angle A correct
		16		A1 for 16 or answer rounding to 16.0
				Total 6 marks

second part method 3 - finds angle ABD (or angle ADB) using trig or Cosine Rule

	$(\cos \angle ABD =) \frac{BD/2}{10} \text{ or } (\cos \angle ABD =) \frac{10^2 + BD^2 - 10^2}{2 \times 10 \times BD}$ $\text{or } \cos \angle ABD = \frac{\sqrt{8}}{20} \text{ or } 0.141 \text{ or better (0.14142...)}$			M1
	($\angle ABD =$) 81.9° or better (81.8698...)			A1
		16		A1 for 16 or answer rounding to 16.0
				Total 6 marks

Centre No.						Paper Reference					Surname	Initial(s)		
Candidate No.						4	4	0	0	/	4	H	Signature	

Paper Reference(s)

4400/4H

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Tuesday 20 May 2008 – Afternoon

Time: 2 hours

Examiner's use only

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Team Leader's use only

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Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.

If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 23 questions in this question paper. The total mark for this paper is 100.

There are 24 pages in this question paper. Any blank pages are indicated.

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

Without sufficient working, correct answers may be awarded no marks.

1. Solve

(a) $6x + 13 = 2x + 7$

$x = \dots\dots\dots$
(3)

(b) $\frac{y}{5} - 2 = 4$

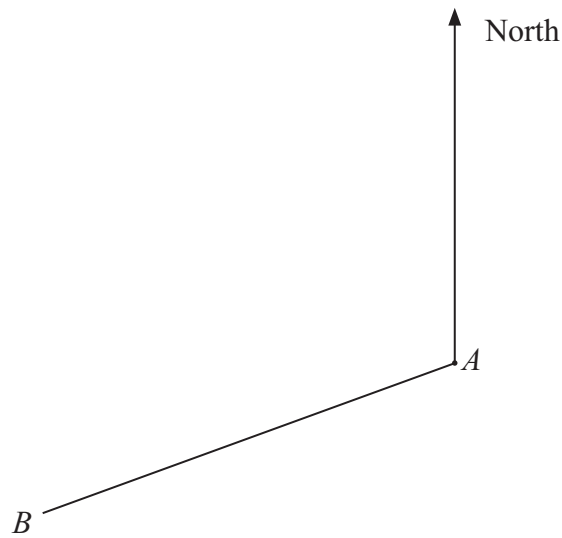
$y = \dots\dots\dots$
(2)

(Total 5 marks)

Q1



2. The diagram shows two towns, *A* and *B*, on a map.



(a) Measure the bearing of *B* from *A*.

.....
(2)

(b) *C* is another town.
The bearing of *C* from *A* is 125° .
Find the bearing of *A* from *C*.

.....
(2)

(Total 4 marks)

Q2



3. The table shows information about the shoe sizes of 20 people.

Shoe size	Number of people
5	3
6	8
7	5
8	2
9	2

(a) Find the median shoe size.

.....
(2)

(b) Exactly 1 of these 20 people has a collar size of 15.

Jean says “If you choose one of these 20 people at random, the probability that this person will have **either** a shoe size of 8 **or** a collar size of 15 is

$$\frac{2}{20} + \frac{1}{20} = \frac{3}{20}$$

Is Jean correct?

.....

Explain your answer.

.....
.....
(2)

(Total 4 marks)

Q3



4. (a) Find the value of $3 - 5x$ when $x = -2$

.....
(2)

(b) Multiply out $5(y - 2)$

.....
(1)

(c) Factorise $w^2 + 5w$

.....
(2)

(Total 5 marks)

Q4



5. The table shows information about the number of letters delivered to Manjit's house each day.

Number of letters delivered	Probability
0	0.2
1 to 5	0.5
6 to 10	0.2
More than 10	0.1

(a) There are 30 days in June.
Calculate an estimate of the number of days in June on which the number of letters delivered is 0

.....
(2)

(b) Find the probability that on a particular day the number of letters delivered is 6 or more.

.....
(2)

(Total 4 marks)

Q5



6. Show that

$$\frac{2}{3} + \frac{1}{4} = \frac{11}{12}$$

Q6

(Total 2 marks)

7. (a) Write $3^8 \times 3^6$ as a power of 3

.....
(1)

(b) Write $\frac{7^5}{7^2}$ as a power of 7

.....
(1)

(c) $\frac{5^n \times 5^3}{5^7} = 5^2$

Find the value of n .

$n =$
(2)

(d) $A = 2^3 \times 3^4 \times 5^{16}$
 $B = 2^5 \times 3 \times 7^{12}$

Find the Highest Common Factor of A and B .

.....
(2)

(Total 6 marks)

Q7



8. The diagram shows a prism with length 15 cm.
The cross section of the prism is a right-angled triangle with sides 3 cm, 4 cm and 5 cm.

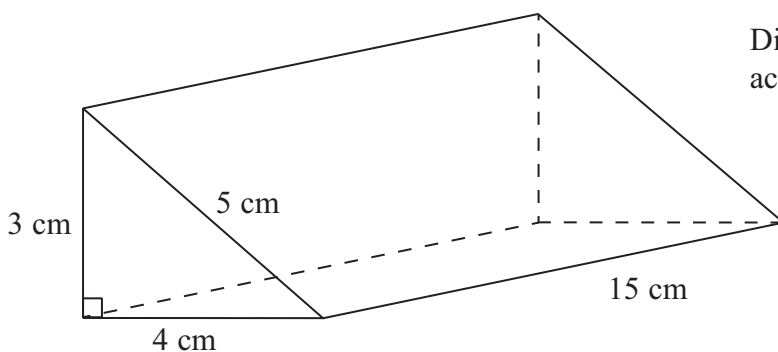


Diagram **NOT** accurately drawn

Calculate the total surface area of the prism.

..... cm²

(Total 4 marks)

Q8

9. Solve the simultaneous equations

$$3x + y = 4$$

$$5x - y = 8$$

You must show sufficient working.

$x =$

$y =$

(Total 3 marks)

Q9



10. The diagram shows a circle with centre O and radius 5 cm.

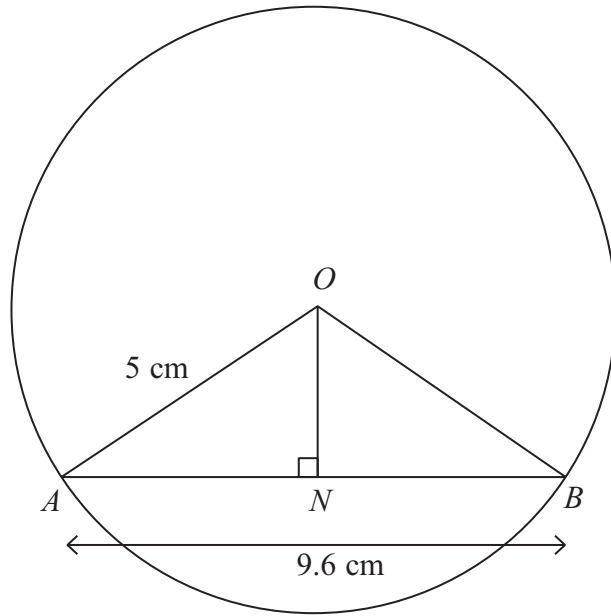


Diagram **NOT** accurately drawn

ANB is a chord of the circle.
 $AB = 9.6$ cm.
 Angle $ONA = 90^\circ$.

(a) Write down the length of AN .

..... cm
(1)

(b) Calculate the length of ON .

..... cm
(3)

(Total 4 marks)

Q10



11. Joshi chooses two numbers from the box.

Marie says

“When you round Joshi’s two numbers to 1 decimal place, they are equal.”

Mikos says

“When you round Joshi’s two numbers to 3 significant figures, they are **NOT** equal.”

Both statements are correct.

Write down Joshi’s two numbers.

- 123.37
- 123.43
- 123.47
- 123.53
- 123.57
- 123.63
- 123.67

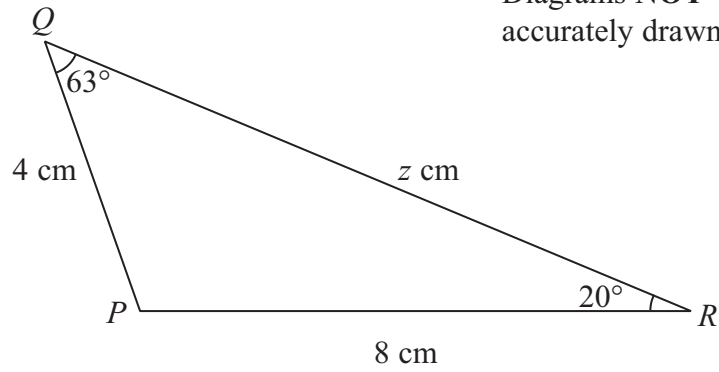
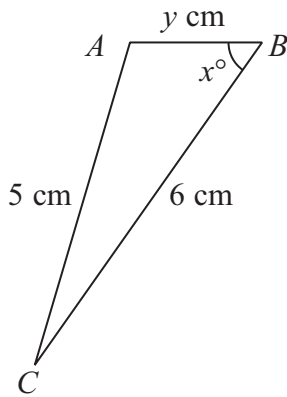
..... ,

(Total 2 marks)

Q11



12. Here are two similar triangles.
AB corresponds to *PQ*.
BC corresponds to *QR*.



Diagrams **NOT** accurately drawn

Find the value of

(a) *x*

$x = \dots\dots\dots$ (1)

(b) *y*

$y = \dots\dots\dots$ (2)

(c) *z*

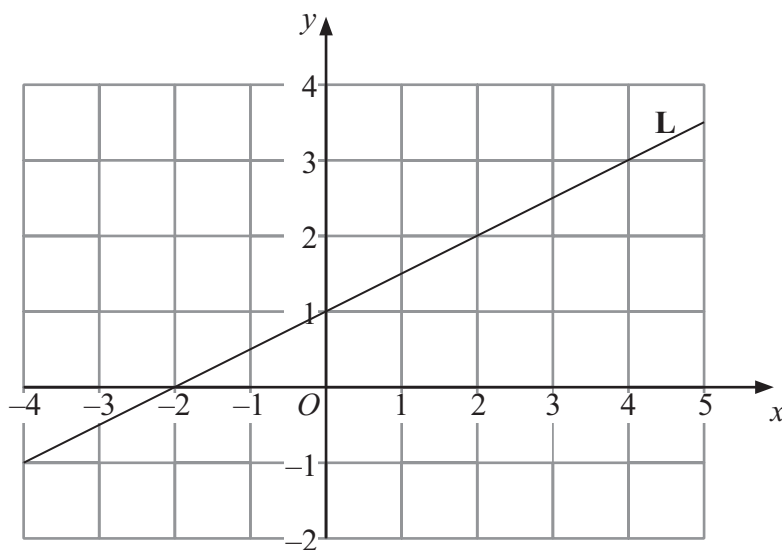
$z = \dots\dots\dots$ (2)

(Total 5 marks)

Q12



14. A line **L** passes through the points (0, 1) and (4, 3).



(a) (i) Find the gradient of the line **L**.

.....

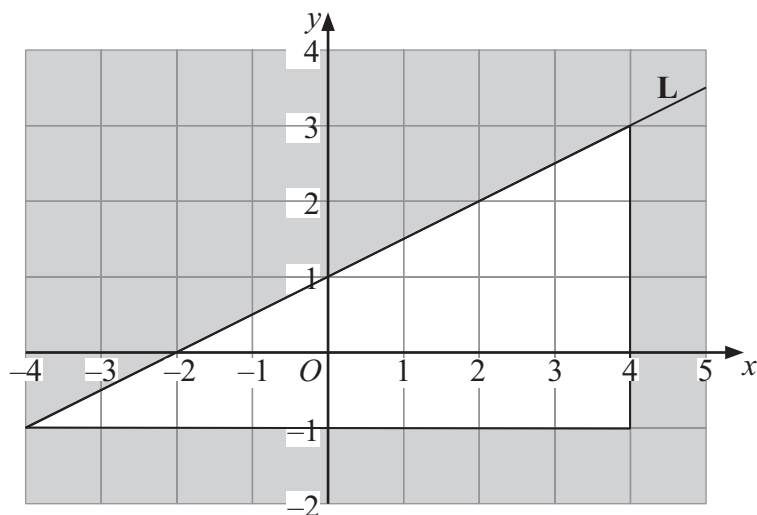
(ii) Find the equation of the line **L**.

.....

(4)



(b)



Write down the three inequalities that define the **unshaded** region.

.....

.....

.....

(3)

(Total 7 marks)

Q14



15.

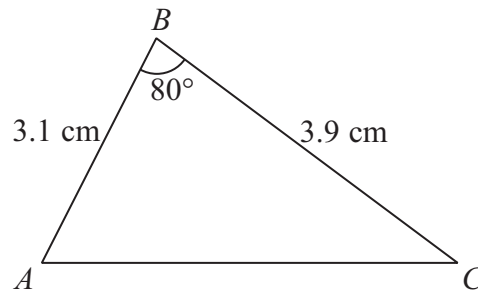


Diagram **NOT** accurately drawn

Calculate the length of AC .
Give your answer correct to 3 significant figures.

.....

(Total 3 marks)

Q15



16. (a) Solve $x^2 - 5x + 3 = 0$
Give your solutions correct to 3 significant figures.
You must show all your working.

.....
(3)

(b) Solve the inequality $y^2 < 9$

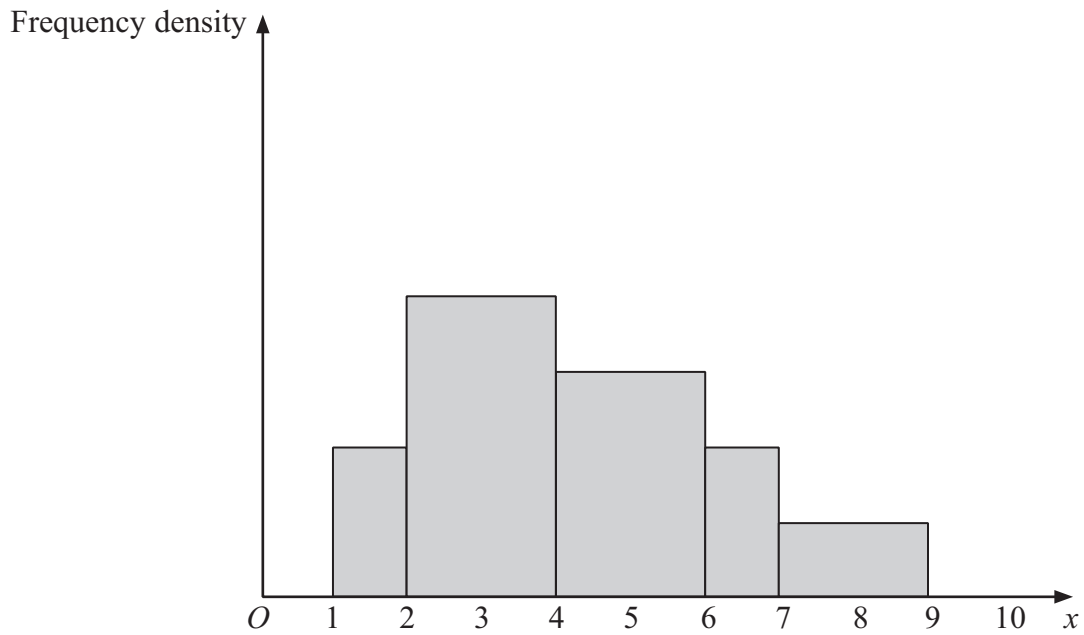
.....
(2)

(Total 5 marks)

Q16



17. The histogram shows information about the heights, x cm, of some plants.
The histogram is drawn accurately.



(a) Calculate the percentage of values of x that lie between 2 and 4.

..... %
(3)

(b) Find the median of x .

.....
(2)

(Total 5 marks)

Q17



18. APC and BPD are chords of a circle.

- $AP = 4$ cm.
- $BP = 3$ cm.
- $PD = 14$ cm.
- $PC = x$ cm.

Calculate the value of x .

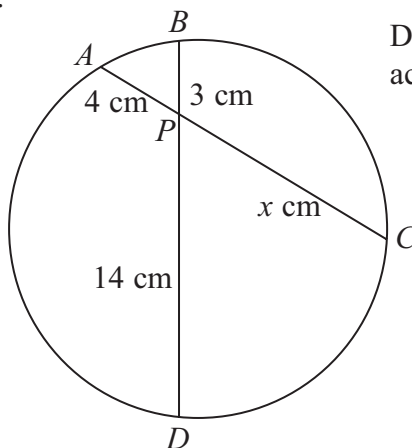


Diagram **NOT** accurately drawn

$x = \dots\dots\dots$

(Total 2 marks)

Q18

19. A particle moves in a straight line through a fixed point O .
The displacement of the particle from O at time t seconds is s metres, where

$$s = t^2 - 6t + 10$$

(a) Find $\frac{ds}{dt}$

$\dots\dots\dots$
(2)

(b) Find the velocity of the particle when $t = 5$

$\dots\dots\dots$ m/s
(2)

(c) Find the acceleration of the particle.

$\dots\dots\dots$ m/s²
(2)

(Total 6 marks)

Q19



20. (a) Evaluate $5 \times 10^{12} + 9 \times 10^{12}$
 Give your answer in standard form.

.....
(2)

(b) Each of the numbers p , q and r is greater than 1 and less than 10

$$p \times 10^{15} + q \times 10^{15} = r \times 10^n$$

$$p + q > 10$$

(i) Find the value of n .

$n =$

(ii) Find an expression for r in terms of p and q .

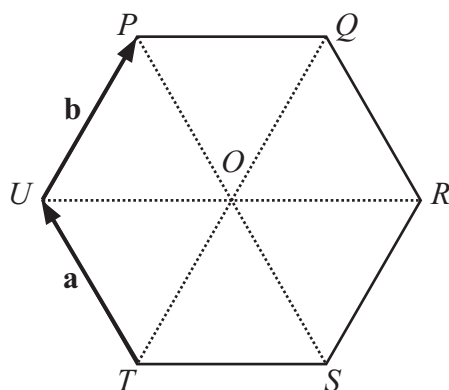
$r =$
(3)

(Total 5 marks)

Q20



21. $PQRSTU$ is a regular hexagon, centre O .
The hexagon is made from six equilateral triangles of side 2.5 cm.



$\vec{TU} = \mathbf{a}$. $\vec{UP} = \mathbf{b}$.

(a) Find, in terms of \mathbf{a} and/or \mathbf{b} , the vectors

(i) \vec{TP}

.....
(1)

(ii) \vec{PO}

.....
(1)

(iii) \vec{UO}

.....
(1)

(b) Find the modulus (magnitude) of \vec{UR} .

..... cm
(1)

(Total 4 marks)

Q21



22.

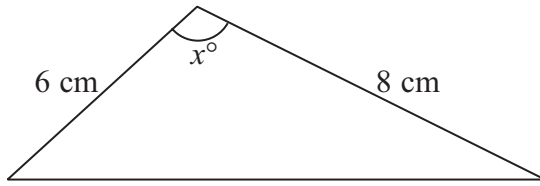


Diagram **NOT** accurately drawn

The area of the triangle is 12 cm^2 .
 The angle x° is obtuse.
 Calculate the value of x .

$x = \dots\dots\dots$

(Total 4 marks)

Q22



23. (a) Simplify $\frac{x^2 - 9}{x^2 + 3x}$

.....
(3)

$$f(x) = \frac{x^2 - 9}{x^2 + 3x} \qquad g(x) = \frac{1}{x^2}$$

(b) Use your answer to part (a) to find and simplify $fg(x)$.

$fg(x) =$
(2)

(Total 5 marks)

Q23

TOTAL FOR PAPER: 100 MARKS

END



Summer 2008 IGCSE Maths Mark Scheme - Paper 4H

Q	Working	Answer	Mark	Notes
1. (a)	$6x - 2x = 7 - 13$ or $2x - 6x = 13 - 7$ $4x = -6$ or $-4x = 6$	$x = -1 \frac{1}{2}$ oe	3	M1 $6x - 2x + 13 - 7 = 0$ or $2x - 6x - 13 + 7 = 0$ M1 A1 Accept $-6/4$ or $-3/2$ (not $6/-4$ or $3/-2$)
(b)	$y - 2 \times 5 = 4 \times 5$ or $y/5 = 4 + 2$	$y = 30$	2	M1 A1
				Total 5 marks

2. (a)		250 ± 2	2	B2 B2 for angle 248 to 252 inclusive. B1 for angle 190 to 260 inclusive
(b)		305 ± 3	2	B2 Award B1 for a bearing $270^\circ < \text{angle} < 360^\circ$
				Total 4 marks

3. (a)	$20/2$ or $(20 + 1)/2$	6	2	M1 A1
(b)		Yes, no or not nec'y with consistent reason	2	B2 Can't tell B1
				Total 4 marks

4	(a)	$3 - 5x - 2$	13	2	M1 A1
	(b)		$5y - 10$	1	B1
	(c)		$w(w + 5)$	2	B2 B1 for two factors that multiply to give at least one correct term. SC $w(w + 5w)$ B1
					Total 5 marks

5.	(a)	30×0.2	6	2	M1 A1 or $30 \div 5$
	(b)	$0.2 + 0.1$	0.3 oe	2	M1 A1
					Total 4 marks

6.		8/12 or 3/12	$\frac{8}{12}, \frac{3}{12}$	2	M1 A1 Accept $(4 \times 2)/(4 \times 3)$ or $(3 \times 1)/(4 \times 3)$ SC Multiply bs by 12 B1 Decimal methods M0 A0
					Total 2 marks

7.	(a)		3^{14}	1	B1
	(b)		7^3	1	B1
	(c)	$5^n = \frac{5^2 \times 5^7}{5^3}$ or $n + 3 - 7 = 2$	$n = 6$	2	M1 Accept $5^{n+3} = 5^9$ A1
	(d)	Product of positive integer powers of both 2 and 3 only	24 or $2^3 \times 3$	2	M1 Powers and/or products may be evaluated. A1
					Total 6 marks

8.	$\frac{1}{2} \times 3 \times 4$ 3×15 and 4×15 and 5×15		192	4	M1 M2 M1 for any ONE of these. A1 cao
					Total 4 marks

9.	$8x = 12$ or $8y = -4$		$x = 1.5$ oe $y = -0.5$ oe	3	M1 Eliminate one variable correctly. Accept $3x + 5x - 8 = 4$ or $5(4 - y)/3 - y = 8$ oe A1 A1 No working M0 A0 A0
					Total 3 marks

10.	(a)		4.8	1	B1
	(b)	$5^2 - "4.8"{}^2$ or 1.96 $\sqrt{(5^2 - "4.8"{}^2)}$	1.4	3	M1 M1dep A1 cao
					Total 4 marks

11.			123.47 & 123.53	2	B2 B1 for 123.37 & 123.43 (equal to 1dp) or 123.57 & 123.63
					Total 2 marks

12.	(a)		63	1	B1 cao
	(b)	$4 \times 5/8$ oe	2.5	2	M1 A1 or $8 \div 2 = 4$ so $5 \div 2 = \dots$, or $4 \div 1.6$
		or $\sqrt{(6^2 + 5^2 - 2 \times 6 \times 5 \cos 20^\circ)}$ or $(5 \times \sin 20^\circ) / \sin 63^\circ$	2.15 1.92		M1 for complete trig method. A1 for answer to 3SF.
	(c)	$6 \times 8/5$ oe	9.6	2	M1 A1
		or $\sqrt{(4^2 + 8^2 - 2 \times 4 \times 8 \cos '97^\circ')}$ or $(8 \times \sin '97^\circ') / \sin 63^\circ$ or $(4 \times \sin '97^\circ') / \sin 20^\circ$	9.37 8.91 11.6		M1 for complete trig method. A1 for answer to 3SF.
					Total 5 marks

13.	(a)		$\frac{2}{3}$ correctly placed once Correct structure All correct	3	B1 B1 B1	correct 4 new lines, ignore labels/probs including labels/probs
	(b)	$\frac{2}{3} \times \frac{2}{3}$ $1 - \frac{2}{3} \times \frac{2}{3}$ or $\frac{1}{3} + \frac{2}{3} \times \frac{1}{3}$ or $\frac{1}{3} \times \frac{2}{3} + \frac{2}{3} \times \frac{1}{3} + \frac{1}{3} \times \frac{1}{3}$	$\frac{5}{9}$ oe	3	M1 M1 A1	$\frac{1}{3} \times \frac{2}{3}$ or $\frac{2}{3} \times \frac{1}{3}$ or $\frac{1}{3} \times \frac{1}{3}$
Total 6 marks						

14.	(a)(i)	vert diff/horiz diff for any 2 points on L			M1	
			0.5 oe	2	A1	
	(a)(ii)	$y = "0.5"x + \text{constant}$	$Y = "0.5"x + 1$ oe	2	M1f A1f	SC "0.5"x + 1 or L = "0.5"x + 1 B1
	(b)		$x < 4$ $y \geq -1$ $Y \leq 0.5x + 1$ oe	3	B1 B1 B1	Allow < SC All inequalities wrong way round B1 Allow > Allow <
Total 7 marks						

15.		$3.1^2 + 3.9^2 - 2 \times 3.1 \times 3.9 \times \cos 80^\circ$ $9.6 + 15.2 - 4.2$	4.54	3	M1 M1 A1	$3.1^2 + 3.9^2 - 24.2 \times \cos 80^\circ$ or 20.6
Total 3 marks						

16.	(a)	$\frac{5 \pm \sqrt{((-5)^2 - 4 \times 3)}}{2}$ $\frac{5 \pm \sqrt{13}}{2}$			M1	
			4.30 and 0.697	3	A1	allow 4.3 and 0.697
	(b)	$y < 3$ or $y > -3$	$-3 < y < 3$	2	M1 A1	Allow $y \leq 3$ or $y \geq -3$
						Total 5 marks

17.	(a)	Try to find area of 2-4 block. Try to find total area.			M1	or 8 M0 for 2/8 or 9 - 1 With consistent scale.
			40%	3	M1 A1	
	(b)	Half total area or try to find middle of distribution			M1f	ft dep on M1 for total area in (a)
			4	2	A1	Cao
						Total 5 marks

18.	$x \times 4 = 3 \times 14$ oe	$x = 10.5$ oe		2	M1 A1	$\frac{x}{14} = \frac{3}{4}, \frac{3}{(3+4)} = \frac{x}{(x+14)}, \frac{4}{(3+4)} = \frac{14}{(x+14)}$
						Total 2 marks

19.	(a)		$2t - 6$	2	B1B1
	(b)	$2 \times 5 - 6$	4	2	M1f A1 Sub $t = 5$ in "ds/dt" dep on linear f(t) M0 for $(2 \times 5 - 6)/5$ Cao
	(c)	$d("2t - 6")/dt$	2	2	M1 A1 Attempt diff "ds/dt" dep on linear f(t) Cao
					Total 6 marks

20.	(a)	14×10^{12} oe	1.4×10^{13}	2	M1 A1 or 1.4e13
	(b)(i)		16	1	B1 cao
	(b)(ii)	$(p + q) \times 10^{15} = r \times 10^p$	$(p + q)/10$ oe	2	M1 A1 may be seen in (i) $0.1(p + q)$, $(p + q) \times 10^{-1}$, $\frac{p \times 10^{15} + q \times 10^{15}}{10^{16}}$
					Total 5 marks

21.	(a)(i)		$a + b$ oe	1	B1
	(a)(ii)		$-a$ oe	1	B1
	(a)(iii)		$b - a$ oe	1	B1
	(b)		5	1	B1
					Total 4 marks

22.	$\frac{1}{2} \times 6 \times 8 \times \sin x^\circ = 12$ $\sin x^\circ = 0.5$ 30	$x = 150$	4	M1 M1 A1 allow $x = 30$ A1
				Total 4 marks

23. (a)	$(x - 3)(x + 3)$ $x(x + 3)$	$\frac{x - 3}{x}$	3	M1 M1 A1 $1 - \frac{3}{x}$
(b)	$\frac{1}{x^2} - 3$ $\frac{1}{x^2}$ or $1 - \frac{3}{x^2}$	$1 - 3x^2$	2	M1 ft $\frac{x+3}{x}$ only A1 cao
				Total 5 marks

Centre No.						Paper Reference						Surname	Initial(s)	
Candidate No.						4	4	0	0	/	3	H	Signature	

Paper Reference(s)

4400/3H

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Thursday 6 November 2008 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

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Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

Without sufficient working, correct answers may be awarded no marks.

You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.

If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 20 questions in this question paper. The total mark for this paper is 100.

There are 20 pages in this question paper. Any blank pages are indicated.

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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Answer ALL TWENTY questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Find the value of $\frac{7.9 + 3.8}{8.6 - 2.1}$

.....
(Total 2 marks)

Q1

2. (a) Factorise $7p - 21$

.....
(1)

(b) Solve $4(x + 5) = 12$
 You must show sufficient working.

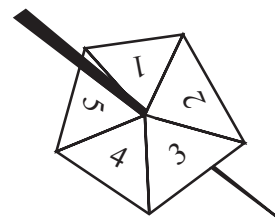
$x =$
(3)

(Total 4 marks)

Q2



3. Jamila spins this 5-sided spinner 50 times.
The table shows information about her scores.



Score	Frequency
1	10
2	9
3	3
4	17
5	11

- (a) Work out the mean score.

.....
(3)

- (b) Jamila is going to spin the spinner once more.
Find an estimate of the probability that her score will be

- (i) 4

.....

- (ii) 1 or 3

.....
(3)

- (c) Is the spinner fair?

Yes

No

Tick (✓) the appropriate box.

Give a reason for your answer.

.....

.....

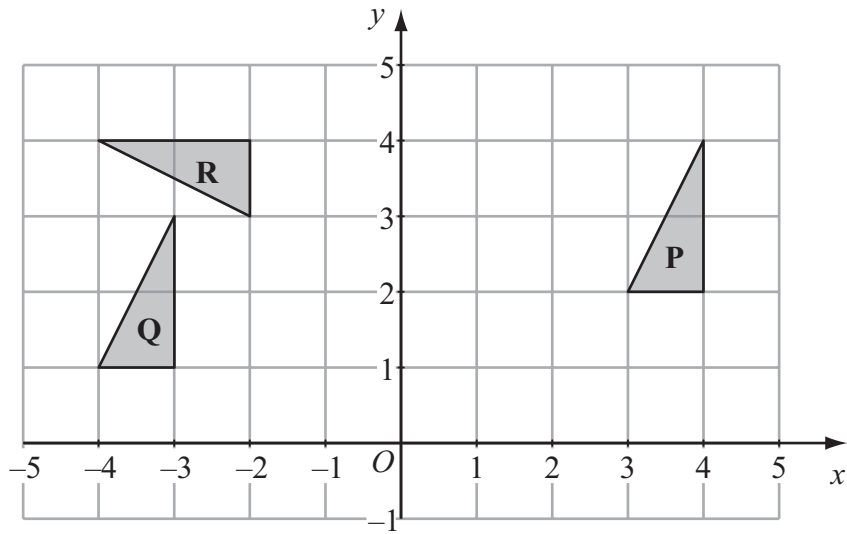
(1)

Q3

(Total 7 marks)



4.



(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

.....

 (2)

(b) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

.....

 (3)

(Total 5 marks)

Q4



5. In a sale, normal prices were reduced by 35%.

(a) The normal price of a camera was £180
Work out the sale price of the camera.

£
(3)

(b) The normal price of a clock was reduced by £84
Work out the normal price of the clock.

£
(3)

(c) The sale price of a computer was £442
Work out the normal price of the computer.

£
(3)

(Total 9 marks)

Q5



6.

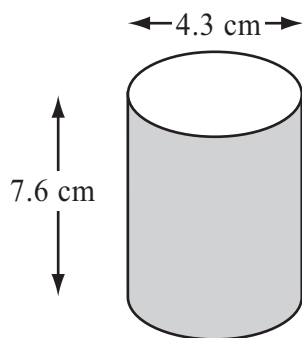


Diagram **NOT** accurately drawn

A solid cylinder has a diameter of 4.3 cm and a height of 7.6 cm.

Work out the volume of the cylinder.
Give your answer correct to 3 significant figures.

..... cm³

(Total 3 marks)

Q6

7. Show that $\frac{2}{5} \div \frac{4}{7} = \frac{7}{10}$

(Total 3 marks)

Q7



8. (a) Simplify

(i) $p^5 \times p$

.....

(ii) $\frac{q^8}{q^3}$

.....

(2)

(b) Expand and simplify $3(4x - 1) - 4(2x - 3)$

.....

(2)

(c) Expand and simplify $(y + 3)(y + 5)$

.....

(2)

(Total 6 marks)

Q8



9.

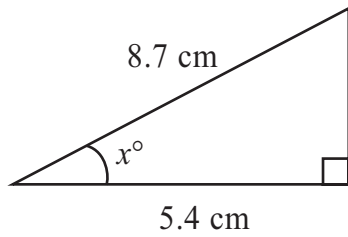


Diagram **NOT** accurately drawn

Work out the value of x .
Give your answer correct to 1 decimal place.

$x = \dots\dots\dots$

(Total 3 marks)

Q9

10. The point A has coordinates $(5, 13)$ and the point B has coordinates $(-1, 1)$.

(a) Work out the coordinates of the midpoint of AB .

$(\dots\dots\dots, \dots\dots\dots)$

(2)

The point C has coordinates $(0, 7)$.

The line L passes through C and is parallel to the line AB .

(b) Find an equation of the line L .

$\dots\dots\dots$

(4)

(Total 6 marks)

Q10



11. The grouped frequency table gives information about life expectancy in the 54 countries of the Commonwealth.

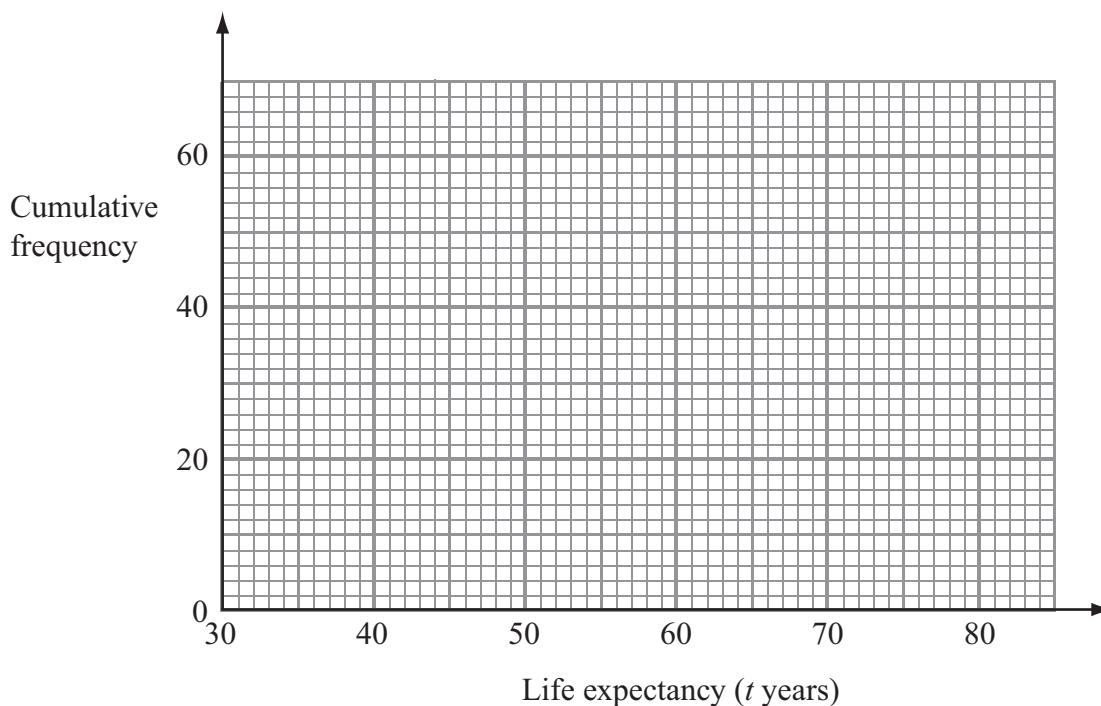
Life expectancy (t years)	Frequency
$30 < t \leq 40$	4
$40 < t \leq 50$	6
$50 < t \leq 60$	9
$60 < t \leq 70$	14
$70 < t \leq 80$	21

(a) Complete the cumulative frequency table.

Life expectancy (t years)	Cumulative frequency
$30 < t \leq 40$	
$30 < t \leq 50$	
$30 < t \leq 60$	
$30 < t \leq 70$	
$30 < t \leq 80$	

(1)

(b) On the grid, draw the cumulative frequency graph for your table.



(2)



(c) Use your graph to find an estimate for the median of the life expectancies in Commonwealth countries.

..... years
(2)

(Total 5 marks)

Q11

12.

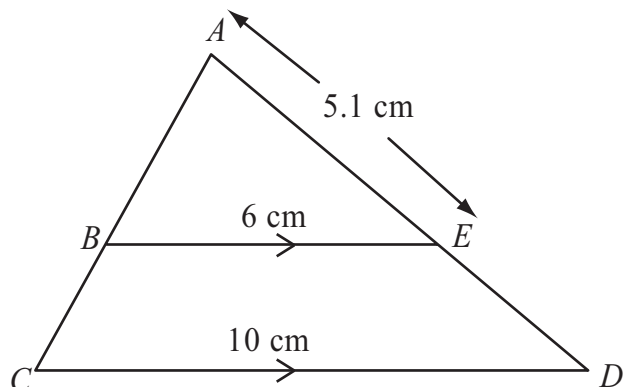


Diagram **NOT** accurately drawn

ABC and AED are two straight lines.
 BE is parallel to CD .
 $AE = 5.1$ cm, $BE = 6$ cm, $CD = 10$ cm.

(a) Calculate the length of DE .

..... cm
(3)

(b) Calculate the value of $\frac{\text{Area of triangle } ABE}{\text{Area of trapezium } BCDE}$

.....
(3)

(Total 6 marks)

Q12

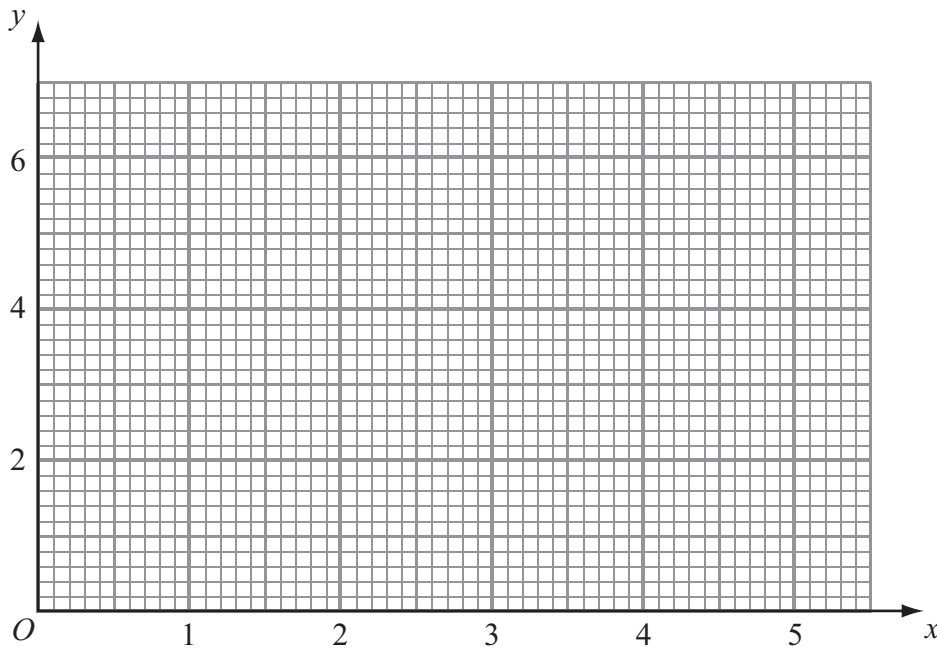


13. (a) Complete the table of values for $y = x + \frac{1}{x^2}$

x	0.5	1	1.5	2	3	4	5
y		2		2.3			5.0

(2)

(b) On the grid, draw the graph of $y = x + \frac{1}{x^2}$ for $0.5 \leq x \leq 5$



(2)



(c) $x = 1$ is a solution of the equation $x + \frac{1}{x^2} = k$ where k is a number.

(i) Find the value of k .

$k = \dots\dots\dots$

(ii) Use your graph to find an estimate for another solution of the equation

$$x + \frac{1}{x^2} = k$$

Give your estimate correct to 1 decimal place.

$x = \dots\dots\dots$

(2)

(Total 6 marks)

Q13

14. (a) Factorise completely $9ab - 12b^2$

.....

(2)

(b) Simplify $(2ab^2)^3$

.....

(2)

(Total 4 marks)

Q14



15. There are 9 counters in a bag.
7 of the counters are red and 2 of the counters are white.

Ajit takes at random two counters from the bag without replacement.

- (a) Calculate the probability that the two counters are red.

.....
(2)

- (b) Calculate the probability that the two counters have different colours.

.....
(3)

(Total 5 marks)

Q15



16.

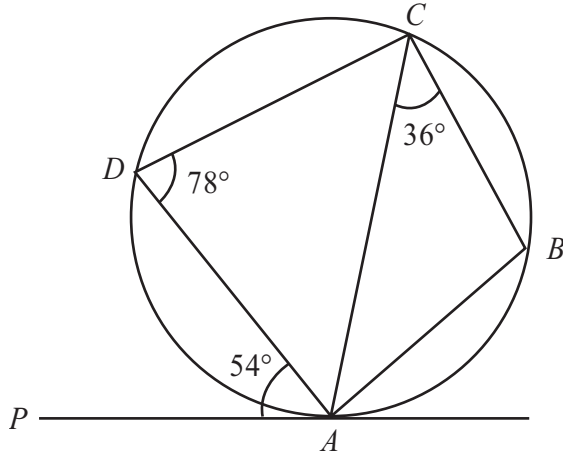


Diagram NOT accurately drawn

A, B, C and D are points on a circle.
 PA is the tangent to the circle at A .
 Angle $PAD = 54^\circ$, angle $ACB = 36^\circ$ and angle $ADC = 78^\circ$.

(a) (i) Find the size of angle ACD .

.....^o

(ii) Give a reason for your answer.

.....

 (2)

(b) Explain why BD is a diameter of the circle.

.....

 (2)

(c) (i) Work out the size of angle ABC .

.....^o

(ii) Give a reason for your answer.

.....

 (2)

(Total 6 marks)

Q16



17. (a) Convert the recurring decimal $0.\dot{7}$ to a fraction.

.....
(2)

$0.0\dot{y}$ is a recurring decimal.
 y is a whole number such that $1 \leq y \leq 9$

(b) (i) Write the recurring decimal $0.0\dot{y}$ as a fraction.

.....

(ii) $0.1\dot{y}$ is also a recurring decimal.
 Using your answer to part (i), or otherwise, convert the recurring decimal $0.1\dot{y}$ to a fraction.
 Give your answer as simply as possible.

.....
(3)

(Total 5 marks)

Q17



18. Simplify fully $\frac{2}{x+2} + \frac{x}{x^2+5x+6}$

.....
Q18

(Total 5 marks)



19.

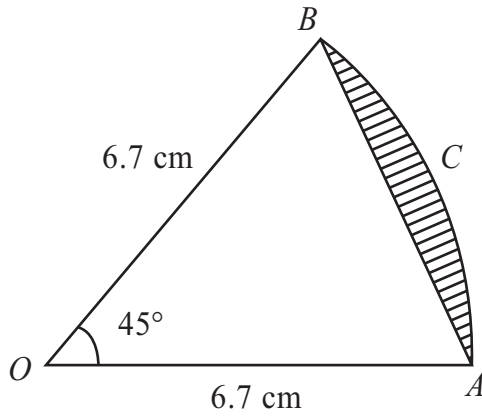


Diagram **NOT** accurately drawn

AB is a chord of a circle, centre O .
 ACB is an arc of the circle.
 $OA = OB = 6.7$ cm.
 Angle $AOB = 45^\circ$.

Calculate the area of the shaded segment.
 Give your answer correct to 3 significant figures.

..... cm²
(Total 5 marks)

Q19



20.

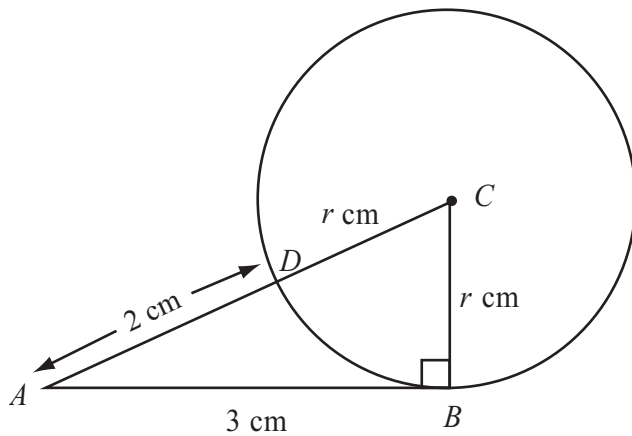


Diagram NOT accurately drawn

B and D are points on a circle, centre C .
 AB is the tangent to the circle at B .
 ADC is a straight line.
 $AB = 3$ cm.
 $AD = 2$ cm.

The radius of the circle is r cm.
 Find the value of r .

$r = \dots\dots\dots$

(Total 5 marks)

Q20

TOTAL FOR PAPER: 100 MARKS

END



November 2008 IGCSE 4400 Maths Mark Scheme - Paper 3H

Q	Working	Answer	Mark	Notes
1.	$\frac{11.7}{6.5}$		2	M1 for 11.7 or 6.5
		1.8		A1 Accept $\frac{9}{5}$ etc
				Total 2 marks

2.	(a)		7(p - 3)	1	B1 cao
	(b)	4x + 20 seen	or x + 5 = 3	3	M1 for 4x + 20 seen
		4x = 12 - 20			M1 for 4x = 12 - 20 or for 4x = 12 - 5 following 4x + 5 = 12
			-2		A1
				Total 4 marks	

Q	Working	Answer	Mark	Notes
3. (a)	$1 \times 10 + 2 \times 9 + 3 \times 3 + 4 \times 17 + 5 \times 11$ or $10 + 18 + 9 + 68 + 55$ or 160		3	M1 for at least 3 correct products and summing them
	$\frac{160}{50}$			M1 (dep) for division by 50
		3.2		A1 Accept 3 if $\frac{160}{50}$ seen
(b)(i)		$\frac{17}{50}$	3	B1 Accept 0.34 or 34%
(ii)	$\frac{10+3}{50}$ or $\frac{10}{50} + \frac{3}{50}$			M1
		$\frac{13}{50}$		A1 Accept 0.26 or 26%
(c)	'No' ticked and eg <i>The scores are not equally likely. 4 is most likely.</i>		1	B1
				Total 7 marks

4. (a)		translation	2	B1 Accept translated, translate etc	These marks are independent but award no marks if the answer is not a single transformation
	7 to the left and 1 down or $\begin{pmatrix} -7 \\ -1 \end{pmatrix}$			B1	
(b)		rotation	3	B1 Accept rotated, rotate etc	
		90°		B1 Accept quarter turn Accept 270°clockwise	
		(0, 0)		B1 Accept origin, O	
				Total 5 marks	

Q	Working	Answer	Mark	Notes	
5. (a)	$\frac{35}{100} \times 180$ or 63		3	M1	M2 for $\frac{65}{100} \times 180$
	180 – “63”			M1 dep	
		117		A1	cao
(b)	$\frac{84}{0.35}$ or $84 \times \frac{100}{35}$		3	M2	for $\frac{84}{0.35}$ or $84 \times \frac{100}{35}$
				M1	for $\frac{84}{35}$ or 2.4
		240		A1	
(c)	$\frac{442}{0.65}$ or $442 \times \frac{100}{65}$		3	M2	for $\frac{442}{0.65}$ or $442 \times \frac{100}{65}$
				M1	for $\frac{442}{65}$ or 6.8 or 65% = 442
		680		A1	cao
Total 9 marks					

6.	$\pi \times r^2 \times 7.6$		3	M2	if $r = \frac{4.3}{2}$ or 2.15 (M1 if $r = 4.3$ may be implied by answer rounding to 441)
		110		A1	for answer rounding to 110 ($\pi \rightarrow 110.367 \dots$ $3.14 \rightarrow 110.311 \dots$)
Total 3 marks					

Q	Working	Answer	Mark	Notes
7.	$\frac{2}{5} \times \frac{7}{4}$ or $\frac{14}{35} \div \frac{20}{35}$		3	B2 for $\frac{2}{5} \times \frac{7}{4}$ (B1 for inverting second fraction ie $\frac{7}{4}$) or B1 for 2 fractions with a denominator of 35 etc B1 for correct numerators
	$\frac{14}{20}$			B1 eg for $\frac{14}{20}$ oe or correct cancelling
				Total 3 marks

8.	(a)(i)		p^6	2	B1 cao
	(ii)		q^5		B1 cao
	(b)	$12x - 3 - 8x + 12$		2	M1 for 3 correct terms
			$4x + 9$		A1 cao
	(c)	$y^2 + 5y + 3y + 15$		2	M1 for 3 correct terms or $y^2 + 8y + c$ or ... + 8y + 15
			$y^2 + 8y + 15$		A1 cao
					Total 6 marks

Q	Working	Answer	Mark	Notes
9.	$\cos x^\circ = \frac{5.4}{8.7}$ or 0.6206...		3	M1 for cos A1 for $\frac{5.4}{8.7}$ or 0.6206... or M1 for sin and $\frac{\sqrt{46.53}}{8.7}$ following correct Pythagoras and A1 for value which rounds to 0.78 or M1 for tan and $\frac{\sqrt{46.53}}{5.4}$ following correct Pythagoras and A1 for value which rounds to 1.26
		51.6		A1 for answer rounding to 51.6
				Total 3 marks

Q	Working	Answer	Mark	Notes
10. (a)		(2, 7)	2	B2 B1 for 2 B1 for 7
(b)	eg $\frac{13-1}{5-(-1)}$ or $\frac{12}{6}$ or $\frac{6}{3}$		4	M1 for clear attempt to use $\frac{\text{vertical difference}}{\text{horizontal difference}}$
	2			A1
		$y = 2x + 7$ or $y = "2" x + 7$		B2 for $y = 2x + 7$ or $y = "2" x + 7$ B1 for $y = 2x + c$ or for $y = "2" x + c$ where $c \neq 7$ or for $2x + 7$, $"2" x + 7$, $L = 2x + 7$, $L = "2" x + 7$ etc ft from their "2" only if it supported by working such as a fraction or numbers indicated on a diagram, even though it may not have gained M1
				SC If no other marks scored, award B1 for $y = mx + 7$ for any m inc $m = 1$
				Total 6 marks

Q	Working	Answer	Mark	Notes
11. (a)		4 10 19 33 54	1	B1 cao
(b)		Points	2	B1 Allow $\pm \frac{1}{2}$ sq ft from sensible table
		Curve		B1 or line segments (dep on 4 pts correct or ft correctly or 5 ordinates from (a) plotted correctly and consistently within intervals but not above end points)
(c)	27 (or $27\frac{1}{2}$) indicated on graph or stated		2	M1 for 27 (or $27\frac{1}{2}$) indicated on graph or stated
		≈ 66		A1 ft from sensible graph
				Total 5 marks

Q	Working	Answer	Mark	Notes
12. (a)	$\frac{10}{6}$ oe or $\frac{6}{10}$ oe seen		3	B1 for $\frac{10}{6}$ oe (1.666...) or $\frac{6}{10}$ oe (0.6) or $\frac{2}{3}$ (0.666...)
	$5.1 \times \frac{10}{6}$ or $5.1 \div \frac{6}{10}$ or 8.5			M1 for $5.1 \times \frac{10}{6}$ or $5.1 \div \frac{6}{10}$ or $5.1 \times \frac{2}{3}$ or 8.5
		3.4		A1 cao
(b)	(scale factor) ² eg $\left(\frac{6}{10}\right)^2$ or $\frac{36}{100}$ or $\left(\frac{10}{6}\right)^2$ or $\frac{100}{36}$		3	M1 M2 for $\frac{\frac{1}{2} \times 6 \times 5.1 \sin \theta}{\frac{1}{2} \times (10 + 6) \times 3.4 \sin \theta}$ or $\frac{\frac{1}{2} \times 6 \times 5.1 \sin \theta}{\frac{1}{2} \times 10 \times 8.5 \sin \theta - \frac{1}{2} \times 6 \times 5.1 \sin \theta}$
	eg $100 - 36, 64, 1 - \frac{36}{100}, \frac{64}{100}$			M1
		$\frac{9}{16}$ oe		A1
				Total 6 marks

Q	Working	Answer	Mark	Notes
13. (a)	4.5	1.9 3.1 4.1	2	B2 for all correct (B1 for 2 or 3 correct)
(b)		Points	2	B1 Allow $\pm \frac{1}{2}$ sq ft from table if at least B1 scored in (a)
		Curve		B1 ft from their points if at least 5 points are correct or ft correctly
(c)(i)		2	2	B1 cao
(ii)		1.6 or 1.7		B1 for answer which rounds to 1.6 or 1.7 ft from curve if B1 scored for curve in (b) Condone >1 dp
				Total 6 marks

14. (a)		$3b(3a - 4b)$	2	B2 B1 for $3(3ab - 4b^2)$ or $b(9a - 12b)$ or for two factors one of which is $3b$ or $(3a - 4b)$ and the other is linear
(b)		$8a^3b^6$	2	B1 B1 for 8 B1 for a^3b^6
				Total 4 marks

Q	Working	Answer	Mark	Notes
15. (a)	$\frac{7}{9} \times \frac{6}{8}$		2	M1
		$\frac{42}{72}$ oe		A1 for $\frac{42}{72}$ oe inc $\frac{7}{12}$
(b)	$\frac{7}{9} \times \frac{2}{8} + \frac{2}{9} \times \frac{7}{8}$		3	M1 for one of correct products $\frac{7}{9} \times \frac{2}{8}$ or $\frac{2}{9} \times \frac{7}{8}$ for sum of both correct products M1 for $\frac{2}{9} \times \frac{1}{8}$ or M2 for $1 - (a) - \frac{2}{9} \times \frac{1}{8}$ SC M1 for $\frac{7}{9} \times \frac{2}{9}$ or $\frac{2}{9} \times \frac{7}{9}$ M1 for $\frac{7}{9} \times \frac{2}{9} + \frac{2}{9} \times \frac{7}{9}$
		$\frac{28}{72}$ oe		A1 for $\frac{28}{72}$ oe inc $\frac{7}{18}$
				Total 5 marks

16. (a)(i)		54	2	B1
(ii)	angle between chord & tangent = angle in alternate segment			B1 Accept 'alternate segment'
(b)	angle $BCD = 90^\circ$		2	B1
	angle in a semicircle is a right angle			B1 Accept if 'semicircle' seen
(c)(i)		102	2	B1
(ii)	opposite angles of a cyclic quadrilateral are supplementary			B1 Accept if 'opposite' and 'cyclic' seen ('Alternate segment' is an alternative)
				Total 6 marks

Q	Working	Answer	Mark	Notes
17. (a)	$10x = 7.\dot{7}$		2	M1 Accept $100x = 77.\dot{7}$
		$\frac{7}{9}$ oe		A1
(b)(i)		$\frac{y}{90}$	3	B1
(ii)	eg $9d = 1 + \frac{y-1}{10}$ or $90d = 10 + y - 1$ or $90d = y + 9$ or $\frac{10+y-1}{90}$ or $0.1 + 0.0\dot{y}$			M1 for equation which would give a correct answer or for an expression which, if simplified would give a correct answer or for $0.1 + 0.0\dot{y}$ but not for $9d = 1.y - 1$ or similar
		$\frac{9+y}{90}$ or $\frac{1}{10} + \frac{y}{90}$		A1 isw and award 2 marks if $\frac{9+y}{90}$ or $\frac{1}{10} + \frac{y}{90}$ seen
				Total 5 marks

Q	Working	Answer	Mark	Notes
18.	$\frac{2}{x+2} + \frac{x}{(x+2)(x+3)}$		5	B1 for factorising $x^2 + 5x + 6$
	$\frac{2(x+3)+x}{(x+2)(x+3)}$ or $\frac{2(x+3)}{(x+2)(x+3)} + \frac{x}{(x+2)(x+3)}$ or $\frac{2(x^2+5x+6)+x(x+2)}{(x+2)(x^2+5x+6)}$			B1 for correct single fraction even if unsimplified or for correct sum of two fractions with the same denominator ft from incorrect factorisation
	$\frac{2x+6+x}{(x+2)(x+3)} = \frac{3x+6}{(x+2)(x+3)}$ or $\frac{2x+6+x}{x^2+5x+6} = \frac{3x+6}{x^2+5x+6}$			B1 for $\frac{2x+6+x}{(x+2)(x+3)}$ or $\frac{2x+6+x}{x^2+5x+6}$
	$\frac{3(x+2)}{(x+2)(x+3)}$			B1
		$\frac{3}{x+3}$		B1 cao
				SC if no denominator, award 3 rd B1 for $2x+6+x$ and 4 th B1 for $3(x+2)$
				Total 5 marks

Q	Working	Answer	Mark	Notes
19.	$\frac{45}{360} \times \pi \times 6.7^2 - \frac{1}{2} \times 6.7^2 \times \sin 45^\circ$		5	M1 for $\frac{45}{360}$ oe
				M1 for $\pi \times 6.7^2$ or value which rounds to 141 seen
				M1 for completely correct method of finding the area of triangle <i>OAB</i> eg $\frac{1}{2} \times 6.7^2 \times \sin 45^\circ$ or $6.7 \times \sin 22.5^\circ \times 6.7 \times \cos 22.5^\circ$
	17.628... (or 17.619...) – 15.871...			A1 for either area correctly evaluated rounded or truncated to 1 dp
		1.76 or 1.75		A1 for answer rounding to 1.76 if π key used ($\pi \rightarrow 1.7572\dots$) or for answer rounding to 1.75 if $\pi = 3.14$ used ($3.14 \rightarrow 1.7483\dots$)
				Total 5 marks

Q	Working	Answer	Mark	Notes
20.	$\text{eg } r^2 + 9 = (r + 2)^2$ $r^2 + 3^2 = (r + 2)^2$ $r = \sqrt{(r + 2)^2 - 9}$ $r + 2 = \sqrt{r^2 + 9}$		5	M2 for correct use of Pythagoras' Rule M1 for $r^2 + 3^2$ or $r^2 + 9$ or $(r + 2)^2$
	$r^2 + 9 = r^2 + 4r + 4$			B1
	$4r = 5$			M1
		$1\frac{1}{4}$ or 1.25		A1 Accept $\frac{5}{4}$
				Total 5 marks

Centre No.						Paper Reference					Surname	Initial(s)	
Candidate No.						4	4	0	0	/	4	H	Signature

Paper Reference(s)

4400/4H

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Wednesday 12 November 2008 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

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Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

Without sufficient working, correct answers may be awarded no marks.

You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.

If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 22 questions in this question paper. The total mark for this paper is 100.

There are 24 pages in this question paper. Any blank pages are indicated.

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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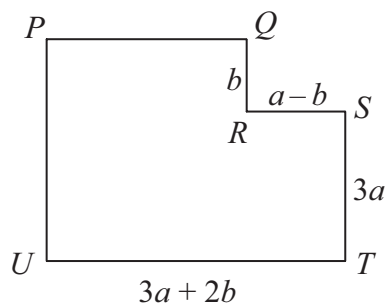
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Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. The diagram shows a shape, $PQRSTU$.
 All the corners are right angles.
 The lengths of four of the sides are given in terms of a and b .



Find an expression, in terms of a and b , for

- (i) PU ,

.....

- (ii) PQ .

.....

(Total 3 marks)

Q1



2. (a) Philip and Nikos share some money in the ratio 3:4
Nikos receives £24
Work out how much Philip receives.

£.....
(2)

- (b) James and Suki share £40 in the ratio 3:5
Work out how much Suki receives.

£.....
(2)

(Total 4 marks)

Q2



3. The diagram shows a wall.

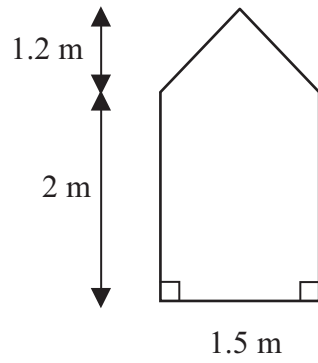


Diagram **NOT** accurately drawn

(a) Calculate the area of the wall.

..... m²
(3)

(b) 1 litre of paint covers an area of 20 m².
Work out the volume of paint needed to cover the wall.
Give your answer in millilitres.

..... ml
(3)

(Total 6 marks)

Q3



4. A train travels 165 km.
Its average speed for the journey is 60 km/h.
Work out the time that this journey takes.
Give your answer in hours and minutes.

..... hours minutes

(Total 3 marks)

Q4

5. When Peter goes to work, he can be early or on time or late.
The probability that he will be early is 0.2
The probability that he will be late is 0.1

(a) Work out the probability that he will be on time.

.....
(2)

(b) Peter will go to work 20 times next month.
Work out an estimate for the number of times he will be **early** next month.

.....
(2)

(Total 4 marks)

Q5



6. (a) Multiply out $5(x - 2)$

.....
(2)

(b) Solve the equation $\frac{x}{4} + 3 = 10$

You must show sufficient working.

$x =$
(2)

(c) Solve the inequality $5x - 6 > 2$

You must show sufficient working.

.....
(2)

(Total 6 marks)

Q6



7.

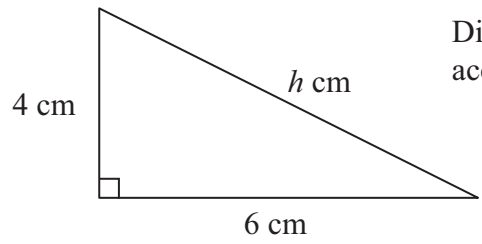


Diagram **NOT** accurately drawn

Work out the value of h .
Give your answer correct to 3 significant figures.

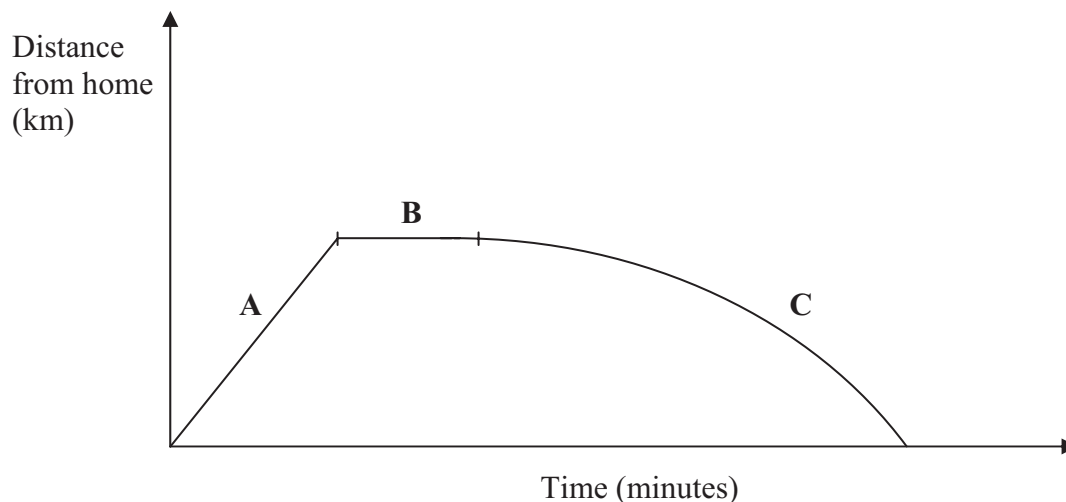
$h = \dots\dots\dots$

(Total 3 marks)

Q7



8. John goes on a trip.
Here is the travel graph for his trip.



The travel graph has three parts, **A**, **B** and **C**.

Here are four statements.

John is not moving.
John is travelling at a steady speed.
John's speed is increasing.
John's speed is decreasing.

Choose the statement from the box that best describes

- (i) part **A**,
- (ii) part **B**,
- (iii) part **C**,

(Total 3 marks)

Q8



9. $\mathcal{E} = \{\text{Positive integers less than 11}\}$
 $A = \{\text{Multiples of 3}\}$
 $B = \{\text{Multiples of 2}\}$

(a) List the members of

(i) A ,

.....

(ii) $A \cup B$.

.....

(3)

- (b) $\mathcal{E} = \{\text{Students in class 12Y}\}$
 $P = \{\text{Students who study Mathematics}\}$
 $Q = \{\text{Students who study History}\}$

(i) Describe the members of $P \cap Q$.

.....

(ii) R is also a set of students in class 12Y.

$$P \cap R = \emptyset$$

Use this information to write a statement about the students in set R .

.....

(3)

(Total 6 marks)

Q9



10. Express 132 as the product of its prime factors.

.....

(Total 3 marks)

Q10

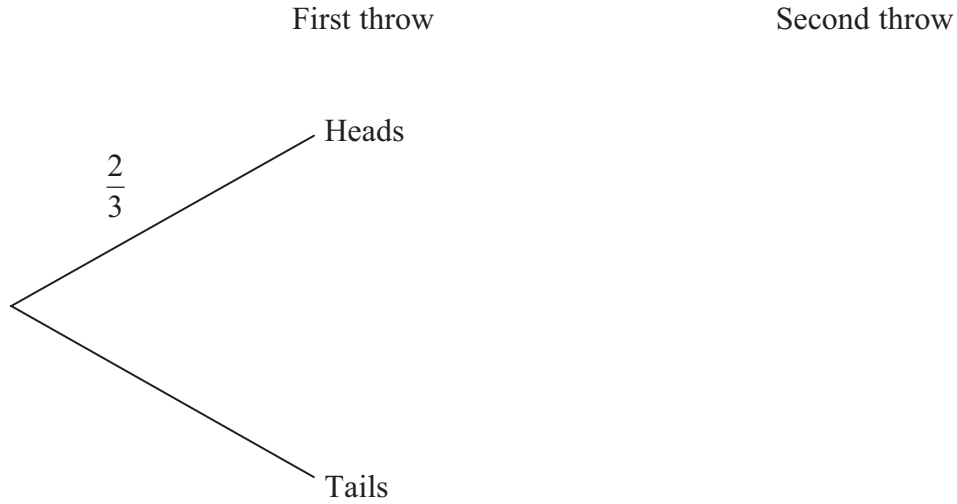


11. A coin is biased.

When it is thrown, the probability that it shows Heads is $\frac{2}{3}$

Dorcas throws the coin twice.

(a) Complete the probability tree diagram.



(3)

(b) Find the probability that the coin shows Heads both times.

.....
(2)

(c) Find the probability that the coin shows Heads at least once.

.....
(3)

(Total 8 marks)

Q11



12. (a) a, b and c are positive numbers such that $1 \leq ab < 10$ and $1 \leq c < 10$

$$(a \times 10^4) \times (b \times 10^7) = c \times 10^m$$

(i) Write down the value of m .

$$m = \dots\dots\dots$$

(ii) Find an expression for c in terms of a and b .

$$c = \dots\dots\dots$$

(2)

(b) $N = (3.2 \times 10^p) \times (4.5 \times 10^q)$, where p and q are integers.
Express N in terms of p and q .
Give your answer in standard form.

$$N = \dots\dots\dots$$

(2)

(Total 4 marks)

Q12



13. (a) Solve $x^2 + 2x - 1 = 0$
Give your solutions correct to 3 significant figures.
You must show sufficient working.

.....
(3)

(b) Solve $\frac{2}{y+4} = 3$
You must show sufficient working.

$y =$
(2)

(Total 5 marks)

Q13



14. (a)

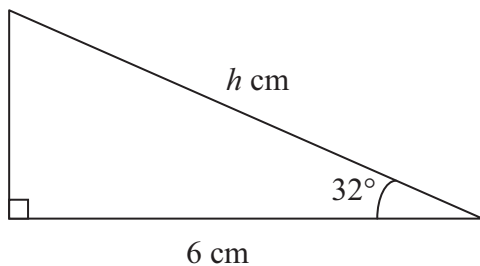


Diagram **NOT** accurately drawn

Calculate the value of h .
Give your answer correct to 3 significant figures.

$h = \dots\dots\dots$
(3)

(b)

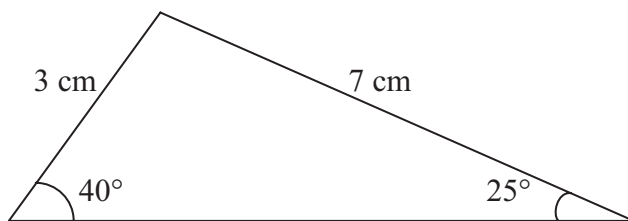


Diagram **NOT** accurately drawn

Calculate the area of the triangle.
Give your answer correct to 3 significant figures.

$\dots\dots\dots \text{ cm}^2$
(3)

(Total 6 marks)

Q14



15. Solve the simultaneous equations

$$\begin{aligned}5x + 4y &= 3 \\ x - 2y &= 2\end{aligned}$$

You must show sufficient working.

$x = \dots\dots\dots$

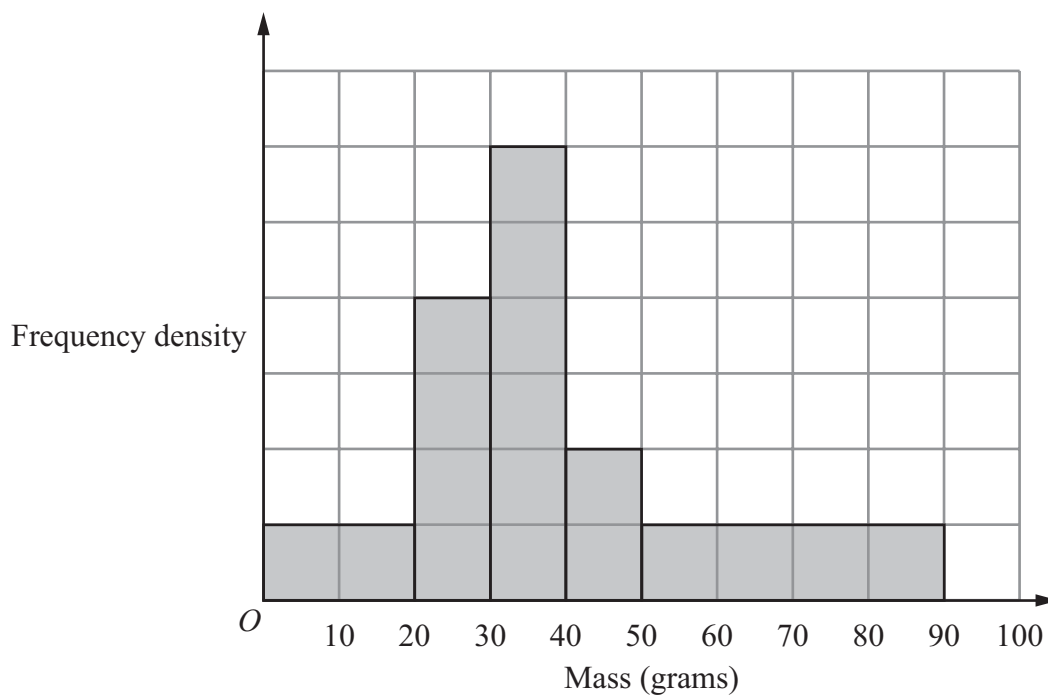
$y = \dots\dots\dots$

(Total 3 marks)

Q15



16. The histogram shows information about the masses, in grams, of some stones.



There are 120 stones with masses less than 30 g.

Calculate an estimate of the number of stones with masses between 35 g and 70 g.

.....

Q16

(Total 3 marks)



17. (a) Factorise $2x^2 + 5x + 3$

.....
(2)

(b) Factorise $4y^2 - 9$

.....
(2)

(Total 4 marks)

Q17

18. (a) Find the value of $(9^{\frac{1}{2}})^4$

.....
(1)

(b) Express 5^{20} as a power of 25

.....
(2)

(c) Express $\sqrt{8}$ as a power of 2

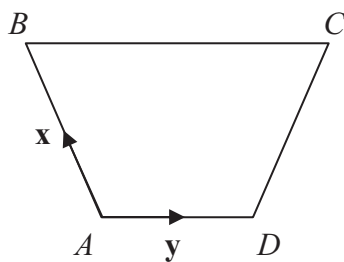
.....
(2)

(Total 5 marks)

Q18



19. The diagram shows a trapezium $ABCD$.



$$\overrightarrow{BC} = 2\overrightarrow{AD}.$$

$$\overrightarrow{AB} = \mathbf{x}. \quad \overrightarrow{AD} = \mathbf{y}.$$

(a) Find, in terms of \mathbf{x} and \mathbf{y} ,

(i) \overrightarrow{AC}

.....

(ii) \overrightarrow{DC}

.....

(2)

(b) The point E is such that $\overrightarrow{AE} = \mathbf{x} + \mathbf{y}$.

Use your answer to part (a)(ii) to explain why $AECD$ is a parallelogram.

.....

.....

(2)

(Total 4 marks)

Q19



20. (a) Differentiate with respect to x

(i) $3x^2 - x$

.....

(ii) $\frac{1}{x}$

.....

(4)

(b) Find the coordinates of the points on the curve $y = x^3$ where the gradient is 12

(..... ,)

(..... ,)

(3)

(Total 7 marks)

Q20



21. The function f is defined as

$$f(x) = \frac{1}{x+3}$$

(a) Find the value of $f(2)$

.....
(1)

(b) State which value(s) of x must be excluded from the domain of f .

.....
(1)

(c) Given that $f(a) = \frac{1}{10}$, find the value of a .

$a =$
(1)

(d) The function g is defined as

$$g(x) = x + 2$$

Express the function gf in the form $gf(x) = \dots$

Give your answer as a single algebraic fraction in its simplest form.

$gf(x) =$
(2)

(Total 5 marks)

Q21



22.

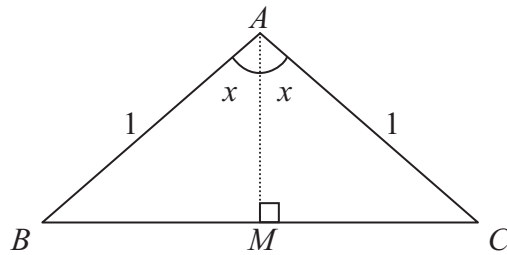


Diagram NOT accurately drawn

ABC is an isosceles triangle.
 $AB = AC = 1$
 M is the midpoint of BC .

(a) (i) Use trigonometry to find an expression, in terms of x , for BM .

.....

(ii) Hence write down an expression, in terms of x , for BC .

.....

(2)

(b) Use the cosine rule to find an expression, in terms of $\cos(2x)$, for BC^2 .

.....

(1)

(c) Hence show that $\cos(2x) = 1 - 2(\sin x)^2$

(2)

Q22

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

END



November 2008 IGCSE 4400 Maths Mark Scheme - Paper 4H

Q	Working	Answer	Mark	Notes	
1.	(i)	$3a + b$	1	B1 oe	
	(ii)	$2a + 3b$	2	B2 B1 each term or if unsimplified: $3a+2b - a + b$ or $3a+2b - (a - b)$: B2 $3a+2b - a - b$: B1 not ISW	
				Total 3 marks	
2	(a)	$24 \div 4 \times 3$ oe	18	2	M1 M1 for $24 \div 4$ or 24×3 or $3 \div 4$ A1
	(b)	$40 \div 8 \times 5$ oe	25	2	M1 M1 8 ($3+5$ or used in $40/8$) A1
				Total 4 marks	
3.	(a)	$0.5 \times 1.5 \times 1.2$ triangle + 2×1.5	3.9	3	M1 or 0.9 M1 $2 \times 1.5 + \dots$ or $3.2 \times 1.5 - \dots$ A1
	(b)	"3.9" / 20 or "3.9" $\times 0.05$ $\times 1000$	195	3	M1 or $1000 \div 20$ M1dep \times "3.9" $50 \times$ "3.9" or $1000 \div (20 / "3.9")$ M2 SC: $100 \div (20 / "3.9")$ M1 A1f
				Total 6 marks	

Q	Working	Answer	Mark	Notes
4.	$165 \div 60$ $=2.75$	2 h 45 m	3	M1 1 km/min A1 165 mins A1
				Total 3 marks

5. (a)	$1 - (0.2 + 0.1)$	0.7	2	M1 A1 oe
(b)	0.2×20	4	2	M1 or $\frac{4}{20}$ oe A1 or 4 out of 20
				Total 4 marks

6. (a)		$5x - 10$	2	B2 B1 for $5x$ or $5 \times x$; B1 for $- 10$ or $+ -10$ ignore " $x = 2$ " but subseq incorrect wking: - B1
(b)	$\frac{x}{4} = 10 - 3$ or $x + 4 \times 3 = 4 \times 10$	28	2	M1 A1 oe
(c)	$5x > 8$	$x > 1.6$	2	M1 condone "=" only if ans " $x > 1.6$ " A1 " $x > 1.6$ " but just " > 1.6 " on line: M1A1 " $x > 1.6$ " but " 1.6 " or " $x = 1.6$ " on line: M1A0 allow \geq
				Total 6 marks

Q	Working	Answer	Mark	Notes
7.	$4^2 + 6^2 (= 52)$ √"52" or 2√13	7.21...	3	M1 M1 dep A1 $\sin(\tan^{-1}(4/6)) = 4/h$ $h = 4 / \sin(\tan^{-1}(4/6))$
				Total 3 marks

8.	A: travelling at a steady speed B: not moving C: speed is increasing	3	B1 B1 B1
			Total 3 marks

9	(a)(i)	3, 6, 9	1	B1
	(ii)	2, 3, 4, 6, 8, 9, 10	2	B2 Any order One omission or extra: B1
In (b)(i) & (ii), answers must refer to context, not just sets				
	(b)(i)	(Students who study) maths and history in 12Y	2	B1 or "study both" allow maths + history B1 indep
	(ii)	(They) don't study maths	1	B1 or No students in R study maths No students who study maths are in R Not: They don't study maths or history
				Total 6 marks

Q	Working	Answer	Mark	Notes
10.	Product of ≥ 3 factors, of which 2 are from $\{2, 2, 3, 11\}$. Can be implied by factor tree or repeated division 2, 2, 3, 11	$2 \times 2 \times 3 \times 11$	3	M1 M1 A1 or $2^2 \times 3 \times 11$
				Total 3 marks

11. (a)		$P(T) = \frac{1}{3}$ correct structure all probs & labels correct	3	B1 B1 B1
(b)	$\frac{2}{3} \times \frac{2}{3}$	$\frac{4}{9}$ oe	2	M1 A1 0.44
(c)	$(\frac{2}{3})^2$ or (b) or $\frac{2}{3} \times \frac{1}{3}$ $\frac{2}{3} \times \frac{1}{3} \times 2 + (\frac{2}{3})^2$ or +(b)	$\frac{8}{9}$ oe	3	M1 M1 $1 - (\frac{1}{3})^2$ M2 A1 0.89, allow 0.88
				Total 8 marks

Q	Working	Answer	Mark	Notes
12. (a)(i)		11	1	B1
(ii)		ab	1	B1
(b)		$1.44 \times 10^{p+q+1}$	2	B2 B1 each for 1.44 and $p + q + 1$
				Total 4 marks

13. (a)	$\frac{-2 \pm \sqrt{(2^2 - 4 \times (-1))}}{2}$ $\frac{-2 \pm \sqrt{8}}{2}$ or better	$x = -2.41$ or 0.414	3	M1 allow ... 4×-1 A1 or $-1 \pm \sqrt{2}$ A1
(b)	$2 = 3(y + 4)$ or $y + 4 = \frac{2}{3}$	$y = -3\frac{1}{3}$	2	M1 A1 oe
				Total 5 marks

14. (a)	$\frac{6}{h} = \cos 32$ oe $h = \frac{6}{\cos 32}$	7.08	3	M1 $(6 \tan 32)^2 + 6^2$ or $3.75^2 + 6^2 (= 50.056\dots)$ M1 $\sqrt{50.056\dots}$ A1 allow 7.07 to 7.08
(b)	$\frac{1}{2} \times 3 \times 7 \times \sin 115$	9.52	3	M2 or $\frac{1}{2} \times 3 \times 7 \times \sin(\text{top angle})$ M1 A1
				Total 6 marks

Q	Working	Answer	Mark	Notes
15.	$2x - 4y = 4$ or $x = 2y + 2$ or similar	$x = 1$ $y = -1/2$ oe	3	M1 correctly equate coeffs of x or y or make x or y the subject A1 A1
				Total 3 marks

16.	(1 sq reps) $120 \div 6$ (=20) or 6 sqs reps 120 ($0.5 \times 6 + 2 + 2$) \times "20" or "20" \times 7	140	3	M1 (f.d. per g) = $1/3 \times 120 \div 20$ or $1/6 \times 120 \div 10$ (= 2) or 2, (4, 6, 8) on fd axis M1dep $5 \times "2" \times 6 + 10 \times 2 \times "2" + 20 \times "2"$ A1 $120 \times 7/6$: M2
				Total 3 marks

17. (a)		$(2x + 3)(x + 1)$	2	B2 B1 if expansion wd give 2 correct terms
(b)		$(2y + 3)(2y - 3)$	2	B2 B1 if expansion wd give 2 correct terms
				Total 4 marks

18. (a)		81	1	B1
(b)	$25 = 5^2$ or $5 = 25^{0.5}$ or 0.5×20 oe	25^{10}	2	M1 not 5×5 A1
(c)	2^3 or $8^{1/3}$ or $8^{0.5}$ or $(\sqrt{2})^3$ or $\sqrt{2^3}$ or $2^{1/2} \times 2^{1/2} \times 2^{1/2}$ or 3×0.5	$2^{1.5}$ oe	2	M1 must involve power(s) not $2/2$ not $\sqrt{2} \times \sqrt{2} \times \sqrt{2}$ A1
				Total 5 marks

Q	Working	Answer	Mark	Notes	
19. (a)(i)		$x + 2y$ oe	1	B1	
(ii)		$x + y$ oe	1	B1	eg $-y + x + 2y$ ISW
(b)	$AE = DC$ $AE \parallel DC$	$\vec{EC} = 2y - y = y$ or $\vec{EC} = y$ shown on diag so $\vec{EC} = \vec{AD}$ $EC \ \& \ AD \ eq \ \& \ \parallel$	2	B1 B1	dep (ii) correct if no mks otherwise scored, $\vec{AE} = \vec{DC}$ B1
					Total 4 marks

20. (a)(i)		$6x - 1$	2	B2	B1 for $6x$ or $6x^1$ B1 for -1
(ii)		$-x^{-2}$ or $-1x^{-2}$ or $-1/x^2$	2	B2	B1 for x^{-2} oe -B1 for incorrect re-writing eg $-1/x^2$
(b)	$3x^2$ "3x ² " = 12	$(-2, -8) (2, 8)$	3	B1 M1 A1	
					Total 7 marks

21. (a)		$1/5$ oe	1	B1	
(b)		-3	1	B1	or $x \neq -3$ or $f(-3)$ or $x = -3$
(c)		7	1	B1	
(d)	$1/x+3 + 2$	$(2x+7)/(x+3)$	2	M1 A1	
					Total 5 marks

Q	Working	Answer	Mark	Notes	
22. (a)(i)		$\sin x$	1	B1	not $\sin x = \sin^{-1} BM$
(ii)		$2\sin x$	1	B1	
(b)	$2 - 2\cos 2x$		1	B1	oe eg $1^2 + 1^2 - 2 \times 1 \times 1 \times \cos 2x$ not ISW
(c)	$(2\sin x)^2 = 2 - 2\cos(2x)$ oe $2(\sin x)^2 = 1 - \cos(2x)$	$(\cos(2x) = 1 - 2(\sin x)^2)$	2	M1 A1	or $2 \cos(2x) = 2 - 4(\sin x)^2$ not ISW
					Total 5 marks

Centre No.						Paper Reference					Surname	Initial(s)		
Candidate No.						4	4	0	0	/	3	H	Signature	

Paper Reference(s)

4400/3H

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Monday 18 May 2009 – Afternoon

Time: 2 hours

Examiner's use only

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Team Leader's use only

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Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

Without sufficient working, correct answers may be awarded no marks.

You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.

If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 21 questions in this question paper. The total mark for this paper is 100.

There are 24 pages in this question paper. Any blank pages are indicated.

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Last year in Mathstown High School, the ratio of the number of candidates for IGCSE mathematics to the number of candidates for IGCSE biology was 5 : 2
The number of candidates for IGCSE mathematics was 80

(a) Work out the number of candidates for IGCSE biology.

.....
(2)

The 80 mathematics candidates were divided between Foundation and Higher in the ratio 1 : 3

(b) Work out the number of Foundation candidates.

.....
(2)

(Total 4 marks)

Q1

2. Omar travelled from Nairobi to Mombasa by train.
The journey took 13 hours 15 minutes.
The average speed was 40 km/h.

Work out the distance from Nairobi to Mombasa.

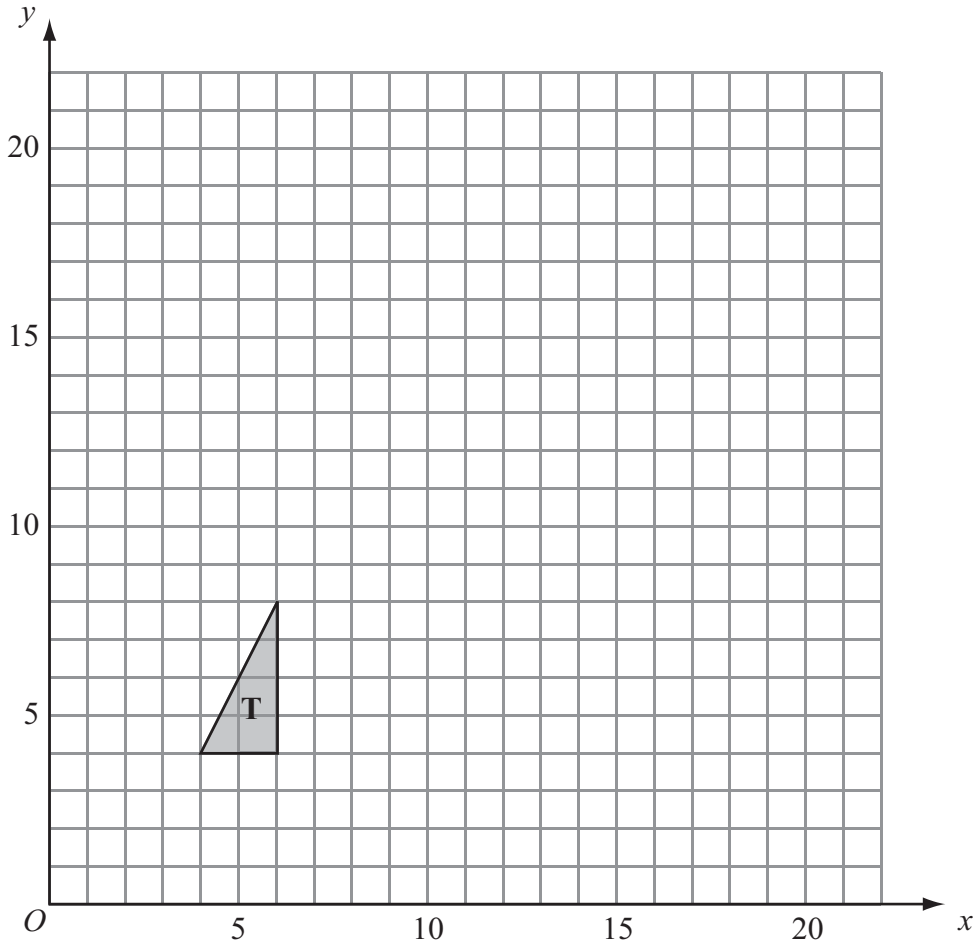
..... km

(Total 3 marks)

Q2



3.



On the grid, enlarge triangle T with a scale factor of $2\frac{1}{2}$ and centre (0, 0).

(Total 3 marks)

Q3

4. A bag contains 10 coloured beads.
Ella is going to take at random a bead from the bag.
She says, "The probability that I will take a red bead is 0.35"

Explain why Ella is wrong.
You must show working to justify your answer.

.....

.....

.....

(Total 2 marks)

Q4



5. (a) Factorise $p^2 + 7p$

.....
(2)

(b) Solve $4 - 5x = 2$

$x =$
(3)

(c) Simplify $t^3 \times t^6$

.....
(1)

(d) Expand and simplify $3(4y + 5) - 5(2y + 3)$

.....
(2)

(Total 8 marks)

Q5



6. Brett's weekly pay is \$760
He spends \$266 on rent.

(a) Express \$266 as a percentage of \$760

..... %
(2)

Kazia spends \$204 a week on rent.
\$204 is 30% of her weekly pay.

(b) Work out her weekly pay.

\$
(2)

(Total 4 marks)

Q6



7.

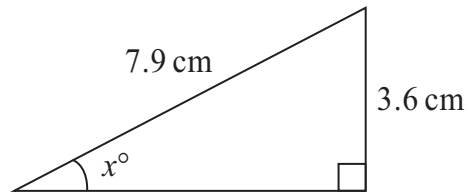


Diagram **NOT** accurately drawn

Work out the value of x .
Give your answer correct to 1 decimal place.

$x = \dots\dots\dots$

(Total 3 marks)

Q7



8. $\mathcal{E} = \{\text{positive whole numbers}\}$
 $A = \{\text{factors of } 27\}$
 $B = \{\text{factors of } 9\}$
 $C = \{\text{first four even numbers}\}$

(a) List the members of $A \cup B$.

.....
(2)

(b) (i) Is it true that $A \cap C = \emptyset$?

Tick (✓) the appropriate box.

Yes

No

(ii) Explain your answer.

.....
.....
(1)

(c) Complete the Venn Diagram to show the relationship between the sets A , B and C .



(2)

Q8

(Total 5 marks)



9.

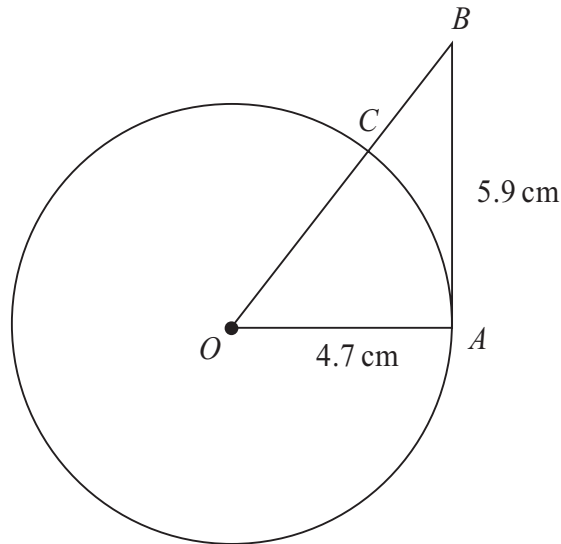


Diagram **NOT** accurately drawn

A is a point on a circle with centre O and radius 4.7 cm.
 AB is the tangent to the circle at A .
 $AB = 5.9$ cm.
 OB intersects the circle at C .

Calculate the length of BC .
 Give your answer correct to 3 significant figures.

..... cm

(Total 4 marks)

Q9



10. The table shows information about the distances walked in a week by 40 people.

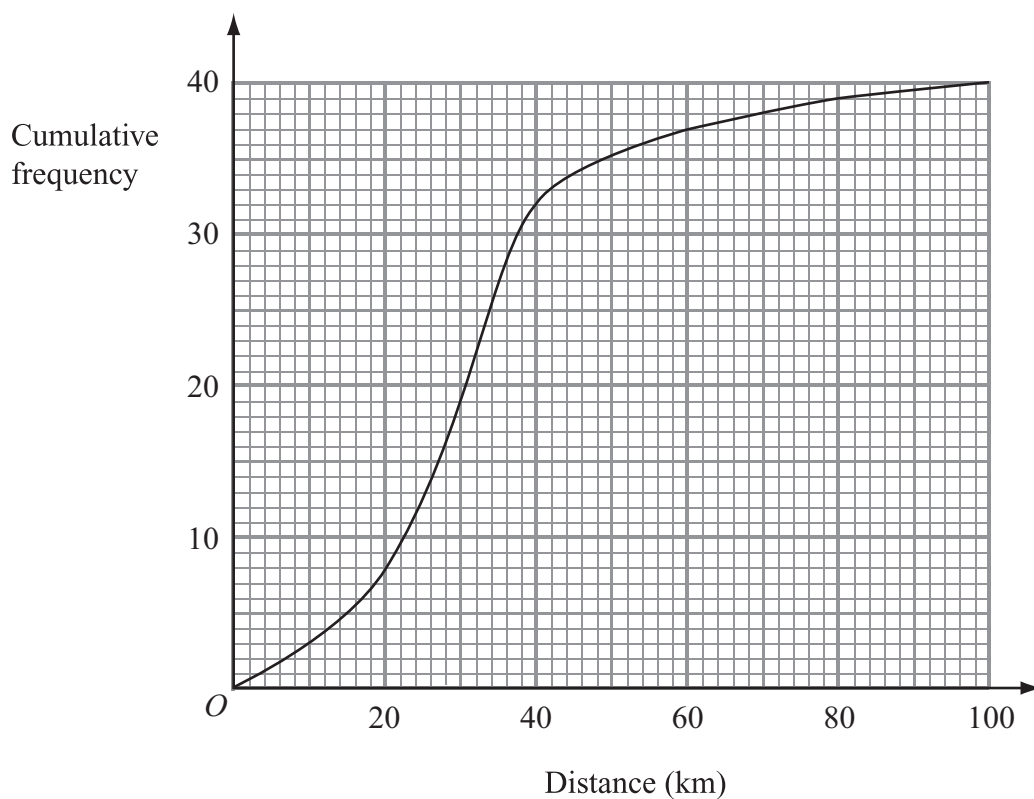
Distance (d km)	Frequency
$0 < d \leq 20$	8
$20 < d \leq 40$	24
$40 < d \leq 60$	5
$60 < d \leq 80$	2
$80 < d \leq 100$	1

(a) Work out an estimate for the mean distance walked in a week by the 40 people.

..... km
(4)



The information in the table was used to draw the cumulative frequency graph.



(b) Find an estimate for the number of people who walked less than 25 km.

.....
(2)

(c) Find an estimate for the interquartile range of the distances walked by the 40 people.

..... km
(2)

(Total 8 marks)

Q10



11. (a) Solve the simultaneous equations

$$2x - 3y = 9$$

$$5x + 4y = 11$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(4)

(b) Write down the coordinates of the point of intersection of the two lines whose equations are $2x - 3y = 9$ and $5x + 4y = 11$

(..... ,)

(1)

(Total 5 marks)

Q11



12. 1 astronomical unit = 150 million kilometres.

(a) Write the number 150 million in standard form.

.....
(2)

The distance from Venus to the Sun is 108 million kilometres.

(b) Express 108 million kilometres in astronomical units.
Give your answer in standard form.

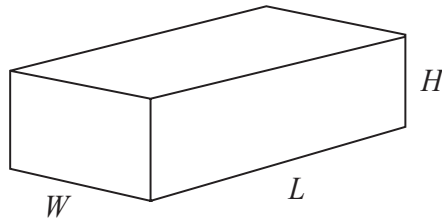
..... astronomical units
(2)

(Total 4 marks)

Q12



13. Here is a cuboid with length L , width W and height H .



The total surface area, A , of the cuboid is given by the formula

$$A = 2(LW + HW + HL)$$

- (a) $A = 70$ $W = 4$ $H = 2$
 Work out the value of L .

$L = \dots\dots\dots$
(3)

- (b) Make W the subject of the formula $A = 2(LW + WH + HL)$

$W = \dots\dots\dots$
(4)

(Total 7 marks)

Q13



14.

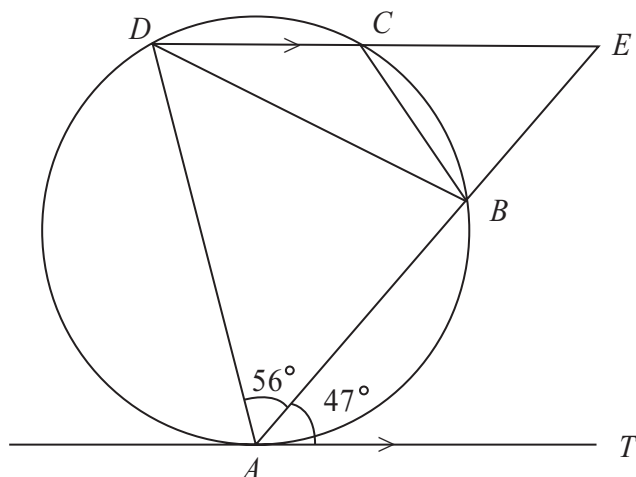


Diagram **NOT** accurately drawn

A, B, C and D are points on a circle.
 ABE and DCE are straight lines.
 AT is a tangent to the circle.
 DCE is parallel to AT .
 Angle $EAT = 47^\circ$. Angle $BAD = 56^\circ$.

(a) (i) Find the size of angle AED .

.....
 °

(ii) Give a reason for your answer.

.....
 (2)

(b) Find the size of angle BCD .

.....
 °
 (1)

(c) (i) Find the size of angle ADB .

.....
 °

(ii) Give a reason for your answer.

.....

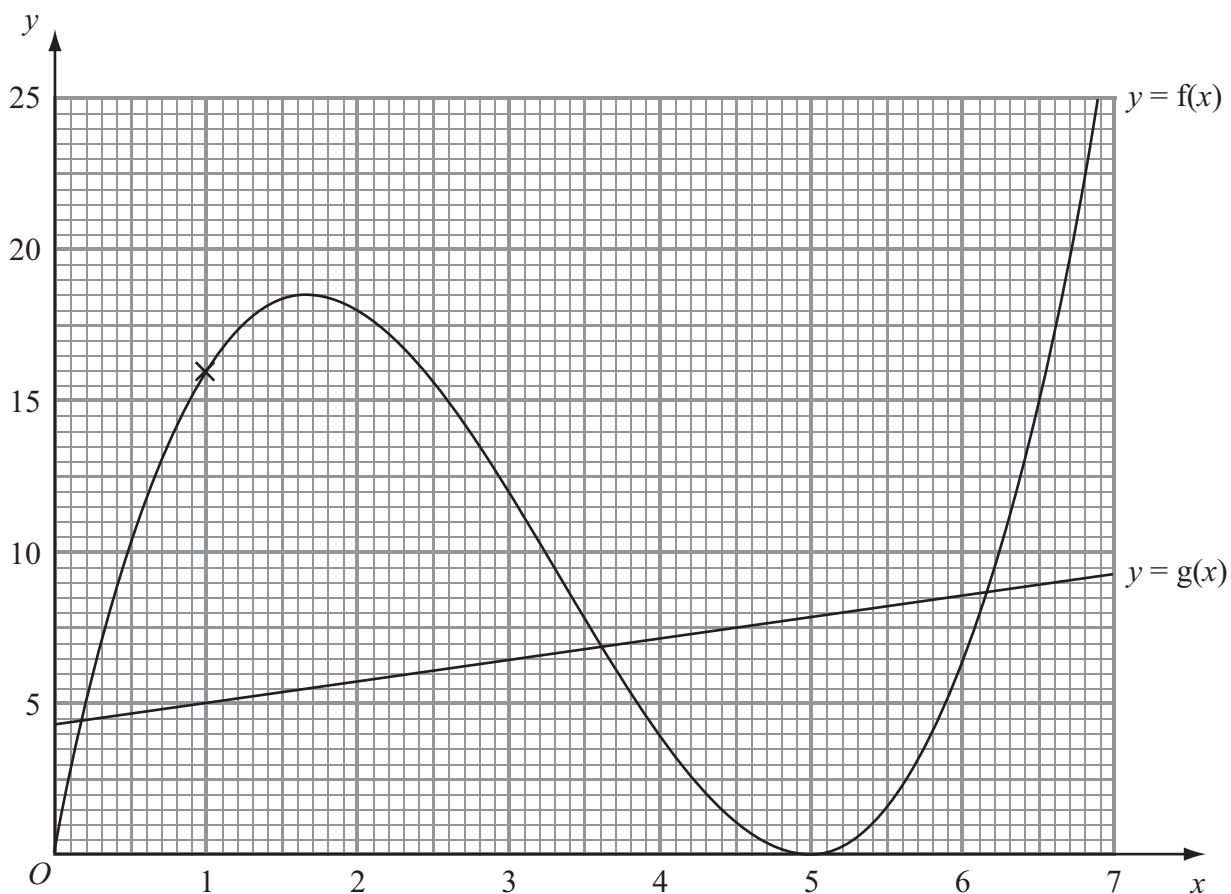
 (2)

(Total 5 marks)

Q14



15. The diagram shows part of the graph of $y = f(x)$ and part of the graph of $y = g(x)$.



(a) Find $f(3)$.

.....
(1)

(b) Solve $f(x) = g(x)$.
Give your answers correct to 1 decimal place.

.....
(2)

(c) Find $fg(1)$.

.....
(2)



(d) Find an estimate for the gradient of the graph of $y = f(x)$ at the point (1, 16).

.....
(3)

Q15

(Total 8 marks)

16.

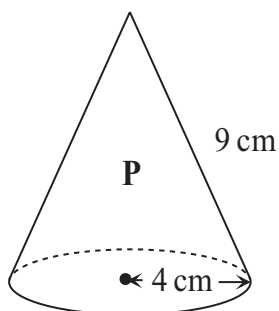


Diagram **NOT** accurately drawn

A solid cone, **P**, has a base radius of 4 cm and a slant height of 9 cm.

- (a) Calculate the total surface area of the cone.
Give your answer correct to 3 significant figures.

..... cm²
(2)

Another solid cone, **Q**, is similar to **P**.
The base radius of **Q** is 6 cm.
The volume of **Q** is k times the volume of **P**.

- (b) Calculate the value of k .

$k =$
(2)

Q16

(Total 4 marks)



17. Here are five counters.
Each counter has a number on it.



Layla puts the five counters in a bag.
She takes two counters at random from the bag without replacement.

Calculate the probability that

(i) **both** counters will have the number 3 on them,

.....

(ii) the sum of the numbers on the two counters will be 6

.....

(Total 5 marks)

Q17



18. Simplify fully $\frac{5x^2 + 14x - 3}{50x^2 - 2}$

.....

(Total 4 marks)

Q18



19.

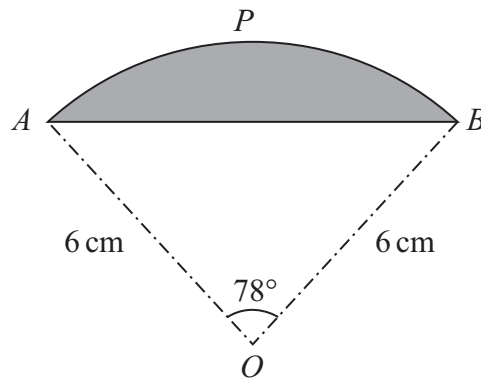


Diagram **NOT** accurately drawn

The diagram shows a sector $OAPB$ of a circle, centre O .
 AB is a chord of the circle.
 The radius of the circle is 6 cm .
 Angle $AOB = 78^\circ$.

Calculate the perimeter of the shaded **segment** APB .
 Give your answer correct to 3 significant figures.

..... cm

(Total 6 marks)

Q19



20. Correct to 2 significant figures, the area of a square is 230 cm^2 .

Calculate the lower bound for the perimeter of the square.

..... cm

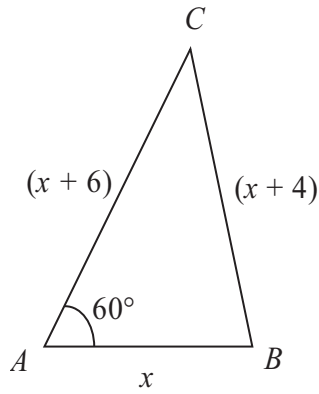
(Total 3 marks)

Q20



21.

Diagram **NOT** accurately drawn



The diagram shows the length, in centimetres, of each side of triangle ABC .
 Angle $BAC = 60^\circ$.

Find the value of x .

$x = \dots\dots\dots$

(Total 5 marks)

Q21

TOTAL FOR PAPER: 100 MARKS

END



4400 Paper 3H Mark Scheme

Except for questions* where the mark scheme states otherwise, the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method. [* Questions 5(b), 11(a), 13(a), 15(d), 20 and 21]

Trial and improvement methods for solving equations score no marks, even if they lead to a correct solution.

Q	Working	Answer	Mark	Notes	
1	a	$80 \times \frac{2}{5}, 2 \times \frac{80}{5}$	2	M1	Also award for 80 : 32 or 32 : 80
				A1	cao
	b	3 + 1 or 4	2	M1	Also award for 60 : 20 or 20 : 60
				A1	cao
				Total 4 marks	

2	40×13.25 or $\frac{40}{60} \times 795$ oe		3	M2	for 40×13.25 oe or $\frac{40}{60} \times 795$ oe
					M1 for $\frac{40}{60} \times (13 \times 60 + 15)$ or for $40 \times$ time eg 40×13.15 or 526 seen or 40×795 or $40 \times 13.$...
		530		A1	cao
				Total 3 marks	

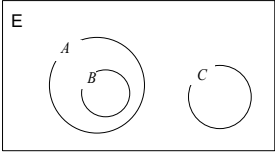
3	correct enlargement vertices (10,10) (15,10) (15,20)	3	B3	B2 for translation of correct shape or 2 vertices correct or for enlargement $1\frac{1}{2}$, centre (0, 0) B1 for one side correct length Allow $\frac{1}{2}$ square tolerance for both vertices and lengths of sides of triangle
				Total 3 marks

4	Examples of complete, correct explanations (i) 10×0.35 or 3.5 seen (may be in $\frac{3.5}{10}$) AND can't have half beads or there must be a whole number of (red) beads (ii) $3\frac{1}{2}$ red beads is impossible (iii) $\frac{7}{20}$ AND there are (only)10 beads or you need 20 beads (iv) The probability of any bead/a red bead must be tenths or must have 1 decimal place (v) Gives at least two examples that the probability of taking a red bead is $\frac{n}{10}$ where $2 \leq n \leq 9$ e.g. states 0.3 and 0.4	2	B2	for a complete, correct explanation B1 for a partially correct explanation Examples of partially correct explanations (i) $\frac{1}{10}$ or 0.1 seen (ii) Gives one example that the probability of taking a red bead is $\frac{n}{10}$ where $2 \leq n \leq 9$ (iii) There would be 3.5 red beads. (iv) You can't have half beads (v) $10 \times 0.35 = 3.5$ (vi) $0.35 = \frac{7}{20}$ Treat statements like 'Don't know the number of red beads' as irrelevant.
				Total 2 marks

5	a		$p(p + 7)$	2	B2	Also accept $(p + 0)(p + 7)$ for B2 B1 for factors which, when expanded and simplified, give two terms, one of which is correct. SC B1 for $p(p + 7p)$
	b	$5x = 2$ or $-5x = -2$		3	M2	for $5x = 2$ or $-5x = -2$ or $\frac{5x}{5} = \frac{2}{5}$ M1 for $4 = 5x + 2$ or $5x = 4 - 2$ or $-5x = 2 - 4$ or $5x - 2 = 0$
			$\frac{2}{5}$ or 0.4		A1	for 4 correct B1 for 2 correct
	c		t^9	1	B1	cao
	d	$12y + 15 - 10y - 15$		2	M1	for 3 correct terms inc correct signs or for $12y + 15 - (10y + 15)$
			$2y$		A1	Accept $2y + 0$
						Total 8 marks

6	a	$\frac{266}{760}$ or 0.35		2	M1	
			35		A1	cao
	b	$\frac{204}{0.3}$ or $\frac{204}{30}$ or 6.8 or $\frac{204}{3}$ or 68		2	M1	
			680		A1	cao
						Total 4 marks

7	sin		3	M1	for sin	or M1 for cos and $\frac{\sqrt{49.45}}{7.9}$ following correct Pythagoras and A1 for 0.8901... or M1 for tan and $\frac{3.6}{\sqrt{49.45}}$ following correct Pythagoras and A1 for 0.5119...
	$\frac{3.6}{7.9}$ or 0.4556...			A1	for $\frac{3.6}{7.9}$ oe or 0.4556...	
		27.1		A1	for answer rounding to 27.1	
						Total 3 marks

8	a	1 3 9 27	2	B2	-B1 for eeoo or any repetition	
	b	Yes and gives an explanation which either refers specifically to the members of A and their properties eg All the factors of 27 are odd. None of the factors of 27 are even. 2, 4, 6, 8 aren't factors of 27. or gives a general explanation which shows understanding of the statement eg A and C have no members in common. The intersection of A and C is empty.	1	B1	for 'Yes' and an acceptable explanation Do not accept an explanation which merely lists, without comment, the members of both sets. Do not accept an explanation which includes the symbol \cap with no indication of its meaning.	
	c		2	B2	B1 for $B \subset A$ B1 for $A \cap C = \emptyset$ and $B \cap C = \emptyset$ Ignore any individual members shown on the diagram. Mark the layout which must be labelled	
						Total 5 marks

9	$4.7^2 + 5.9^2$ $= 22.09 + 34.81 = 56.9$		4	M1	for squaring & adding
	$\sqrt{4.7^2 + 5.9^2}$			M1	(dep) for square root
	7.5432...			A1	for value which rounds to 7.54
		2.84		A1	for answer which rounds to 2.84 (2.84320...)
					Total 4 marks

10 a	$10 \times 8 + 30 \times 24 + 50 \times 5 + 70 \times 2 + 90 \times 1$ or $80 + 720 + 250 + 140 + 90$ or 1280		4	M1	for finding at least three products $f \times x$ consistently within intervals (inc end points) and summing them
				M1	(dep) for use of halfway values
				M1	(dep on 1st M1) for division by 40 or division by their $8+24+5+2+1$
	$\frac{"1280"}{40}$			A1	cao
		32		A1	cao
b	$d = 25$ indicated on graph		2	M1	
		12 or 13		A1	Accept 12 - 13 inc
c	10 and 30 or $10\frac{1}{4}$ and $30\frac{3}{4}$ indicated on cumulative frequency axis or stated		2	M1	
				A1	
		14 - 17 inc		A1	
					Total 8 marks

11	a	$10x - 15y = 45$ $10x + 8y = 22$	$8x - 12y = 36$ $15x + 12y = 33$		4	M1	for coefficients of x or y the same followed by correct operation or for correct rearrangement of one equation followed by substitution in the other eg $5x + 4\left(\frac{2x - 9}{3}\right) = 11$ For both approaches, condone one arithmetical error
		$y = -1$	$x = 3$			A1	cao dep on M1
						M1	(dep on 1st M1) for substituting for other variable
			3 -1			A1	cao dep on all preceding marks
	b		3, -1		1	B1	ft from (a)
							Total 5 marks

12	a		1.5×10^8		2	M1	for 1.5×10^m
						A1	if $m = 8$
	b		7.2×10^{-1}		2	M1	for 7.2×10^n or 0.72 oe with digits 72 eg 72×10^{-2}
						A1	if $n = -1$
							Total 4 marks

13	a	$12L + 16 = 70$ or $8L + 4L = 54$ or $12L = 54$	$6L + 8 = 35$ or $4L + 2L = 27$ or $6L = 27$		3	M2	for correctly collecting L s or constants or both	
							M1 for correct substitution in given formula or in a correct rearrangement of the given formula in which L is not the subject	
							eg $70 = 2(4L + 2 \times 4 + 2L)$ or $70 = 2(4L + 8 + 2L)$ or $35 = 4L + 2 \times 4 + 2L$ or $35 = 4L + 8 + 2L$ or $70 - 2 \times 2 \times 4 = 8L + 4L$ or $35 - 2 \times 4 = 4L + 2L$	
			4.5 oe			A1	depends on M2	
	a	alternative method						
					3	M1	for making L the subject of the given formula	
		eg $\frac{70 - 2 \times 2 \times 4}{2(4 + 2)}$				M1	for correct substitution into a correct expression for L	
			4.5 oe			A1	depends on both method marks	

13	b	$A=2LW+2WH+2HL$ or $\frac{A}{2} = LW + WH + HL$		4	M1	for a correct equation following expansion or division by 2 May be implied by second M1
		$A-2HL=2LW+2WH$ or $\frac{A}{2} - HL = LW + WH$			M1	for correct equation with W terms isolated
		$A-2HL=2W(L+H)$ or $A-2HL=W(2L+2H)$ or $\frac{A}{2} - HL = W(L+H)$			M1	for correct equation with W as a factor
			$\frac{A-2HL}{2(L+H)}$ or $\frac{A-2HL}{2L+2H}$ or $\frac{\frac{A}{2}-HL}{L+H}$ oe		A1	
						Total 7 marks

14	ai		47	2	B1	cao
	ii	alternate angles			B1	Award this mark if 'alternate' appears
	b		124	1	B1	cao
	ci		47	2	B1	cao
	ii	angle between a chord and a tangent = angle in the alternate segment			B1	Accept 'alternate segment'
						Total 5 marks

15	a		12	1	B1	cao Do not accept (3, 12)
	b		0.2 3.6 6.1 or 6.2 or values rounding to these	2	B2	for all 3 correct solutions (B1 for 2 correct solutions or for 3 coordinates with correct solutions as x-coordinates)
	c	5 seen		2	M1	
			0		A1	cao
	d	tan drawn at (1, 16)		3	M1	tan or tan produced passes between points (0.5, $11 \leq y \leq 13$) and (1.5, $19 \leq y \leq 21$)
		$\frac{\text{vertical difference}}{\text{horizontal difference}}$			M1	finds their $\frac{\text{vertical difference}}{\text{horizontal difference}}$ for two points on tan or finds the intercept of their tangent on the y-axis and substitutes $y = 16$, $x = 1$ and their c into $y = mx + c$ or finds their $\frac{\text{vertical difference}}{\text{horizontal difference}}$ for two points on curve, where one of the points has an x-coordinate between 0.5 and 1 inc and the other point has an x-coordinate between 1 and 1.5 inc
			6-10 inc		A1	dep on both M marks
						Total 8 marks

16	a	$\pi \times 4^2 + \pi \times 4 \times 9$		2	M1	
			163		A1	for ans rounding to 163 ($\pi \rightarrow 163.3628\dots$ 3.14 \rightarrow 163.28 3.142 \rightarrow 163.384)
	b	$\frac{6}{4}$ or 1.5 oe or 6 : 4 oe or $\frac{4}{6}$ oe or 4 : 6 oe		2	M1	May be implied by 13.5 or 12.09... Also award for cube of any correct values or cube of correct ratios
			3.375 oe		A1	for 3.375 or $3\frac{3}{8}$ or $\frac{27}{8}$ oe Accept 3.38 if M1 scored Do not award A1 if slant heights used as h in $v = \frac{1}{3}\pi r^2 h$
						Total 4 marks

17	i	$\frac{3}{5} \times \frac{2}{4}$		5	M1		Sample space method - award 2 marks for a correct answer, otherwise no marks
			$\frac{6}{20}$ or $\frac{3}{10}$		A1		
	ii	$\frac{1}{5} \times \frac{1}{4} \times 2 + \text{“} \frac{6}{20} \text{”}$ or $\frac{2}{5} \times \frac{1}{4} + \text{“} \frac{6}{20} \text{”}$			M1	for $\frac{1}{5} \times \frac{1}{4}$ or $\frac{2}{5} \times \frac{1}{4}$	Award M0 M0 A0 for $\frac{1}{5} + \frac{1}{5} = \frac{2}{5}$ Sample space method - award 3 marks for a correct answer, otherwise no marks
					M1	for complete sum	
			$\frac{8}{20}$ or $\frac{2}{5}$ oe		A1		SC
						M1 for $\frac{1}{5} \times \frac{1}{5}$ or $\frac{1}{25}$	
						M1 for $\frac{1}{5} \times \frac{1}{5} \times 2 + \text{their(i)}$	Sample space method - award 2 marks for $\frac{11}{25}$ otherwise no marks
Total 5 marks							

18		$\frac{(5x-1)(x+3)}{2(25x^2-1)}$ $\frac{(5x-1)(x+3)}{2(5x+1)(5x-1)}$		4	B1	for factorising numerator as $(5x-1)(x+3)$	
					B1	for factorising denominator as $2(25x^2-1)$	or B2 for factorising denominator as $(5x-1)(10x+2)$
					B1	for factorising $25x^2-1$ as $(5x+1)(5x-1)$	or $(5x+1)(10x-2)$
			$\frac{x+3}{2(5x+1)}$ or $\frac{x+3}{10x+2}$		B1		
Total 4 marks							

19	$2 \times 6 \sin 39^\circ$ or $2 \times 6 \cos 51^\circ$ or $6^2 + 6^2 - 2 \times 6 \times 6 \cos 78^\circ$ or $\frac{6 \sin 78^\circ}{\sin 51^\circ}$		6	M1	
	7.551...			A1	for answer rounding to 7.55
	eg $\frac{78}{360} \times \pi \times 12$			M1	for $\frac{78}{360}$ oe inc 0.2166... rounded or truncated to at least 3 decimal places or for $\frac{360}{78}$ oe inc 4.6153... rounded or truncated to at least 3 decimal places
				M1	for $\pi \times 12$ or for $2\pi \times 6$ ($\pi \rightarrow 37.699...$ $3.14 \rightarrow 37.68$ $3.142 \rightarrow 37.704$)
	8.16 - 8.17 inc oe inc $\frac{13\pi}{5}$, 2.6π oe			A1	for 8.17 or better ($\pi \rightarrow 8.168...$ $3.14 \rightarrow 8.164$ $3.142 \rightarrow 8.1692$)
		15.7		A1	for ans rounding to 15.7 ($\pi \rightarrow 15.7199...$ $3.14 \rightarrow 15.7158...$ $3.142 \rightarrow 15.7202...$)
					Total 6 marks

20	225 seen		3	B1	
	$\sqrt{225}$ or 15			B1	Award B1 for 15 only if 225 seen
		60		B1	cao Award only if preceding 2 marks scored
					Total 3 marks

21	$(x + 4)^2 = x^2 + (x + 6)^2 - 2x(x + 6)\cos 60^\circ$ or $\cos 60^\circ = \frac{(x + 6)^2 + x^2 - (x + 4)^2}{2x(x + 6)}$		5	M1	
	$x^2 + 4x + 4x + 16$ or $x^2 + 8x + 16$ and $x^2 + 6x + 6x + 36$ or $x^2 + 12x + 36$			B1	dep on M1 for correct expansion of $(x + 4)^2$ and $(x + 6)^2$ in correct statement of Cosine Rule Omitted brackets may be implied by correct subsequent working.
	$x^2 + 8x + 16 = x^2 + x^2 + 12x + 36 - x^2 - 6x$ or $x^2 + 6x = x^2 + 12x + 36 + x^2 - x^2 - 8x - 16$ oe			B1	for correctly dealing with $\cos 60^\circ$ and obtaining a correct equation with no fractions and no brackets
	$2x = 20$ oe			B1	for correct linear equation e.g. $2x = 20$ $-2x = -20$, $4x = 40$, $2x - 20 = 0$
		10		A1	cao dep on all preceding marks
					Total 10 marks

Centre No.						Paper Reference					Surname	Initial(s)	
Candidate No.						4	4	0	0	/	4	H	Signature

Paper Reference(s)

4400/4H

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Monday 1 June 2009 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

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Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

Without sufficient working, correct answers may be awarded no marks.

You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.

If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 22 questions in this question paper. The total mark for this paper is 100.

There are 20 pages in this question paper. Any blank pages are indicated.

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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W850/U4400/57570 4/4/6/4/3



Turn over

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Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. Show that $\frac{2}{3} \div \frac{5}{9} = 1\frac{1}{5}$

Q1

(Total 3 marks)

2. Angelou has x sweets.
He eats 5 of these sweets.
He puts all the sweets he has left into a bag.

(i) Nina has 3 times as many sweets as the number that Angelou put into the bag.
Nina has 39 sweets.

Use this information to write down an equation in x .

.....

(ii) Solve your equation to find the value of x .

$x =$

Q2

(Total 5 marks)



3. Work out the value of $\frac{a(b+1)}{16}$ when $a = 6$ and $b = -9$

.....

(Total 3 marks)

Q3

4. The table gives information about the shoe sizes of 67 people.

Shoe size	6	7	8	9	10
Number of people	20	19	0	26	2

Find the median shoe size.

.....

(Total 2 marks)

Q4



5. (a) Calculate the circumference of a circle of radius 40 m.
Give your answer correct to 3 significant figures.

..... m
(2)

(b)

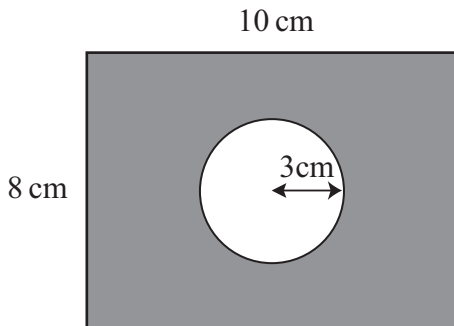


Diagram **NOT** accurately drawn

The diagram shows a circle inside a rectangle.
The rectangle has length 10 cm and width 8 cm.
The radius of the circle is 3 cm.

Calculate the area of the shaded region.
Give your answer correct to 3 significant figures.

..... cm²
(4)

(Total 6 marks)

Q5



6. The diagram shows a biased spinner, numbered 1, 2, 3 and 4

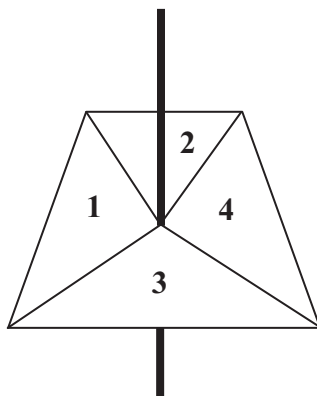


Diagram **NOT** accurately drawn

When the spinner is spun, the number on which it lands is the score.

The table shows the probabilities for three of the scores.

Score	Probability
1	0.3
2	0.1
3	0.4
4	

The spinner is spun once.
Work out the probability that the score is

(a) 4

.....
(2)

(b) an odd number.

.....
(2)

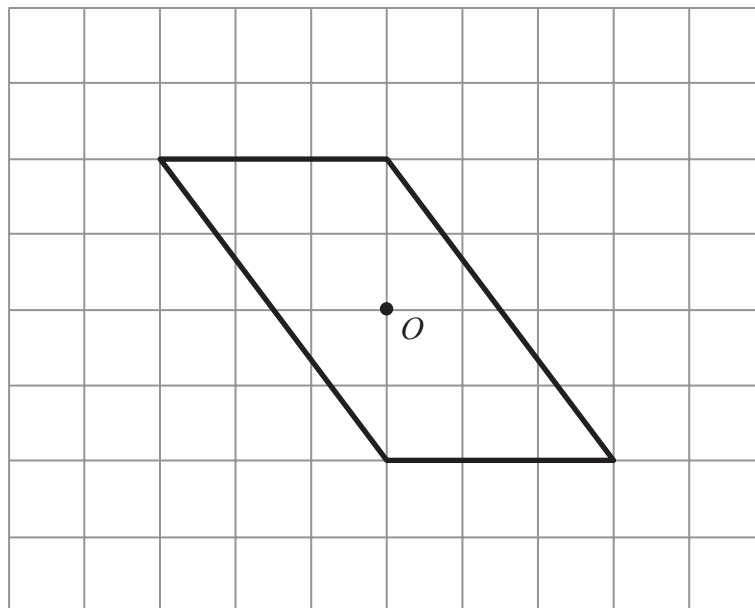
(Total 4 marks)

Q6



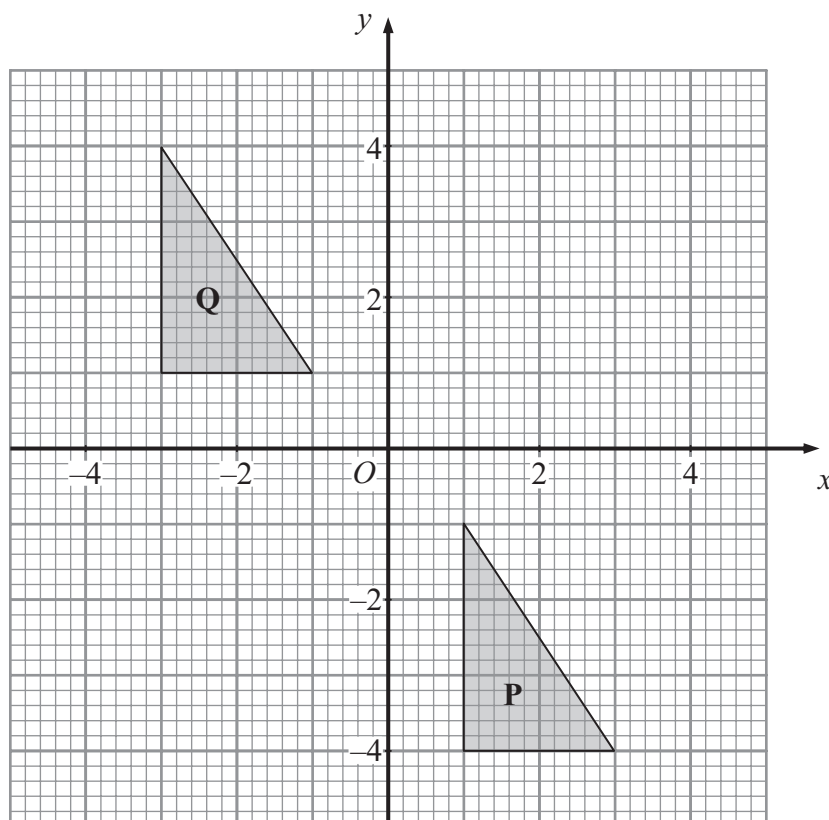
7. The diagram shows a parallelogram.

(a) On the grid, rotate the parallelogram through 90° anticlockwise about the point O .



(2)

(b)



Describe fully the single transformation that maps triangle **P** onto triangle **Q**.

.....

(2)

(Total 4 marks)

Q7



8. (a)

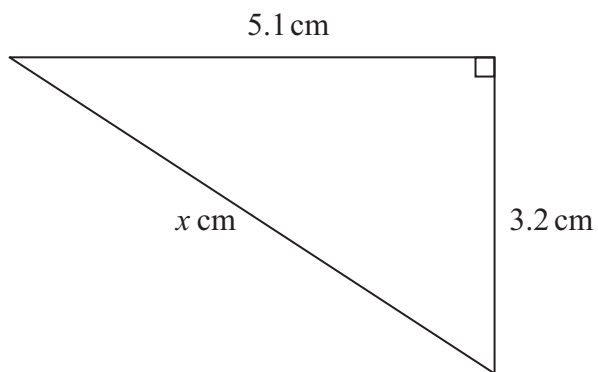


Diagram **NOT** accurately drawn

Calculate the value of x .
Give your answer correct to 3 significant figures.

$x = \dots\dots\dots$
(3)

(b)

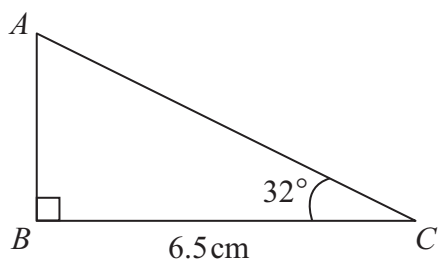


Diagram **NOT** accurately drawn

Calculate the length of AB .
Give your answer correct to 3 significant figures.

$\dots\dots\dots$ cm
(3)

(Total 6 marks)

Q8



9. Solve $\frac{12-x}{3} = 7$

$x = \dots\dots\dots$

(Total 3 marks)

Q9

10. Express 132 as a product of its prime factors.

$\dots\dots\dots$

(Total 3 marks)

Q10



11. Jagdeesh has to work out $\frac{84.2 \times \sqrt{38.2}}{41.6}$ without using a calculator.

Use suitable approximations to work out an estimate for Jagdeesh's calculation.
You **must** show all your working.

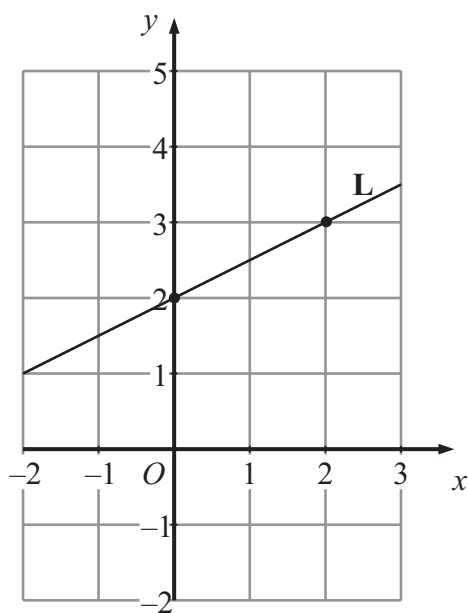
.....

(Total 3 marks)

Q11



12. The straight line, **L**, passes through the points (0, 2) and (2, 3).



(a) Work out the gradient of **L**.

.....
(2)

(b) Find the equation of **L**.

.....
(2)

(c) Write down the equation of a line parallel to **L**.

.....
(1)

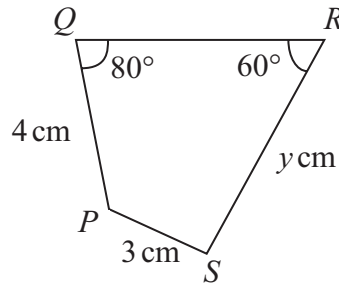
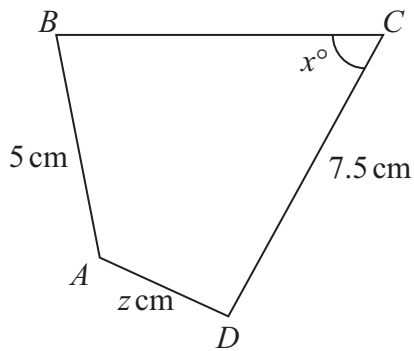
(Total 5 marks)

Q12



13. $ABCD$ and $PQRS$ are two similar quadrilaterals.

Diagrams **NOT** accurately drawn



AB corresponds to PQ .
 BC corresponds to QR .
 CD corresponds to RS .

Find the value of

(a) x ,

$x = \dots\dots\dots$ (1)

(b) y ,

$y = \dots\dots\dots$ (2)

(c) z .

$z = \dots\dots\dots$ (2)

(Total 5 marks)

Q13



15. (a) Simplify $3c^5d \times c^2d^4$

.....
(2)

(b) Simplify $(2x^3y)^4$

.....
(2)

(c) Simplify fully $\frac{2x-6}{x^2-3x}$

.....
(2)

(Total 6 marks)

Q15

16. (a) Factorise $2x^2 - x - 3$

.....
(2)

(b) Hence write down the solutions of $2x^2 - x - 3 = 0$

.....
(1)

(Total 3 marks)

Q16



17. A curve has equation $y = x^2 + 3x$

(a) Find $\frac{dy}{dx}$

.....
(2)

(b) Find the gradient of the curve at the point where $x = -4$

.....
(1)

(c) The curve has a minimum point.
Find the coordinates of this minimum point.

.....
(3)

(Total 6 marks)

Q17



18. The diagram shows a parallelogram, $ABCD$.
 M is the midpoint of BC .
 N is the midpoint of AD .

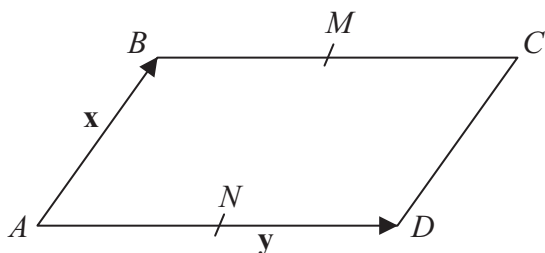


Diagram NOT accurately drawn

$$\vec{AB} = \mathbf{x}$$

$$\vec{AD} = \mathbf{y}$$

Find, in terms of \mathbf{x} and/or \mathbf{y} , the vectors

- (a) \vec{MN}

.....
(1)

- (b) \vec{AC}

.....
(1)

P is the point such that $\vec{CP} = \mathbf{y} - \frac{1}{2}\mathbf{x}$

- (c) Find, in terms of \mathbf{x} and/or \mathbf{y} , the vector \vec{PA}
 Simplify your answer as much as possible.

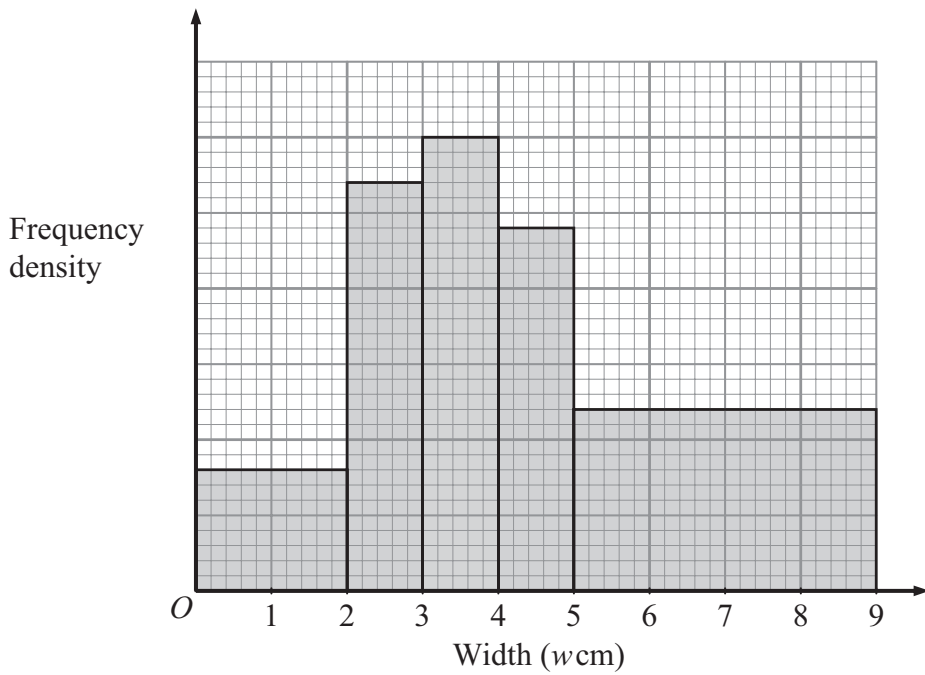
.....
(3)

(Total 5 marks)

Q18



19. The histogram shows information about the widths, w centimetres, of some leaves.



The number of leaves with widths in the class $3 < w \leq 4$ is 15

(a) Find the number of leaves with widths in the class $0 < w \leq 2$

.....
(2)

(b) Find an estimate of the number of leaves with widths in the range

$$4.5 < w \leq 5.5$$

.....
(3)

(Total 5 marks)

Q19



20. The diagram shows an equilateral triangle of side 2 m.

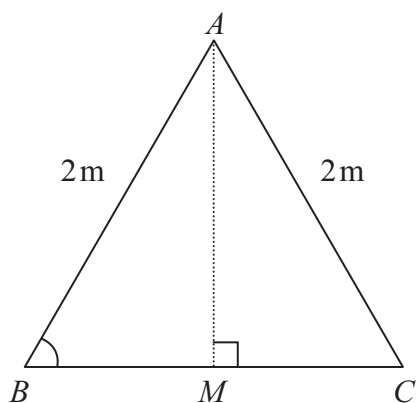


Diagram **NOT** accurately drawn

(a) (i) Use the diagram to show that $\cos 60^\circ = \frac{1}{2}$

(ii) Use the diagram to find the exact value of $\sin 60^\circ$
Give your answer as a surd.

$\sin 60^\circ = \dots\dots\dots$
(4)

(b) Use the exact values of $\cos 60^\circ$ and $\sin 60^\circ$ to show that $(\cos 60^\circ)^2 + (\sin 60^\circ)^2 = 1$

(2) **Q20**

(Total 6 marks)



21. (a) Solve $2x^2 + 3x - 1 = 0$
 Give your solution(s) correct to 3 significant figures.

.....
 (3)

(b) Solve $\frac{2}{x} - \frac{1}{x+1} = 1$

.....
 (4)

(Total 7 marks)

Q21

TURN OVER FOR QUESTION 22



22. (a) Each of the numbers x , y and z is greater than 1 and less than 10

$$x \times 10^5 + y \times 10^4 = z \times 10^5$$

Find an expression for z in terms of x and y .
Give your answer as simply as possible.

$$z = \dots\dots\dots$$

(2)

(b) Each of the numbers 3×10^n , 4×10^m and $a \times 10^p$ is in standard form.

$$\frac{3 \times 10^n}{4 \times 10^m} = a \times 10^p$$

(i) Find the value of a .

$$a = \dots\dots\dots$$

(ii) Find an expression for p in terms of n and m .

$$p = \dots\dots\dots$$

(3)

(Total 5 marks)

Q22

TOTAL FOR PAPER: 100 MARKS

END



3	$6 \times (-9 + 1)$ or -8 seen			M1	allow $6 \times -9 + 1$
	-48 or $-54+6$			M1	Accept $6/(-2)$ or $(3/8) \times -8$
		-3	3	A1	Total 3 marks

4	$67 \div 2$ or $(67 + 1) \div 2$ oe			M1	attempt to find middle of cumulative frequency or listing of people.
		7	2	A1	cao look for mean (7.56..) rounded down (M0 A0)
					Total 2 marks

5	a	$2 \times \pi \times 40$ oe			M1	
			251	2	A1	answer rounding to 251
	b	8×10 or 80 $\pi \times 3^2$ (awrt 28.2 or 28.3) "8x10" - " $\pi \times 3^2$ "			M1	
			51.7	4	M1 M1 A1	dep on both M1's answer rounding to 51.7
						Total 6 marks

6	a	$1 - (0.3 + 0.1 + 0.4)$			M1	
			0.2oe	2	A1	Look for answer in table if missing from answer line
	b	$0.3 + 0.4$			M1	
			0.7oe	2	A1	
						Total 4 marks

7	a		Correct ± 2 mm	2	B2	B1 for any 2 vertices correct ± 2 mm or translation of correct image
	b		Translation $\begin{pmatrix} -4 \\ 5 \end{pmatrix}$	2	B1 B1	translate or translated or -4 in x dir'n, or 4 to left or 4 west (not backwards or across) AND 5 in y dir'n or 5 up or 5 north (not (-4,5) or vectors without brackets)
penalise contradictions						
Total 4 marks						

8	a	$5.1^2 + 3.2^2 (= 36.25)$ $\sqrt{36.25}$	6.02	3	M1 M1 A1	M2 for $5.1/\cos(\tan^{-1}(3.2/5.1))$ or $3.2/\sin(\tan^{-1}(3.2/5.1))$ Must be complete methods answer rounding to 6.02
	b	tan selected $6.5 \times \tan 32^\circ$	4.06	3	M1 M1 A1	$\sin 32^\circ = \frac{AB}{6.5/\cos 32}$ or $AB/\sin 32 = 6.5/\sin 58$ (AB =) $\sin 32^\circ \times 6.5/\cos 32$ or (AB=) $\sin 32 \times 6.5 / \sin 58$ answer rounding to 4.06
Total 6 marks						

9		$12 - x = 21$ or $12 - 21 = x$ or $-x = 21 - 12$	-9	3	M2 A1	or $[-x/3 = 7 - 12/3]$ or $[12/3 - 7 = x/3]$ M1 for $12 - x = 3 \times 7$ (Answer only gains no marks)
Total 3 marks						

10		A product of 3 or more factors of which 2 are from 2,2,3,11 1,2,2,3,11 or 2,2,3,11	$2 \times 2 \times 3 \times 11$	3	M2 A1	M1 can be implied from a factor tree or repeated division M2 can be implied from a factor tree or repeated division product must be stated (not dots for product)
Total 3 marks						

11	$[\frac{80}{40}]$ or $[\frac{84}{42}]$ $\sqrt{36}$ or 6	12	3	B1 B1 B1	dep on both previous B1's (Accept 10 only if $\frac{80}{40}$, 6 used) (Answer only gains no marks) Total 3 marks
----	--	----	---	----------------	--

12	a	$\frac{v}{h}$ in a correct Δ	$\frac{1}{2}$ oe	2	M1 A1	M1 A0 for $\frac{1}{2}x$
	b		$y = \frac{1}{2}x + 2$ oe	2	B2	B1 for $\frac{1}{2}x + 2$ or $L = \frac{1}{2}x + 2$
	c		$y = \frac{1}{2}x + c$	1	B1	c any number $\neq 2$ or letter or $y = 0.5x$ or a line parallel to their b)
Total 5 marks						

13	a		60	1	B1	
	b	$\frac{y}{7.5} = \frac{4}{5}$ oe	6	2	M1 A1	correct ratios or correct use of sf (0.8 or 1.25 or 1.5 or 2/3)
	c	$[\frac{z}{5} = \frac{3}{4}]$ oe or $[\frac{z}{7.5} = \frac{3}{6}]$	3.75	2	M1 A1	allow ft on their "6" or correct use of sf (0.8 or 1.25 etc) cao
Total 5 marks						

14	a		$\frac{1}{4}$ binary tree structure all probs & labels correct	3	B1 B1 B1	P(tail) on 1st throw
	b	$\frac{1}{4} \times \frac{1}{4}$	$\frac{1}{16}$ or 0.0625	2	M1 A1	ft their 2 tail branches cao
Total 5 marks						

15	a		$3c^7d^5$	2	B2	B1 for c^7 or d^5 Accept $3 \times c^7 \times d^5$
	b		$16x^{12}y^4$	2	B2	B1 for 16 or x^{12} or y^4 Accept $16 \times x^{12} \times y^4$
	c	$\frac{2(x-3)}{x(x-3)}$	$\frac{2}{x}$	2	M1 A1	either factorisation correct. Accept $(x \pm 0)$ (2 ± 0) Accept $\frac{2 \pm 0}{x \pm 0}$ Look for incorrect algebra
Total 6 marks						

16	a		$(2x - 3)(x + 1)$	2	B2	B1 for one correct factor or $(2x + 3)(x - 1)$ (integers only)
	b		"1.5" and "-1"	1	B1	both req ^d ft (a) if 2 linear factors
Total 3 marks						

17	a		$2x + 3$	2	B2	B1 each term (accept $3x^0$)
	b		"-5"	1	B1	ft their $ax + b$ ($a, b \neq 0$)
	c	$"2x + 3" = 0$ $x = -\frac{3}{2}$	$(-\frac{3}{2}, -\frac{9}{4})$ oe	3	M1 A1 A1	only ft their $\frac{dy}{dx}$, if $ax + b$ ($a, b \neq 0$) cao dependent on $2x+3=0$ cao Answer dependent on $2x + 3 = 0$ seen
Total 6 marks						

18	a		-x oe	1	B1	can be unsimplified
	b		$x + y$ oe	1	B1	can be unsimplified
	c	Unsimplified expression in terms of x and y for PA or AP (either correct or ft from b) e.g. (AP=) " $x+y$ " + $y - \frac{1}{2}x$ or (PA=) $\frac{1}{2}x - y - "x-y"$	$-0.5x - 2y$	3	B2 B1	B1 Correct vector statement with at least 3 terms including AP or PA e.g. PA = PC + CA or AP = AC + CP can include x and/or y cao
Total 5 marks						

19	a	$\frac{80}{150} \times 15$ or 4×2 (small squares) (freq den)		8	2	M1 A1	M1 for any fd value in correct position and no errors or 1 large square=2.5 leaves or 1 small square=1/10 (leaf) oe
	b	Freq 4-5 = 12 and (freq 5-6 = 6 or freq 5-9=24) $\frac{1}{2} \times (\text{freq 4-5} + \text{freq 5-6})$ or $(\frac{1}{2} \times \text{freq 4-5} + \frac{1}{8} \times \text{freq 5-9})$		9	3	M1 M1 A1	12 & 6 seen or 12 & 24 or 60 & 30 (small squares) dep e.g. $(0.5 \times 12) + (0.5 \times 6)$ or $(0.5 \times 12) + (\frac{1}{8} \times 24)$ or $\frac{1}{10} \times 90$
							Total 5 marks

20	ai	$BM = 1$ or $CM = 1$				B1	(can be marked on diagram) allow cosine rule method
	ii	$(AM^2 =) 2^2 - 1^2$ (= 3) $(AM =) \sqrt{2^2 - 1^2}$ (= $\sqrt{3}$)		$\sqrt{3}/2$ or $\sqrt{3}/4$	4	M1 M1 A1	(dependent on 1 line of Pythagoras or sine rule)
	b	$(\sqrt{3}/2)^2 + (1/2)^2$ = $3/4 + 1/4$ oe			2	M1 A1	$(\sqrt{3}/2)^2$ Must be seen allow $0.75 + 0.25$ if M1 gained
							Total 6 marks

21	a	$\frac{-3 \pm \sqrt{3^2 - 4 \times 2 \times (-1)}}{2 \times 2}$ $\frac{-3 \pm \sqrt{17}}{4}$	0.281 and -1.78	3	M1 M1 A1	allow one sign error both answers rounding to 0.281 & -1.78 (answer only gains no marks)
	b	$\frac{2(x+1)-x}{x(x+1)} = 1$ $2(x+1)-x = x(x+1)$ $x^2 - 2 = 0 \text{ oe}$	$\pm\sqrt{2}$ or $\pm 1.41\dots$	4	M1 M1 M1 A1	$\frac{2(x+1)}{x} - 1 = x + 1 \text{ or } 2 - \frac{x}{x+1} = x$ removal of denominator correct gathering of terms answer rounding to ± 1.41 (answer only gains no marks)
Total 7 marks						

22	a	$x \times 10^5 + 0.1y \times 10^5 = z \times 10^5$	$x + 0.1y \text{ oe}$	2	M1 A1	M1 for 0.1y or $(10^x \times 10^4 + y \times 10^4 = 10z \times 10^4)$ or $(10x + y = 10z)$
	bi		7.5	1	B1	
	ii	$0.75 \times 10^{n-m} (= a \times 10^p)$	$n - m - 1$	2	M1 A1	0.75 and n-m seen (even in part i))
Total 5 marks						

Total 100 marks

Centre No.						Paper Reference						Surname	Initial(s)	
Candidate No.						4	4	0	0	/	3	H	Signature	

Paper Reference(s)

4400/3H

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Thursday 5 November 2009 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

--	--	--

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.

Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

Without sufficient working, correct answers may be awarded no marks.

You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.

If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 25 questions in this question paper. The total mark for this paper is 100.

There are 24 pages in this question paper. Any blank pages are indicated.

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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W850/U4400/57570 5/4/6/4/



Turn over

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Answer ALL TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. Show that $\frac{2}{3} + \frac{1}{5} = \frac{13}{15}$

(Total 2 marks)

Q1

2. Solve $8y - 9 = 5y + 3$

$y = \dots\dots\dots$

(Total 3 marks)

Q2



3. (a) The diagram shows a regular octagon, with centre O .

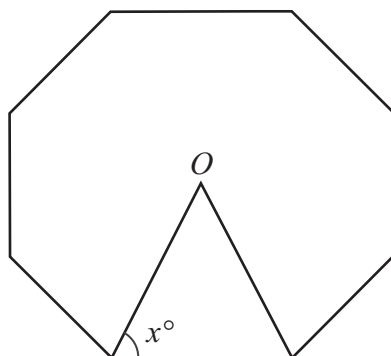


Diagram **NOT** accurately drawn

Work out the value of x .

$x = \dots\dots\dots$
(3)

- (b) A regular polygon has an exterior angle of 30° .
Work out the number of sides of the polygon.

$\dots\dots\dots$
(2)

(Total 5 marks)

Q3



4. In a survey of 36 families, the number of people in each family was recorded. The table shows the results.

Number of people in the family	Frequency
1	3
2	2
3	7
4	13
5	11

Work out the mean number of people in these 36 families.

.....

(Total 3 marks)

Q4



5. Cups cost x dollars each.
Mugs cost $(x + 2)$ dollars each.

(a) Write down an expression, in terms of x , for the total cost of 12 cups and 6 mugs.

..... dollars
(2)

(b) The total cost of 12 cups and 6 mugs is 57 dollars.
Work out the cost of 1 cup.

..... dollars
(2)

(Total 4 marks)

Q5



6. (a) $S = \{1, 3, 5, 7\}$
 $T = \{2, 3, 7, 11\}$

How many members are there in $S \cup T$?

.....
(1)

- (b) $U = \{3, 4, 5\}$
 $U \cup V = \{1, 2, 3, 4, 5\}$

The set V has as few members as possible.
List the members of the set V .

.....
(1)

- (c) $A = \{\text{Cats}\}$
 $B = \{\text{Black animals}\}$

Describe the members of $A \cap B$.

.....
(1)

(Total 3 marks)

Q6



7. (a) Calculate the circumference of a circle of radius 30 cm.
Give your answer correct to 3 significant figures.

..... cm
(2)

- (b) The diagram shows a circle with radius 2.1 cm inside a square.
The circle touches the sides of the square.

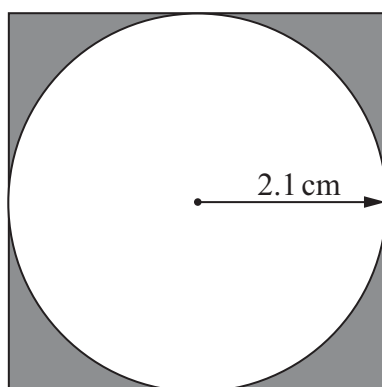


Diagram **NOT** accurately drawn

Work out the shaded area.
Give your answer correct to 3 significant figures.

..... cm²
(4)

(Total 6 marks)

Q7



8. James throws a biased dice once.
The table shows all the possible scores and their probabilities.

Score	Probability
1	0.4
2	0.3
3	0.1
4	0.1
5	0.05
6	0.05

Find the probability that the score is more than 3

.....

(Total 2 marks)

Q8



9. (a) Expand and simplify fully $2(w - 3) + 3(w + 5)$

.....
(2)

(b) Solve the equation $\frac{x+5}{3} = 9$

$x =$
(2)

(c) Solve the inequality $5y + 7 < 13$

.....
(2)

(Total 6 marks)

Q9



10. The diagram shows a prism.
 The cross section of the prism is a right-angled triangle.
 The lengths of the sides of the triangle are 8 cm, 15 cm and 17 cm.
 The length of the prism is 20 cm.
 Work out the total surface area of the prism.

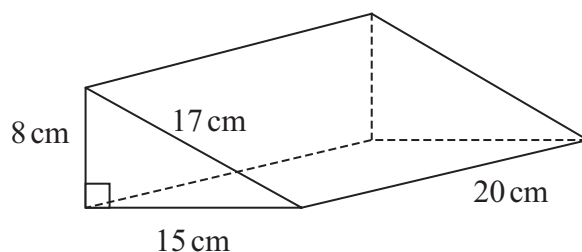


Diagram NOT accurately drawn

..... cm²

(Total 3 marks)

Q10

11. Make a the subject of $P = \sqrt{ab}$

$a =$

(Total 2 marks)

Q11



12. (a)

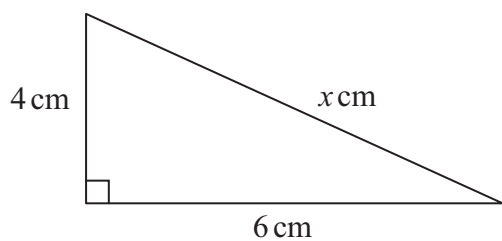


Diagram **NOT** accurately drawn

Calculate the value of x .
Give your answer correct to 3 significant figures.

$x = \dots\dots\dots$
(3)

(b)

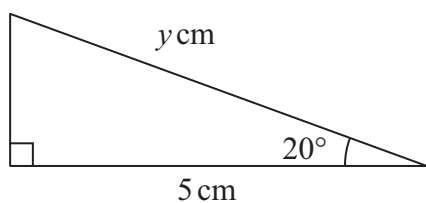


Diagram **NOT** accurately drawn

Calculate the value of y .
Give your answer correct to 3 significant figures.

$y = \dots\dots\dots$
(3)

(Total 6 marks)

Q12



13. The table shows the area, in km², of some countries.

Country	Area (km ²)
Algeria	2.4×10^6
Botswana	6.0×10^5
Equatorial Guinea	2.8×10^4
Ethiopia	1.2×10^6
Malawi	1.2×10^5

(a) Which of these countries has the largest area?

.....
(1)

(b) How many times greater is the area of Ethiopia than the area of Malawi?

.....
(1)

(c) Work out the total area of all five countries.
Give your answer in standard form.

..... km²
(2)

(Total 4 marks)

Q13



14. Solve the simultaneous equations

$$\begin{aligned} 2x - 3y &= 3 \\ 3x + 6y &= 1 \end{aligned}$$

$x = \dots\dots\dots$

$y = \dots\dots\dots$

(Total 3 marks)

Q14

15. Jothi bought a car.
Later, Jothi sold the car for £2125
He made a loss of 15%.
Work out the original price of the car.

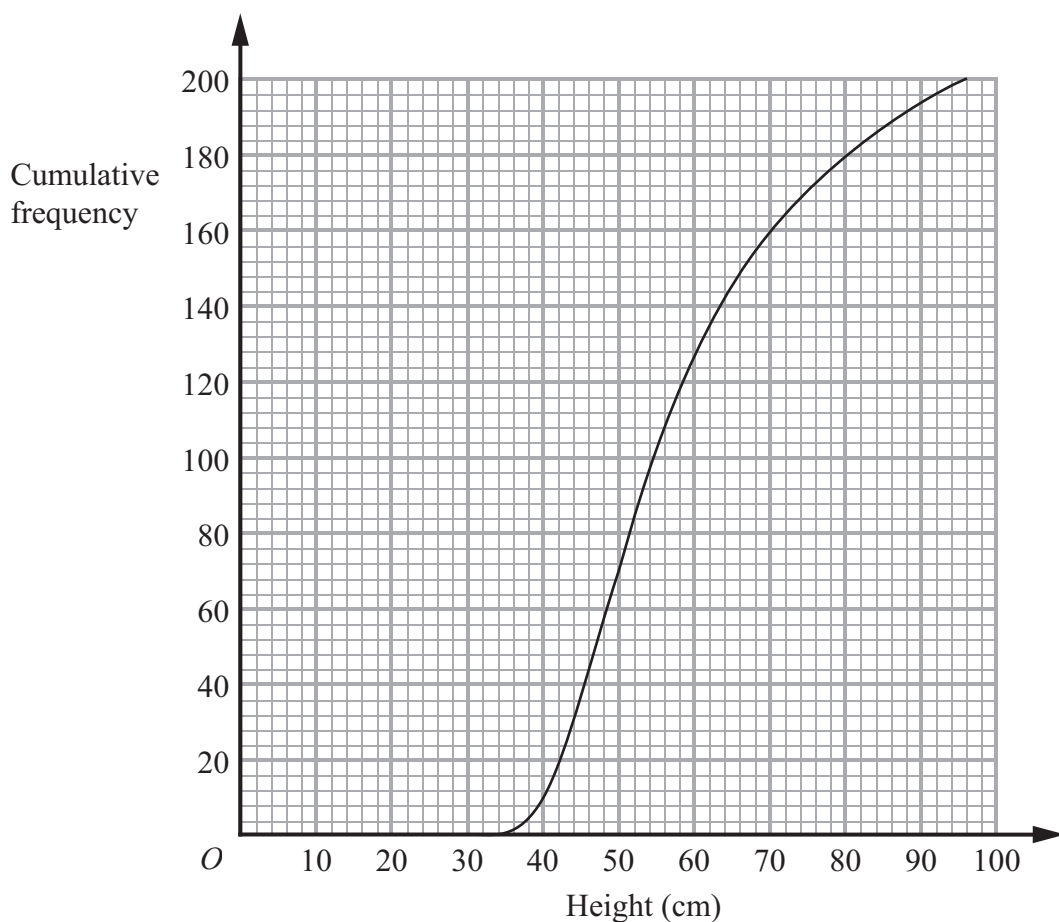
£ $\dots\dots\dots$

(Total 3 marks)

Q15



16. The cumulative frequency diagram shows information about the heights, in centimetres, of 200 plants.



(a) Find an estimate for the median height.

..... cm
(2)

(b) Work out an estimate for the number of plants whose heights are greater than 80 cm.

.....
(2)

(Total 4 marks)

Q16



17. (a) Factorise $x^2 - y^2$

.....
(1)

(b) Factorise completely $(c + d)^2 - d^2$

.....
(2)

(c) Factorise $2w^2 + w - 3$

.....
(2)

(Total 5 marks)

Q17



18. In the diagram, a sector of a circle of radius 12 cm is shaded.
 The area of the sector is $112\pi\text{ cm}^2$.
 Calculate the value of x .

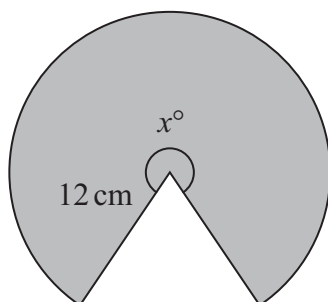


Diagram **NOT** accurately drawn

$x = \dots\dots\dots$

(Total 4 marks)

Q18



19. (a) Simplify $\frac{x^2}{x^2 - 2x}$

.....
(2)

(b) Simplify $\frac{2}{2x-1} - \frac{1}{x+1}$

.....
(4)

(Total 6 marks)

Q19



20. Each time Jeni plays a computer game the probability that she will win is $\frac{2}{3}$

Jeni plays the computer game 3 times.

Calculate the probability that Jeni will win

(a) all 3 games,

.....
(2)

(b) exactly 2 out of the 3 games.

.....
(3)

(Total 5 marks)

Q20



21. t is proportional to the square root of d .

$t = 12$ when $d = 4$

(a) Find a formula for t in terms of d .

.....
(3)

(b) Calculate the value of t when $d = 9$

$t =$
(2)

(Total 5 marks)

Q21



22. The diagram shows the positions of two ships, *A* and *B*, and a lighthouse *L*.

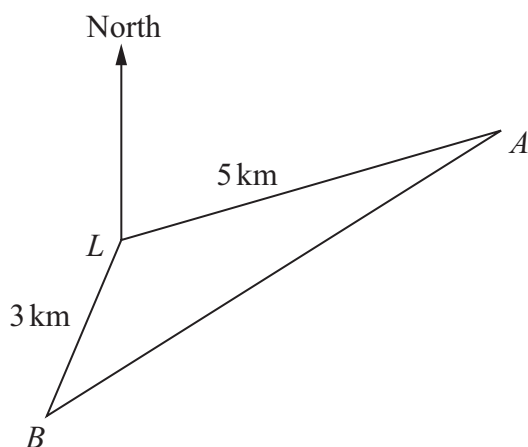


Diagram **NOT** accurately drawn

Ship *A* is 5 km from *L* on a bearing of 070° from *L*.
 Ship *B* is 3 km from *L* on a bearing of 210° from *L*.
 Calculate the distance between ship *A* and ship *B*.
 Give your answer correct to 3 significant figures.

..... km

(Total 3 marks)

Q22



- 23.** In a race, Paula runs 25 laps of a track.
Each lap of the track is 400 m, correct to the nearest metre.
Paula's average speed is 5.0 m/s, correct to one decimal place.

Calculate the upper bound for the time that Paula takes to run the race.
Give your answer in minutes and seconds, correct to the nearest second.

.....

(Total 4 marks)

Q23



24.

$$f(x) = x^2$$
$$g(x) = x - 3$$

(a) (i) Find $gf(x)$

.....

(ii) Find $g^{-1}(x)$

.....

(2)

(b) Solve the equation $gf(x) = g^{-1}(x)$

.....

(3)

(Total 5 marks)

Q24



25. (a) $(\sqrt{a})^7 = k\sqrt{a}$, where $k = a^n$
Find the value of n .

$n = \dots\dots\dots$
(2)

(b) Express $\frac{1}{2\sqrt{2}}$ as a power of 2

$\dots\dots\dots$
(2)

(Total 4 marks)

Q25

TOTAL FOR PAPER: 100 MARKS

END



November 2009 IGCSE Mathematics (4400) Mark Scheme - Paper 3H

Q	Working	Answer	Mark	Notes	
1.	$\frac{x}{15} + \frac{y}{15}$ or $\frac{(2 \times 5) + (1 \times 3)}{(3 \times 5)}$		2	B1 denominators common multiple of 15 or 10/15 or 3/15 (accept $\frac{2 \times 5}{15}$ or $\frac{3 \times 1}{15}$) B1 correct answer equivalent to 13/15	
				Total 2 marks	
2.	$8y - 5y = 3 + 9$ $3y = 12$ or $3y - 12 = 0$	4oe	3	M1 correct gathering of terms M1 (can imply 1st M1) A1 Answer only or embedded answer =MOA0	
				Total 3 marks	
3.	(a) $360 \div 8 (=45)$ $(180 - "45") / 2$	$180 \times 6/8 (=135)$ "135" $\div 2$	67.5	3	M1 M1 dep A1
	(b) $360 \div 30$	$180 - 30 = 180(n-2)/n$	12	2	M1 A1
				Total 5 marks	
4.	$(1 \times 3) + (2 \times 2) + (3 \times 7) + (4 \times 13) + (5 \times 11)$ "135" $\div 36$		3.75	3	M1 must see at least 3 correct products M1 (dep) A1 accept 4 with working
				Total 3 marks	
5.	(a) $12x + 6(x + 2)$ oe	$18x + 12$	2	B2 B1 for $12x$ or $6(x + 2)$ penalise errors	
	(b) "a" = 57 $18x + 12 = 57$ or $45 \div 18$	2.5	2	M1ft "a" = linear term $b x + c$ ($c, b \neq 0$) A1 cao allow numerical methods	
				Total 4 marks	

Q	Working	Answer	Mark	Notes
6. (a)		6	1	B1
(b)		1, 2	1	B1
(c)		Black cats	1	B1 Cats that are black etc
				Total 3 marks

7. (a)	$2 \times \pi \times 30$	188	2	M1 A1 188(.495...) awrt 188 or 189
(b)	4.2^2 (=17.6(4)) $\pi \times 2.1^2$ (= 13.8.....) "4.2 ² " - " $\pi \times 2.1^2$ "	3.79	4	M1 M1 M1 dep on both previous M1 marks A1 Accept awrt 3.78 or 3.79
				Total 6 marks

8.	$0.1 + 0.05 + 0.05$ or $1 - (0.4 + 0.3 + 0.1)$	0.2	2	M1 A1
				Total 2 marks

9. (a)	$2w - 6 + 3w + 15$	$5w + 9$	2	M1 A1 M1 for 3 correct terms (no isw)
(b)	$x + 5 = 3 \times 9$	22	2	M1 A1 Answer only or embedded answer =MOA0
(c)	$5y < 13 - 7$	$y < 6/5$ oe	2	M1 A1 Must be an inequality
				Total 6 marks

10.	$2 \times (0.5 \times 8 \times 15) + (17 \times 20) + (15 \times 20) + (8 \times 20)$ $2 \times 60 + 340 + 300 + 160$	920	3	M1 M1 A1 1 correct face 60, 340, 300 or 160 All correct faces added 120 \neq 2x60
				Total 3 marks

Q	Working	Answer	Mark	Notes
11.	$P^2 = ab$ or $p/\sqrt{b} = \sqrt{a}$	P^2/b oe	2	M1 accept $P^2 = a \times b$ and $p \times p = a \times b$ A1
				Total 2 marks

12. (a)	$4^2 + 6^2 (=52)$ $\sqrt{"52"}$	7.21	3	M1 M1 (dep) A1 7.21(11...) awrt 7.21
(b)	Alt. $y/\sin 90 = 5/\sin 70$ M1 $y = 5 / \sin 70$ M1	$\cos 20 = 5/y$ $y = 5/ \cos 20$	5.32	3 M1 cos selected M1 A1 5.32088..... awrt 5.32
				Total 6 marks

13. (a)		Algeria	1	B1 Accept 2.4×10^6
(b)		10	1	B1 Ten times etc
(c)		4.348×10^6 or 4.35×10^6	2	B2 B1 for digits 4348 or 4350000 or 4.3×10^6
				Total 4 marks

14.	2 lines where coeff of x or y are "equal"	$x=1, y=-1/3$	3	M1 eg $4x - 6y = 6$ or $6x - 9y = 9$ and $3x + 6y = 1$ and $6x + 12y = 2$ and then add/subtract (condone 1 num. error) or make x or y the subject in either equation & subst. A1 A1 Answers alone =MOAO
				Total 3 marks

15.	$2125 \div 0.85$ oe	2500	3	M2 M1 for $2125 \div 85 (=25)$ or $85\%=2125$ or $0.85 \times "x" = 2125$ A1 cao
				Total 3 marks

Q	Working	Answer	Mark	Notes
16. (a)	Read height at cf 100 or 100.5	54 to 56 inc	2	M1 A1
(b)	200 - (178 to 182)	18 to 22 inc	2	M1 A1
				Total 4 marks

17. (a)	$(x - y)(x + y)$		1	B1
(b)	$c^2 + 2cd + d^2 - d^2$	$c(c + 2d)$	2	M1 A1 Alt $(c + d + d)(c + d - d)$
(c)		$(2w + 3)(w - 1)$	2	B2 B1 for 1 correct factor or $(2w-3)(w+1)$ Integers only
				Total 5 marks

18.	Alt. 144π M1 $112\pi/144\pi(=7/9)$ or $32\pi/144\pi(=2/9)$ M1 $7/9 \times 360$ or $2/9 \times 360 = 80$ M1	$x/360 \times \pi \times 12^2 = 112\pi$ $(x=)112\pi \times 360/12^2 \pi$ oe	280	4	M2 M1 for $x/360 \times \pi \times 12^2 (=0.4\pi x$ or $1.256...x)$ M1 A1
				Total 4 marks	

19. (a)	$x^2/x(x-2)$	$x/(x-2)$	2	M1 A1 M1 for $x(x-2)$ brackets not necessary
(b)	$\frac{2(x+1) - (2x - 1)}{(2x - 1)(x + 1)}$ $\frac{2x+2 - 2x + 1}{(2x - 1)(x + 1)}$	$\frac{3}{(2x - 1)(x + 1)}$ oe	4	M2 M1 for $(2x - 1)(x + 1)$ seen M1 A1 $\frac{3}{2x^2 + x - 1}$
				Total 6 marks

Q	Working	Answer	Mark	Notes
20. (a)	$(2/3)^3$	8/27 oe	2	M1 A1 0.296.....
(b)	$(2/3)^2 \times 1/3 \times 3$	4/9 oe	3	M2 A1 M1 for $(2/3)^2 \times 1/3 (=4/27)$ 0.444....
				Total 5 marks

21. (a)	$t = k \sqrt{d}$ $12 = k \sqrt{4}$ $k = 6$	$t = 6\sqrt{d}$	3	M1 M1 A1 Must make t the subject
(b)	"6" $\times \sqrt{9}$	18	2	M1ft A1 ft
				Total 5 marks

22.	210 - 70 (=140) ("AB" ² =) $3^2 + 5^2 - 2 \times 3 \times 5 \cos "x"$ ("AB" ² =) 56.98	7.55	3	M1 x=80,140,210 A1 awrt 57 A1 7.5485.... awrt 7.54 or 7.55
				Total 3 marks

23.	$d/s = t$ $25 \times 400.5 / 4.95 (=2022.727\dots)$ secs "2022.727"/60 (=33.712..) mins	33mins 43 secs	4	M2 M1 for 400.5 or 4.95 seen M1 dep on at least 1 previous M1 A1 cao
				Total 4 marks

Q	Working	Answer	Mark	Notes
24. (a) (i)		$x^2 - 3$	1	B1 accept "y=" $x^2 - 3$
(ii)		$x + 3$	1	B1 accept "y=" $x + 3$
(b)	$"x^2 - 3" = "x + 3"$ $x^2 - x - 6 = 0$ $(x - 3)(x + 2) (=0)$	$x = 3 \quad x = -2$	3	M1ft quadratic = linear (ax+b) a,b ≠ 0 M1 or formula reaching (x=) $(1 \pm \sqrt{25})/2$ A1 cao algebraic method req ^d
				Total 5 marks

25. (a)	$a^{3.5} = k a^{0.5}$ or $a^3 \sqrt{a} (=k \sqrt{a})$	$n=3$	2	M1 M1 for 3.5 and 0.5 seen or $(\sqrt{a})^6$ or a^3 A1
(b)	$2^{-1} \times 2^{-0.5}$	$2^{-1.5}$	2	M1 $1/2^{1.5}$ or $\sqrt{2}/4$ or $2^{0.5}/2^2$ or $2^{0.5} \times 2^{-2}$ A1
				Total 4 marks

				TOTAL FOR PAPER: 100 MARKS
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Centre No.						Paper Reference						Surname	Initial(s)	
Candidate No.						4	4	0	0	/	4	H	Signature	

Paper Reference(s)

4400/4H

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Tuesday 10 November 2009 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

--	--	--

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

Without sufficient working, correct answers may be awarded no marks.

You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.

If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 22 questions in this question paper. The total mark for this paper is 100.

There are 24 pages in this question paper. Any blank pages are indicated.

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Use your calculator to work out the value of $\frac{11.7+18.4^2}{0.3}$

Write down all the figures on your calculator display.

.....

(Total 2 marks)

Q1

2. (a) Factorise $n^2 - 4n$

.....

(2)

- (b) Solve $8 - 5x = 2$

$x =$

(3)

(Total 5 marks)

Q2



3.

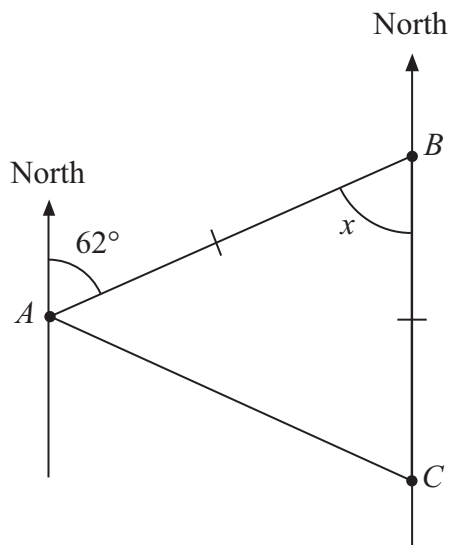


Diagram **NOT** accurately drawn

The bearing of B from A is 062° .

C is due south of B .

$AB = CB$.

(a) (i) Find the size of angle x .

.....^o

(ii) Give a reason for your answer.

.....

(2)

(b) Work out the bearing of C from A .

.....^o

(2)

(Total 4 marks)

Q3



4. A bag contains some beads.
The colour of each bead is red or green or blue.
Binita is going to take a bead at random from the bag.
The probability that she will take a red bead is 0.4
The probability that she will take a green bead is 0.5

(a) Work out the probability that she will take a blue bead.

.....
(2)

(b) There are 80 beads in the bag.
Work out the number of red beads in the bag.

.....
(2)

(Total 4 marks)

Q4

5. (a) Cheng invested 3500 dollars.
At the end of one year, interest of 161 dollars was added to his account.

Express 161 as a percentage of 3500

..... %
(2)

(b) Lian invested an amount of money at an interest rate of 5.2% per year.
After one year, she received interest of 338 dollars.

Work out the amount of money Lian invested.

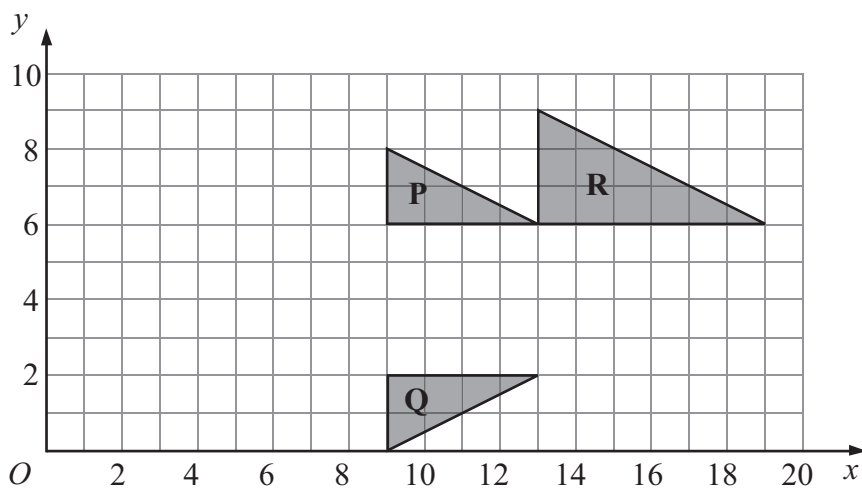
..... dollars
(3)

(Total 5 marks)

Q5



6.



(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

.....
(2)

(b) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

.....
.....
(3)

(Total 5 marks)

Q6



7. Carlos mixes cement, lime and sand in the ratios 1 : 2 : 9 by weight.

Work out the weight of cement, the weight of lime and the weight of sand in 60 kg of the mixture.

cement kg

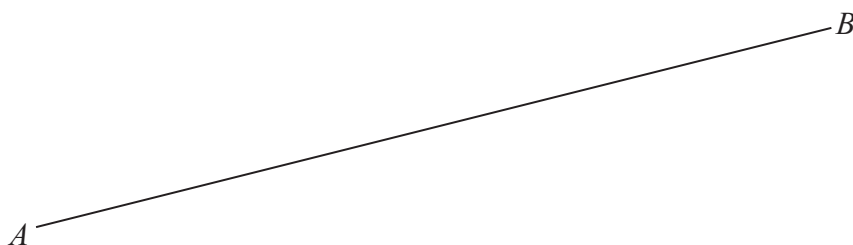
lime kg

sand kg

(Total 3 marks)

Q7

8. Use ruler and compasses to construct the perpendicular bisector of the line AB .
You must show all construction lines.

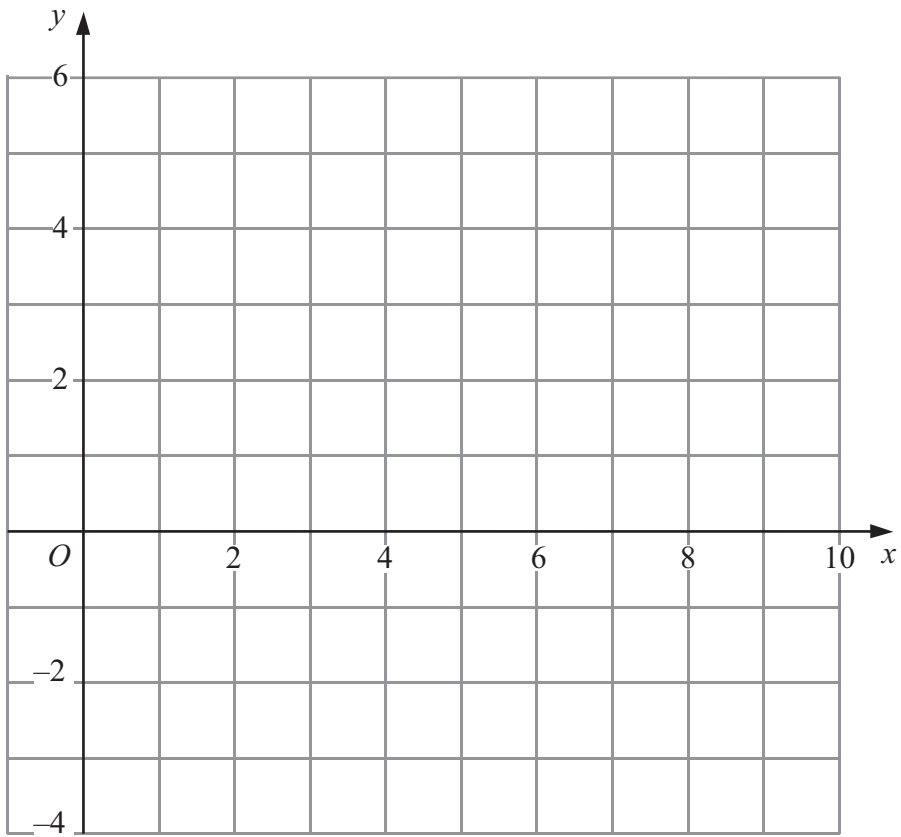


(Total 2 marks)

Q8



9. (a) On the grid, draw the graph of $2x - 3y = 6$ from $x = 0$ to $x = 9$



(2)



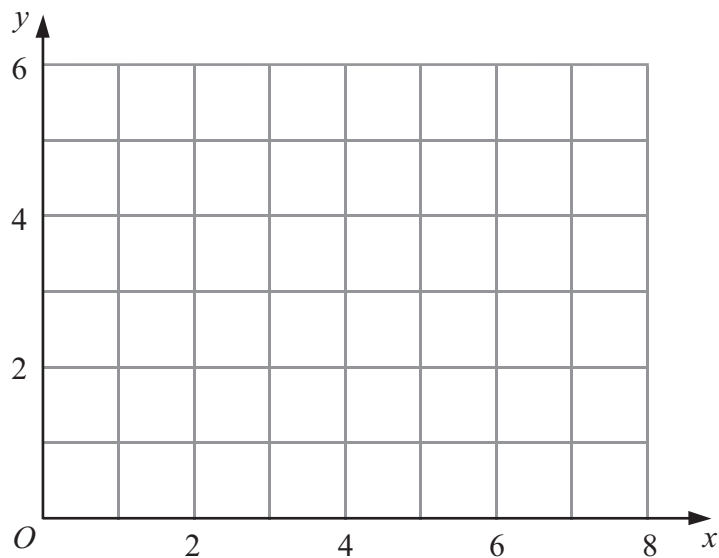
(b) On the grid, show by shading the region which satisfies the inequalities

$$3 \leq x \leq 6$$

and

$$2 \leq y \leq 4$$

Label your region **R**.



(3)

Q9

(Total 5 marks)



10. (a) The table shows information about the rainfall in Singapore in December one year.

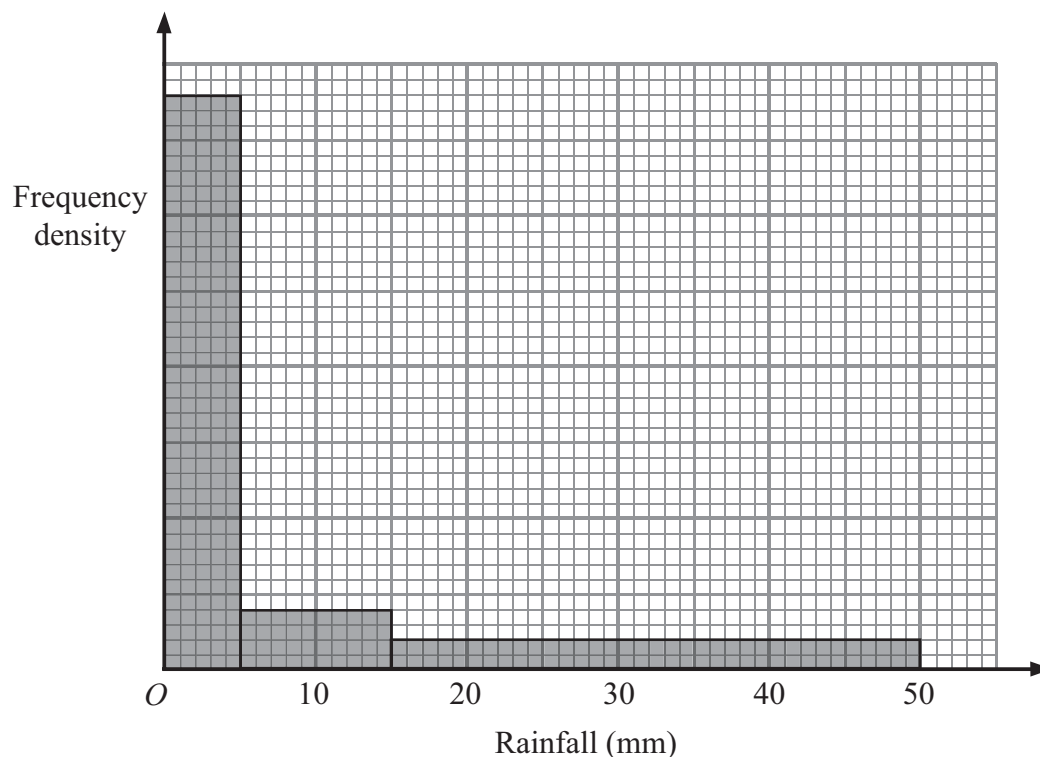
Rainfall (d mm)	Number of days
$0 \leq d < 10$	23
$10 \leq d < 20$	3
$20 \leq d < 30$	2
$30 \leq d < 40$	3

Work out an estimate for the total rainfall in December.

..... mm
(3)



- (b) The histogram shows information, for the same year, about the rainfall in Singapore in November, which has 30 days.
The rainfall was less than 50 mm every day in November.



Complete the table.

Rainfall (d mm)	Number of days
$0 \leq d < 5$
$5 \leq d < 15$
$15 \leq d < 50$

(3)

Q10

(Total 6 marks)



11. (a) Find the Highest Common Factor of 64 and 80

.....
(2)

(b) Find the Lowest Common Multiple of 64 and 80

.....
(2)

(Total 4 marks)

Q11

12. (a) Expand and simplify $(p + 7)(p - 4)$

.....
(2)

(b) Simplify $4x^3y^5 \times 3x^2y$

.....
(2)

(c) Simplify $(27q^6)^{\frac{2}{3}}$

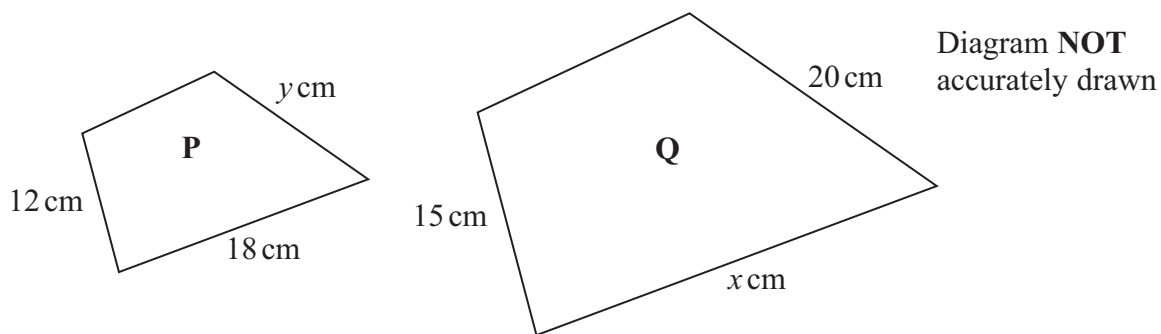
.....
(2)

(Total 6 marks)

Q12



13.



Quadrilateral **P** is mathematically similar to quadrilateral **Q**.

(a) Calculate the value of x .

$x = \dots\dots\dots$
(2)

(b) Calculate the value of y .

$y = \dots\dots\dots$
(2)

(Total 4 marks)

Q13

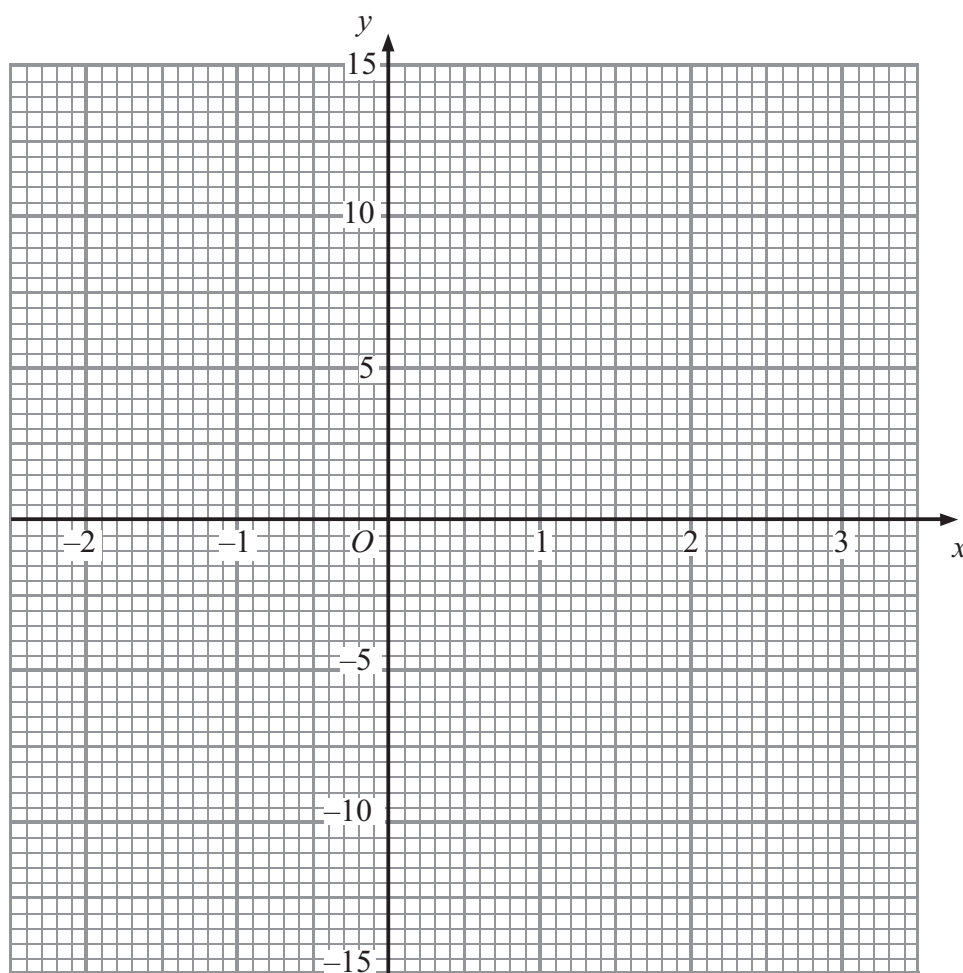


14. (a) Complete the table of values for $y = x^3 - 3x^2 + 12$

x	-2	-1	0	1	2	3
y		8				

(2)

(b) On the grid, draw the graph of $y = x^3 - 3x^2 + 12$



(2)

Q14

(Total 4 marks)



15.

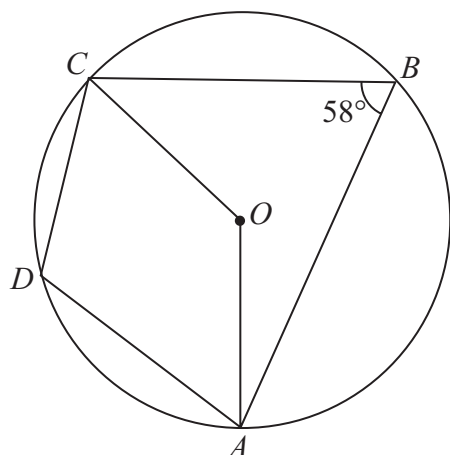


Diagram **NOT** accurately drawn

A, B, C and D are points on a circle, centre O .
Angle $ABC = 58^\circ$.

(a) (i) Calculate the size of angle AOC .

.....^o

(ii) Give a reason for your answer.

.....
.....

(2)

(b) (i) Calculate the size of angle ADC .

.....^o

(ii) Give a reason for your answer.

.....
.....

(2)

(Total 4 marks)

Q15



17.

$$T = \frac{n(1+e)}{(1-e)}$$

- (a) Work out the value of T when $n = 8.6$ and $e = 0.2$

$$T = \dots\dots\dots$$

(2)

- (b) Make e the subject of the formula $T = \frac{n(1+e)}{(1-e)}$

$$e = \dots\dots\dots$$

(5)

(Total 7 marks)

Q17



18.

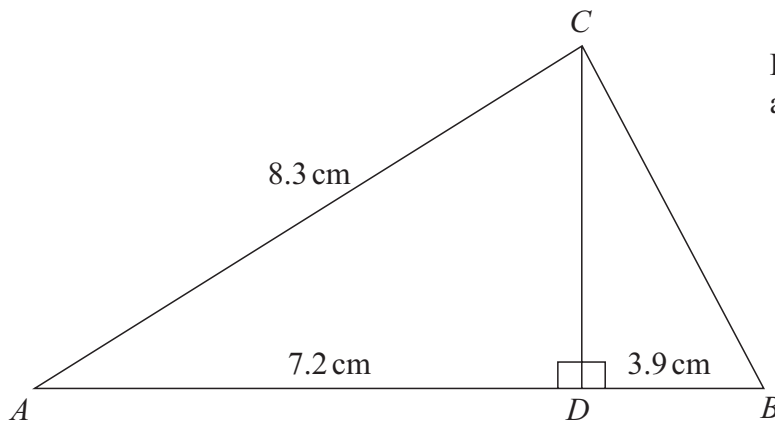


Diagram **NOT** accurately drawn

ABC is a triangle.
 D is a point on AB .
 CD is perpendicular to AB .
 $AD = 7.2\text{ cm}$, $DB = 3.9\text{ cm}$, $AC = 8.3\text{ cm}$.

Calculate the size of angle DBC .
 Give your answer correct to 1 decimal place.

.....^o

(Total 5 marks)

Q18



19. A particle moves in a straight line through a fixed point O .
 The displacement, s metres, of the particle from O at time t seconds is given by

$$s = t^3 - 5t^2 + 8$$

(a) Find an expression for the velocity, v m/s, of the particle after t seconds.

$v = \dots\dots\dots$
(2)

(b) Find the time at which the acceleration of the particle is 20 m/s^2 .

$\dots\dots\dots$ seconds
(2)

(Total 4 marks)

Q19



20. P and Q are two sets.
 $n(P) = 9$ and $n(Q) = 5$

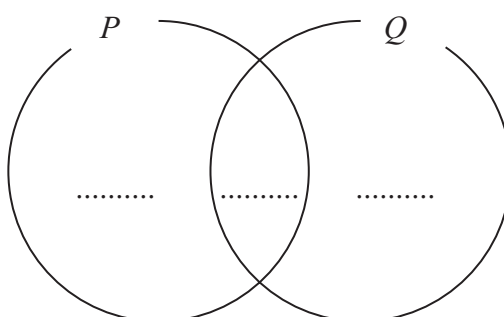
(a) Find the value of $n(P \cup Q)$ when $P \cap Q = \emptyset$

$n(P \cup Q) = \dots\dots\dots$
(1)

(b) Find the value of $n(P \cup Q)$ when $Q \subset P$

$n(P \cup Q) = \dots\dots\dots$
(1)

(c) (i) Complete the Venn Diagram to show **numbers** of elements when $n(P \cap Q) = 3$



(ii) Find the value of $n(P \cup Q)$ when $n(P \cap Q) = 3$

$n(P \cup Q) = \dots\dots\dots$
(3)

(Total 5 marks)

Q20



21.

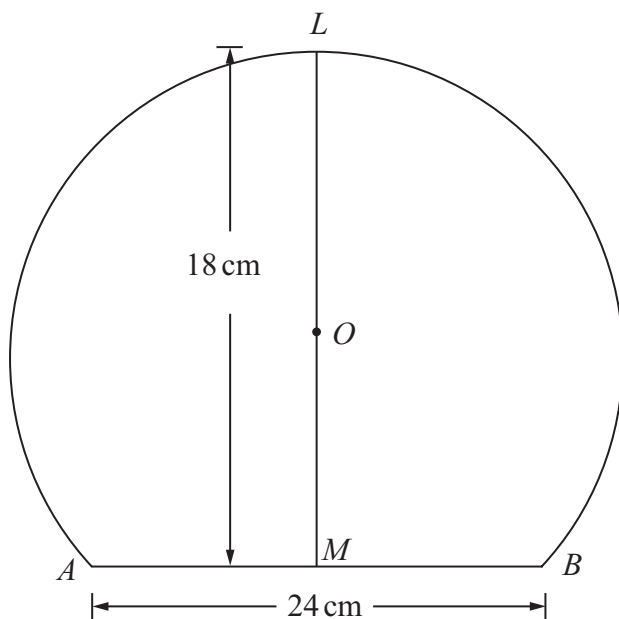


Diagram **NOT** accurately drawn

- A, B and L are points on a circle, centre O .
- AB is a chord of the circle.
- M is the midpoint of AB .
- LOM is a straight line.
- $AB = 24$ cm.
- $LM = 18$ cm.

Calculate the diameter of the circle.

..... cm

(Total 4 marks)

Q21



22. Solve the simultaneous equations

$$y - 3x = 4$$

$$x^2 + y^2 = 34$$

.....
Q22

(Total 7 marks)

TOTAL FOR PAPER: 100 MARKS**END**

November 2009 IGCSE Mathematics (4400) Mark Scheme - Paper 4H

Except for questions * where the mark scheme states otherwise the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

[* Questions 2(b), 21 and 22]

Trial and improvement methods for solving equations score no marks, even if they lead to a correct solution.

Q	Working	Answer	Mark	Notes
1.	$\frac{350.26}{0.3}$		2	M1 for 350.26
		1167.5333		A1 Accept 1dp or better Also accept 1167.5 $\dot{3}$ or $\frac{17513}{15}$
				Total 2 marks

2. (a)		$n(n - 4)$	2	B2 B1 for factors which, when expanded and simplified, give two terms, one of which is correct except $(n + 2)(n - 2)$ and similar SC B1 for $n(n - 4n)$
(b)	$5x = 8 - 2$ or $-5x = 2 - 8$ or $5x = 6$ or $-5x = -6$		3	M2 M1 for $5x + 2 = 8$
		$1\frac{1}{5}$ oe		A1 dep on M2 Do not accept $\frac{-6}{-5}$
				Total 5 marks

Q	Working	Answer	Mark	Notes
3. (a)(i)		62	2	B1 cao
(ii)		alternate angles		B1 Accept 'alternate' but not 'Z angles'
(b)	$\frac{180-62}{2}$ or $\frac{180-62}{2}$ or 59		2	M1
		121		A1 cao
				Total 4 marks

4. (a)	$1 - (0.4 + 0.5)$		2	M1
		0.1		A1 Also accept $\frac{0.1}{1}$
(b)	0.4×80 or $\frac{n}{80} = 0.4$		2	M1
		32		A1 cao
				Total 4 marks

5. (a)	$\frac{161}{3500} \times 100$		2	M1 for $\frac{161}{3500}$ oe inc 0.046
		4.6		A1 cao
(b)	1% = $\$ \frac{338}{5.2}$ or 65 seen or 5.2% (of amount) = 338		3	M1 M2 for $\frac{338}{5.2} \times 100$ or $\frac{338}{0.052}$
	"65" $\times 100$			M1
		6500		A1
				Total 5 marks

Q	Working	Answer	Mark	Notes
6. (a)		Reflection in the line $y = 4$	2	B2 B1 for reflection, reflects etc B1 for $y = 4$ or eg 'dotted line' but, if given, equation must be correct
(b)		Enlargement with scale factor $1\frac{1}{2}$, centre (1,6)	3	B3 B1 for enlargement, enlarge etc B1 for $1\frac{1}{2}$ oe B1 for (1,6)
				Total 5 marks

7.	1 + 9 + 2 or 12 or 5 seen		3	M1 May be implied by 1 correct answer
		5 10 45		A2 A1 for one correct
				Total 3 marks

8.	Arcs of equal radii $> \frac{1}{2}AB$, centres A, B, which intersect twice		2	M1
	Perpendicular bisector within guidelines			A1
				Total 2 marks

Q	Working	Answer	Mark	Notes
9. (a)		Correct line	2	B2 Must be a single straight line passing through at least 3 of (0, -2), (3, 0), (6, 2), (9, 4) B1 for a single straight line with a positive gradient passing through either (0, -2) or (3, 0) or for 3 of 4 points (0, -2), (3, 0), (6, 2), (9, 4) correct with at most 1 point incorrect Allow $\pm 2\text{mm}$
(b)	Lines $x = 3$ and $x = 6$ drawn		3	B1
	Lines $y = 2$ and $y = 4$ drawn			B1
		R shown		B1 Condone omission of label Accept shading in or shading out, if consistent Award 3 marks for correct labelled rectangle, even if not shaded Award 2 marks for a correct unshaded rectangle without a correct label SC B1 for region bounded by $2 \leq x \leq 4$ and $3 \leq y \leq 6$
				Total 5 marks

10. (a)	6.2	C	$5 \times 23 + 15 \times 3 + 25 \times 2 + 35 \times 3$ $= 115 + 45 + 50 + 105$		3	M1 for finding at least 3 products $x \times f$ consistently within intervals (inc end points)
						M1 (dep) for use of at least 3 correct halfway values
				315		A1 cao isw after 315
(b)	6.1	A		19 4 7	3	B3 B1 for each value cao
						Total 6 marks

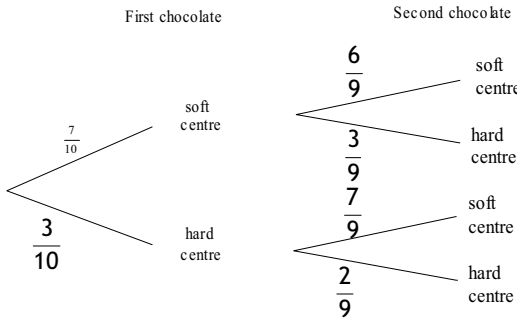
Q	Working	Answer	Mark	Notes
11. (a)	$64 = 2^6$ and $80 = 2^4 \times 5$ or 1,2,4,8,16,32,64 and 1,2,4,5,8,10,16,20,40,80 or 2^4		2	M1 Need not be product of powers; accept products or lists ie 2,2,2,2,2,2 and 2,2,2,2,5 Prime factors may be shown as factor trees or repeated division
		16		A1 cao
(b)	$2^6 \times 5$ oe eg $2^4 \times 4 \times 5$, $16 \times 4 \times 5$ or 64,128,192,256,320 and 80,160,240,320		2	M1
		320		A1 cao
				Total 4 marks

12. (a)	$p^2 - 4p + 7p - 28$		2	M1 for 4 correct terms ignoring signs or for 3 terms with correct signs
		$p^2 + 3p - 28$		A1 cao
(b)		$12x^5y^6$	2	B2 B1 for any two parts correct
(c)		$9q^4$	2	B2 B1 for either 9 or q^4
				Total 6 marks

13. (a)	$18 \times \frac{15}{12}$		2	M1 for $\frac{15}{12}$ (1.25) oe or $\frac{18}{12}$ (1.5) oe seen
		22.5		A1 cao
(b)	eg $20 \div \frac{15}{12}$, $20 \times \frac{12}{15}$, $12 \times \frac{20}{15}$		2	M1 for eg $20 \div 1.25$, 20×0.8 , $12 \times 1.\dot{3}$
		16		A1 cao
				Total 4 marks

Q	Working	Answer	Mark	Notes
14. (a)		-8 (8) 12 10 8 12	2	B2 for all correct (B1 for 3 correct)
(b)		Points	2	B1 Allow $\pm \frac{1}{2}$ sq ft from table if at least B1 scored in (a)
		Curve		B1 ft if B1 for points Award for single curve (not line segments) which does not miss more than one plotted point by more than $\frac{1}{2}$ square
				Total 4 marks

15. (a)(i)	2×58	116	2	B1 cao
(ii)		eg angle at the centre = $2 \times$ angle at the circumference		B1 Three key points must be mentioned 1. angle at centre/middle/ <i>O</i> /origin 2. twice/double/ $2 \times$ or half/ $\frac{1}{2}$ as appropriate 3. angle at circumference/ edge/ perimeter/arc (<i>NOT</i> e.g. angle <i>B</i> , angle <i>ABC</i> , angle at top, angle at outside)
(b)(i)	$180 - 58$	122	2	B1 cao
(ii)		eg sum of opposite angles of a cyclic quadrilateral = 180°		B1 Accept reason which includes 'opposite' and 'cyclic' and nothing incorrect Also award if (b)(i) is correct and reason is given as 'angle at the centre = $2 \times$ angle at the circumference' oe ignore additional reason(s)
				Total 4 marks

Q	Working	Answer	Mark	Notes			
16. (a)	<p style="text-align: center;">First chocolate Second chocolate</p> 		2	B2 for completely correct diagram, inc labels (accept clear abbreviations eg S and H) (B1 for branches with at least 3 correct probabilities in the correct place)			
(b)	$\frac{7}{10} \times \frac{3}{9} + \frac{3}{10} \times \frac{7}{9} + \frac{3}{10} \times \frac{2}{9}$ $\left(= \frac{21}{90} + \frac{21}{90} + \frac{6}{90} \right)$ <p>or $\frac{7}{10} \times \frac{3}{9} + \frac{3}{10} \left(= \frac{21}{90} + \frac{3}{10} \right)$</p>		3	M1 for one correct product	M2 for $1 - \frac{7}{10} \times \frac{6}{9}$	SC M1 for $\frac{7}{10} \times \frac{3}{10}$ or $\frac{3}{10} \times \frac{7}{10}$ or $\frac{3}{10} \times \frac{3}{10}$	for method marks ft from their tree diagram, provided probabilities < 1
				M1 for completely correct expression	SC M2 for $1 - \frac{7}{10} \times \frac{7}{10}$	SC M1 (dep) for sum of above products or for $\frac{7}{10} \times \frac{3}{10} + \frac{3}{10}$	
			$\frac{48}{90}$	A1 for $\frac{48}{90}$ oe inc $\frac{8}{15}$ or for 0.53 or for answer rounding to 0.53			
Total 5 marks							

Q	Working	Answer	Mark	Notes
17. (a)	$\frac{8.6 \times (1 + 0.2)}{(1 - 0.2)}$ or $\frac{10.32}{0.8}$		2	M1 for correct substitution
		12.9 oe		A1
(b)	$T(1 - e) = n(1 + e)$		5	M1 removes fractions
	$T - eT = n + en$			M1 expands brackets
	$en + eT = T - n$			M1 collects terms
	$e(n + T) = T - n$			M1 factorises
		$\frac{T - n}{T + n}$		A1 for $\frac{T - n}{T + n}$ oe
				Total 7 marks

18.	$8.3^2 - 7.2^2$ $= 68.89 - 51.84 = 17.05$		5	M1 for $8.3^2 - 7.2^2$
	$\sqrt{8.3^2 - 7.2^2} = 4.129\dots$			M1 for $\sqrt{8.3^2 - 7.2^2}$
	tan and $\frac{"4.129\dots"}{3.9}$			M2 M1 for tan and $\frac{3.9}{"4.129\dots"}$ Accept CD rounded or truncated to at least 1 dp (4.12916...)
		46.6		A1 Accept answer rounding to 46.6 (4.1 \rightarrow 46.43... 4.12 \rightarrow 46.57... 4.13 \rightarrow 46.64...)
				Total 5 marks

Alternative methods for Q18 appear on the next two pages.

Question 18 Alternative methods

Method 1

Working	Answer	Mark	Notes
$8.3^2 - 7.2^2$ $= 68.89 - 51.84 = 17.05$		5	M1 for $8.3^2 - 7.2^2$
$\sqrt{8.3^2 - 7.2^2} = 4.129\dots$ $\sqrt{4.129^2 + 3.9^2} = 5.679\dots$			M1 for $\sqrt{8.3^2 - 7.2^2}$
cos and $\frac{3.9}{"5.679"}$			M2 M1 for cos and $\frac{"5.679"}{3.9}$ Accept <i>BC</i> rounded or truncated to at least 1 dp (5.67978...)
	46.6		A1 Accept answer rounding to 46.6
			Total 5 marks

Method 2

Working	Answer	Mark	Notes
$8.3^2 - 7.2^2$ $= 68.89 - 51.84 = 17.05$		5	M1 for $8.3^2 - 7.2^2$
$\sqrt{8.3^2 - 7.2^2} = 4.129\dots$ $\sqrt{4.129^2 + 3.9^2} = 5.679\dots$			M1 for $\sqrt{8.3^2 - 7.2^2}$
sin and $\frac{"4.129"}{"5.679"}$			M2 M1 for sin and $\frac{"5.679"}{"4.129"}$ Accept <i>CD</i> rounded or truncated to at least 1 dp (4.12916...) and <i>BC</i> rounded or truncated to at least 1 dp (5.67978...)
	46.6		A1 Accept answer rounding to 46.6
			Total 5 marks

Method 3

Working	Answer	Mark	Notes
Correct method for finding $\angle A$		5	M1 eg for $\cos \angle A = \frac{7.2}{8.3}$ ($\angle A = 29.83\dots^\circ$)
$\sqrt{11.1^2 + 8.3^2 - 2 \times 11.1 \times 8.3 \cos 29.8^\circ}$			M1 for correct Cosine Rule expression for calculating BC
\cos and $\frac{3.9}{5.679}$			M2 M1 for \cos and $\frac{5.679}{3.9}$ Accept BC rounded or truncated to at least 1 dp (5.67978...)
	46.6		A1 Accept answer rounding to 46.6
			Total 5 marks

Method 4

Working	Answer	Mark	Notes
Correct method for finding $\angle A$		5	M1 eg for $\cos \angle A = \frac{7.2}{8.3}$ ($\angle A = 29.83\dots^\circ$)
$\sqrt{11.1^2 + 8.3^2 - 2 \times 11.1 \times 8.3 \cos 29.8^\circ}$			M1 for correct Cosine Rule expression for calculating BC
$\sin B = \frac{8.3 \sin 29.8^\circ}{5.68}$			M2 for correct expression for $\sin B$ M1 for correct statement of Sine Rule eg $\frac{\sin B}{8.3} = \frac{\sin 29.8^\circ}{5.68}$
	46.6		A1 Accept answer rounding to 46.6
			Total 5 marks

Q	Working	Answer	Mark	Notes
19. (a)		$3t^2 - 10t$	2	B2 B1 for $3t^2$ or $-10t$ Ignore further differentiation seen in body or on answer line
(b)	$6t - 10 = 20$		2	M1 for linear expression including either $6t$ or -10
			5	A1 ft from " $6t - 10$ " = 20 if M1 scored
				Total 4 marks

20. (a)		14	1	B1 cao
(b)		9	1	B1 cao
(c)(i)		6 3 2	3	B2 B1 for 2 correct
(ii)		11		B1 cao
				Total 5 marks

21.	$12 \times 12 = 18(d - 18)$	$12 \times 12 = 18x$		4	M1 or for $r^2 = 12^2 + (18 - r)^2$
	$144 = 18d - 324$	$x = 8$			M1 or for $r^2 = 144 + 324 - 18r - 18r + r^2$
	$18d = 468$	$(d=)8+18$			M1 or for $36r = 468$
				26	A1 dep on all method marks
					Total 4 marks

Alternative methods for Q21 appear on the next page.

Question 21 Alternative methods

Method 1

Working	Answer	Mark	Notes
Complete, correct method for finding $\angle AOM$ or $\angle BOM$ or $\angle OAB$ or $\angle OBA$		4	M1 eg $\tan \angle ALM = \frac{12}{18}$ $\angle ALM = 33.69^\circ$ $\angle AOM = 2 \times 33.69^\circ = 67.38^\circ$ $AL = \sqrt{12^2 + 18^2} = \sqrt{468} = 21.63 \text{ cm}$ $\cos \angle ALB = \frac{468 + 468 - 576}{2 \times 468} = 0.3846$ $\angle ALB = 67.38^\circ$ $\angle ALM = 33.69^\circ$ $\angle AOM = 2 \times 33.69^\circ = 67.38^\circ$ $\tan \angle ALM = \frac{12}{18}$ $\angle ALM = 33.69^\circ$ $\angle OAM = 90^\circ - 2 \times 33.69^\circ = 22.62^\circ$
Correct numerical expression for length of OA or OM			M1 eg $\frac{12}{\sin 67.38^\circ}$ or $\frac{24 \sin 22.62^\circ}{\sin 134.76^\circ}$ (= 13) or $\frac{12}{\tan 67.38^\circ}$ or $12 \tan 22.62^\circ$ (= 5)
Length of OA or OM used to find diameter			M1 eg $2 \times "13"$ or $2 \times (18 - "5")$ dep on both previous M1s
	26		A1 dep on all method marks Accept answer rounding to 26.0
			Total 4 marks

Method 2

Working	Answer	Mark	Notes
$AM = 12, OM = 5, OA = 13$ and $13 + 5 = 18$ or $18 - 5 = 13$		4	M3 for use of Pythagorean triple 5-12-13 or use of $OM = 5$ Pythagoras to obtain $\sqrt{5^2 + 12^2} = 13$ for OA and justification
	26		A1 dep on M3
			Total 4 marks

Q	Working	Answer	Mark	Notes
22.	$y = 3x + 4$		7	B1 for correct rearrangement
	$x^2 + (3x + 4)^2 = 34$			M1 for correct substitution
	$x^2 + 9x^2 + 12x + 12x + 16 = 34$ or $x^2 + 9x^2 + 24x + 16 = 34$			B1 (indep) for correct expansion of $(3x + 4)^2$ even if unsimplified
	$10x^2 + 24x - 18 = 0$			B1 for correct simplification Condone omission of '= 0'
	$(5x - 3)(2x + 6) = 0$ or $(5x - 3)(x + 3) = 0$ or $(10x - 6)(x + 3) = 0$ or $\frac{-24 \pm \sqrt{1296}}{20}$ or $\frac{-12 \pm \sqrt{324}}{10}$ or $\frac{-12}{10} \pm \frac{\sqrt{324}}{10}$ or $\frac{-6}{5} \pm \frac{\sqrt{81}}{5}$			B1 for correct factorisation Condone omission of '= 0' or for correct substitution into the quadratic formula and correct evaluation of ' $b^2 - 4ac$ ' or for using square completion correctly as far as indicated
	$x = \frac{3}{5}$ or $x = -3$			A1 for both values of x
		$x = \frac{3}{5}, y = 5\frac{4}{5}$ $x = -3, y = -5$		A1 for complete, correct solutions Need not be explicitly paired
				Total 7 marks

				TOTAL FOR PAPER: 100 MARKS
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Note

The mark scheme for an alternative method for Q22 is on the next page.

Question 22 Alternative method

Working	Answer	Mark	Notes
$x = \frac{y - 4}{3}$		7	B1 for correct rearrangement
$\left(\frac{y - 4}{3}\right)^2 + y^2 = 34$			M1 for correct substitution
$\frac{y^2 - 4y - 4y + 16}{9} + y^2 = 34$ or $y^2 - 4y - 4y + 16 + 9y^2 = 306$ or $r \frac{y^2 - 8y + 16}{9} + y^2 = 34$ or $y^2 - 8y + 16 + 9y^2 = 306$			B1 (indep) for correct expansion of $(y - 4)^2$ even if unsimplified
$10y^2 - 8y - 290 = 0$			B1 for correct simplification Condone omission of '= 0'
$(5y - 29)(y + 5) = 0$ $(5y - 29)(2y + 10) = 0$ $(10y - 58)(y + 5) = 0$ or $\frac{8 \pm \sqrt{11664}}{20}$ or $\frac{4 \pm \sqrt{2916}}{10}$ or $\frac{4}{10} \pm \frac{\sqrt{2916}}{10}$ or $\frac{2}{5} \pm \frac{\sqrt{729}}{5}$			B1 for correct factorisation Condone omission of '= 0' or for correct substitution into the quadratic formula and correct evaluation of ' $b^2 - 4ac$ ' or for using square completion correctly as far as indicated
$y = 5\frac{4}{5}$ or $y = -5$			A1 for both values of y
	$x = \frac{3}{5}, y = 5\frac{4}{5}$ $x = -3, y = -5$		A1 for complete, correct solutions
			Total 7 marks

Centre No.						Paper Reference					Surname	Initial(s)	
Candidate No.						4	4	0	0	/	3	H	Signature

Paper Reference(s)

4400/3H

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Monday 7 June 2010 – Afternoon

Time: 2 hours

Examiner's use only

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Team Leader's use only

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Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

Without sufficient working, correct answers may be awarded no marks.

You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.

If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 21 questions in this question paper. The total mark for this paper is 100.

There are 20 pages in this question paper. Any blank pages are indicated.

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Here are the ingredients needed to make Apple Fool for 6 people.

Apple Fool
Ingredients for 6 people
900 g cooking apples
100 g sugar
300 ml double cream

- (a) Work out the amount of sugar needed to make Apple Fool for 15 people.

..... g
(2)

- (b) Work out the amount of cooking apples needed to make Apple Fool for 5 people.

..... g
(2)

(Total 4 marks)

Q1



2.

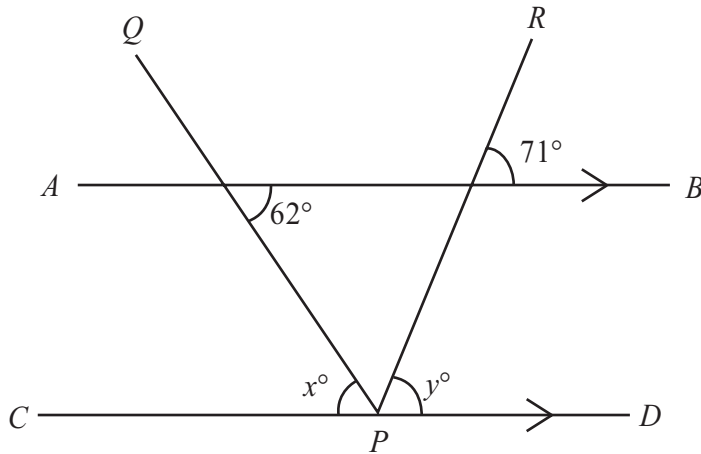


Diagram NOT accurately drawn

AB and *CPD* are parallel straight lines.
PQ and *PR* are straight lines.

(a) (i) Find the value of x .

$x = \dots\dots\dots$

(ii) Give a reason for your answer.

.....
(2)

(b) (i) Find the value of y .

$y = \dots\dots\dots$

(ii) Give a reason for your answer.

.....
(2)

(Total 4 marks)

Q2

3. Three numbers a , b and c have a median of 4 and a range of 7

(a) Find the median of the three numbers $a + 2$, $b + 2$ and $c + 2$

.....
(1)

(b) Find the range of the three numbers $a + 2$, $b + 2$ and $c + 2$

.....
(1)

(Total 2 marks)

Q3



4. (a) Multiply out $5(n + 6)$

.....
(1)

(b) Simplify $y \times y \times y \times y \times y \times y$

.....
(1)

(c) Solve $4(x - 2) = 3$

$x =$
(3)

(Total 5 marks)

Q4

5. (a) $\frac{3}{10}$ of the members of a tennis club are men.

$\frac{5}{6}$ of these men are right-handed.

Work out the fraction of the members of the tennis club who are right-handed men.

.....
(2)

(b) $\frac{7}{12}$ of the members of a badminton club are women.

$\frac{3}{8}$ of the members of the badminton club wear glasses.

Work out the smallest possible number of members of the badminton club.

.....
(2)

(Total 4 marks)

Q5



6. The table shows information about the volume of water, in m^3 , used by each of 80 families in one year.

Volume of water ($V \text{ m}^3$)	Frequency
$0 < V \leq 100$	2
$100 < V \leq 200$	4
$200 < V \leq 300$	6
$300 < V \leq 400$	18
$400 < V \leq 500$	44
$500 < V \leq 600$	6

- (a) Write down the modal class.

.....
(1)

- (b) Work out an estimate for the mean volume of water used by the 80 families.

..... m^3
(4)



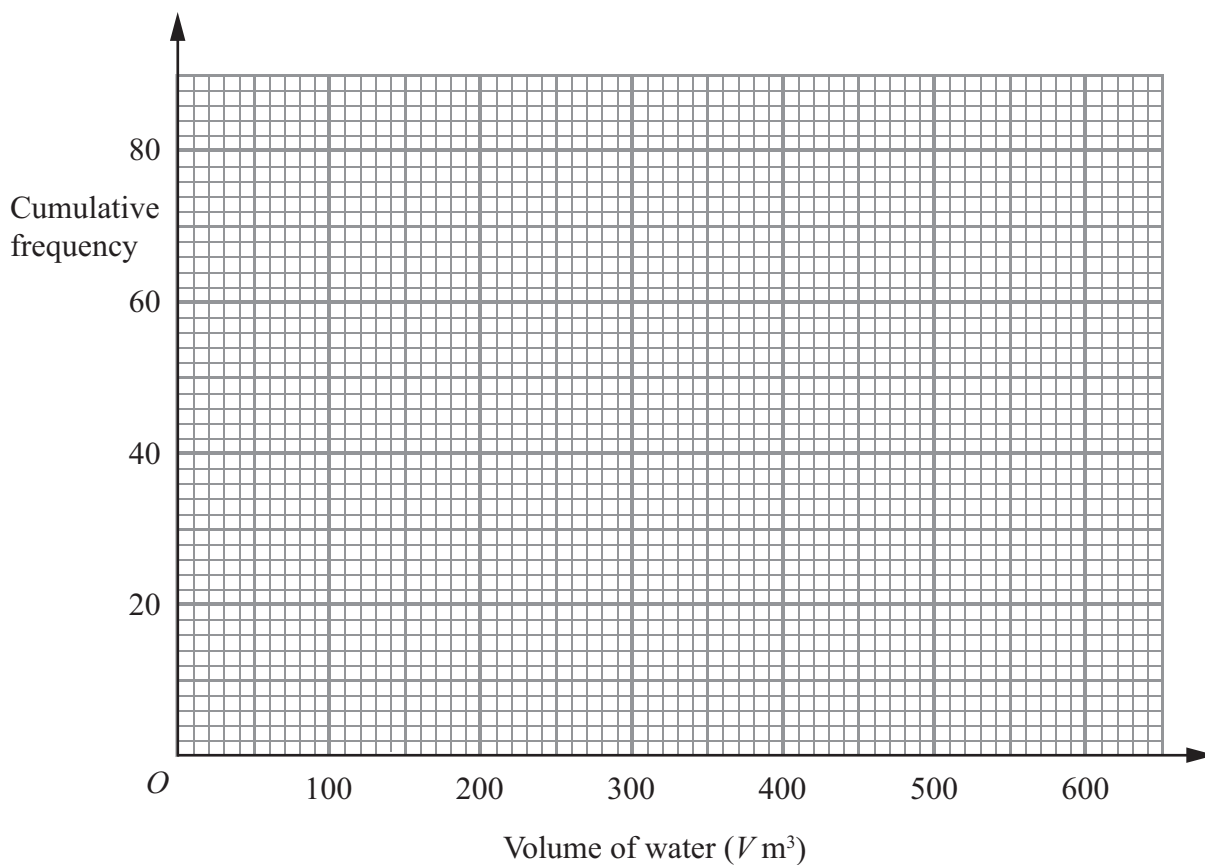
(c) Complete the cumulative frequency table.

Volume of water ($V \text{ m}^3$)	Cumulative frequency
$0 < V \leq 100$	
$0 < V \leq 200$	
$0 < V \leq 300$	
$0 < V \leq 400$	
$0 < V \leq 500$	
$0 < V \leq 600$	

(1)

(d) On the grid, draw a cumulative frequency graph for your table.

(2)



(e) Use your graph to find an estimate for the median volume of water used by the 80 families.

..... m^3
(2)

Q6

(Total 10 marks)



7.

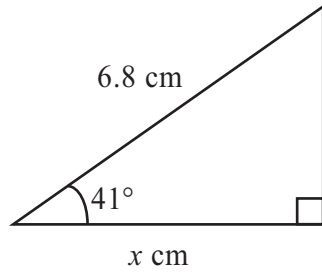


Diagram **NOT** accurately drawn

Work out the value of x .
Give your answer correct to 3 significant figures.

$x = \dots\dots\dots$

Q7

(Total 3 marks)

8. Jade has tax deducted from her income at the rate of 24%.
Last month, after tax had been deducted, \$1786 of her income remained.
Calculate her income last month before the tax was deducted.

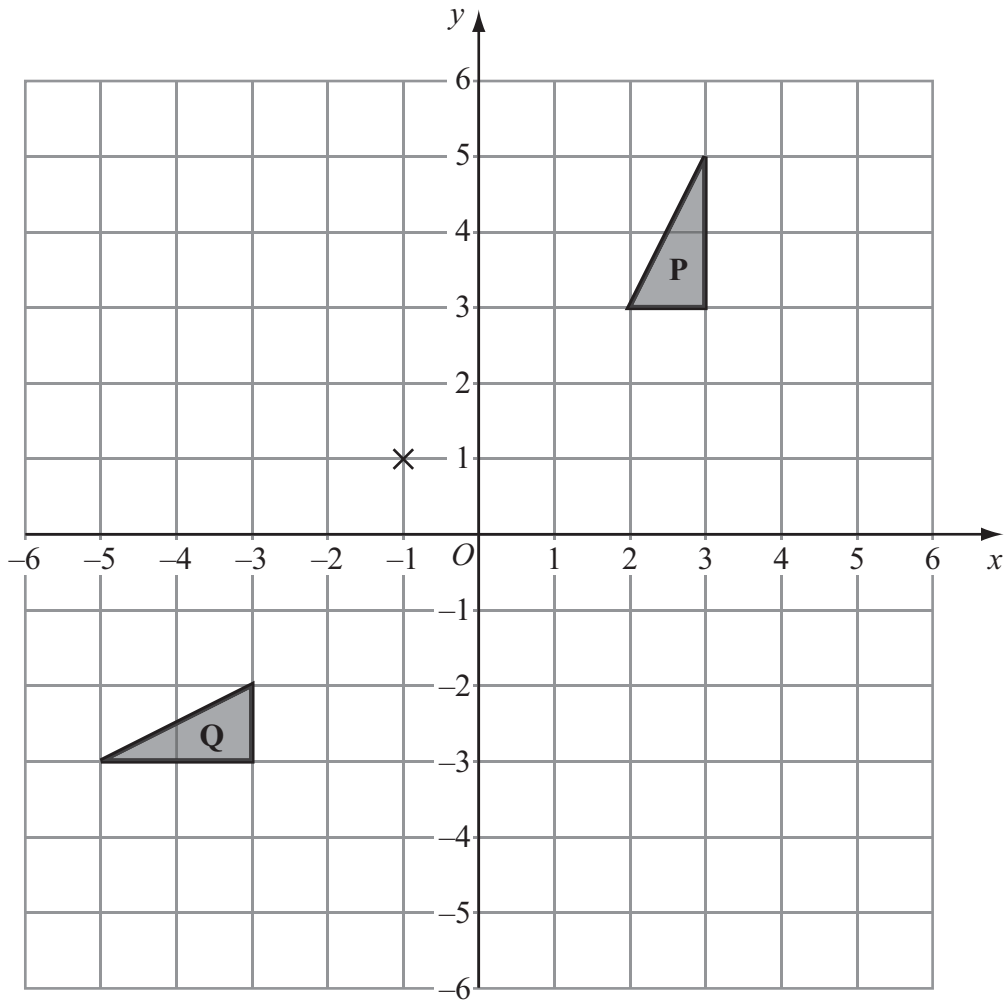
\$

Q8

(Total 3 marks)



9.



(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

..... (2)

(b) Rotate triangle **Q** through 90° anti-clockwise about the point $(-1, 1)$.
Label the new triangle **R**.

(2)

(c) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

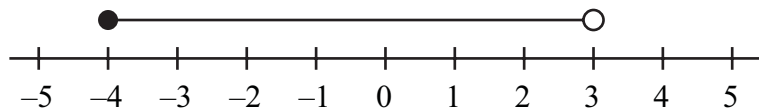
..... (2)

(Total 6 marks)

Q9



10. (a)



An inequality is shown on the number line.

Write down this inequality.

.....
(2)

(b) (i) Solve the inequality $2x + 9 > 1$

.....

(ii) n is a **negative** integer.

Write down all the values of n which satisfy $2n + 9 > 1$

.....
(4)

(Total 6 marks)

Q10



11.



Diagram **NOT** accurately drawn

The diagram shows a fish bowl.
The water surface is a circle with a diameter of 16 cm.

- (a) Work out the area of a circle with a diameter of 16 cm.
Give your answer correct to 3 significant figures.

..... cm²
(2)

- (b) The volume of water, V cm³, in the fish bowl may be found using the formula

$$V = \frac{1}{6}\pi h(3x^2 + 3y^2 + h^2)$$

Find the value of V when $h = 16.4$
 $x = 6.5$
and $y = 8$

Give your answer correct to 3 significant figures.

$V =$
(2)

(Total 4 marks)

Q11

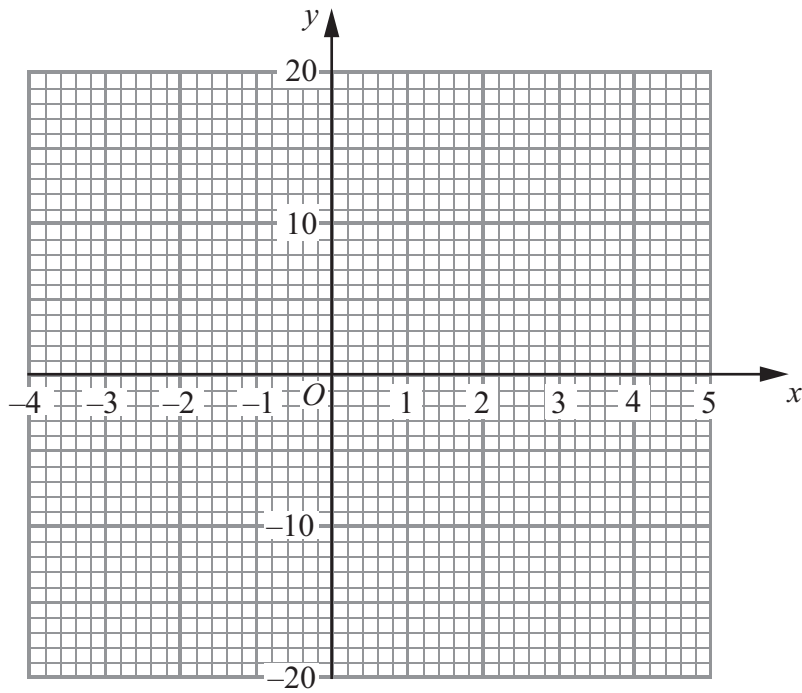


12. (a) Complete the table of values for $y = x^3 - 12x + 2$

x	-3	-2	-1	0	1	2	3	4
y	11						-7	18

(2)

(b) On the grid, draw the graph of $y = x^3 - 12x + 2$ for values of x from -3 to 4



(2)



(c) For the curve with equation $y = x^3 - 12x + 2$

(i) find $\frac{dy}{dx}$

.....

(ii) find the gradient of the curve at the point where $x = 5$

.....

(4)

Q12

(Total 8 marks)

13.

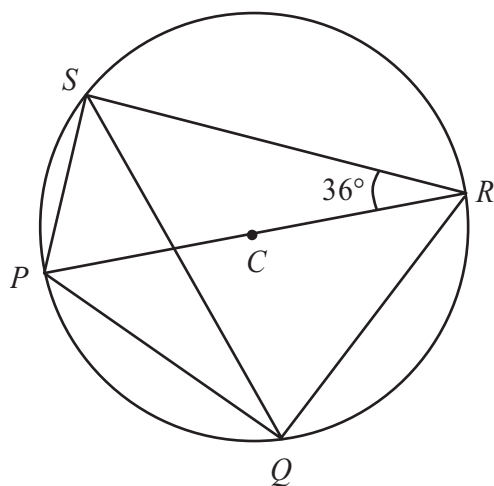


Diagram **NOT** accurately drawn

P, Q, R and S are points on a circle, centre C .
 PCR is a straight line.
 Angle $PRS = 36^\circ$.

Calculate the size of angle RQS .
 Give a reason for each step in your working.

.....

Q13

(Total 4 marks)



14.

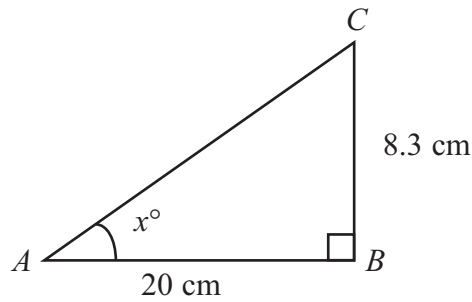


Diagram **NOT** accurately drawn

Triangle ABC is right-angled at B .
 $AB = 20$ cm, correct to 1 significant figure.
 $BC = 8.3$ cm, correct to 2 significant figures.

(a) Write down the lower bound for the length of

(i) AB ,

..... cm

(ii) BC .

..... cm
(2)

(b) Calculate the lower bound for the area of triangle ABC .

..... cm^2
(2)

(c) Calculate the lower bound for the value of $\tan x^\circ$.

.....
(3)

(Total 7 marks)

Q14



15. The light intensity, E , at a surface is inversely proportional to the square of the distance, r , of the surface from the light source.

$E = 4$ when $r = 50$

(a) Express E in terms of r .

$E = \dots\dots\dots$
(3)

(b) Calculate the value of E when $r = 20$

$E = \dots\dots\dots$
(1)

(c) Calculate the value of r when $E = 1600$

$r = \dots\dots\dots$
(2)

(Total 6 marks)

Q15

16. Show that $(3 - \sqrt{5})^2 = 14 - 6\sqrt{5}$

(Total 2 marks)

Q16



17.

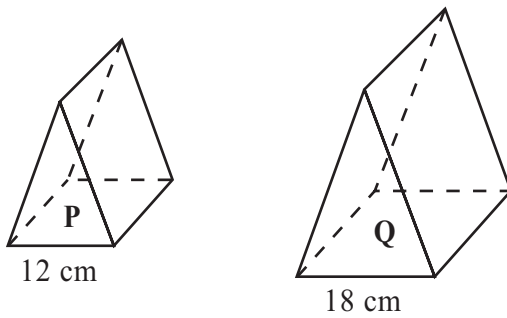


Diagram **NOT** accurately drawn

Two prisms, **P** and **Q**, are similar.

The cross-section of prism **P** is a triangle with a base of length 12 cm.

The cross-section of prism **Q** is a triangle with a base of length 18 cm.

The total surface area of prism **P** is 544 cm².

Calculate the total surface area of prism **Q**.

..... cm²

(Total 3 marks)

Q17

18. Simplify fully $\frac{x^2 + 6x}{x^2 - 36}$

.....

(Total 3 marks)

Q18



19.



Ashok has six coins in his pocket.
 He has one 5 cent coin, two 10 cent coins and three 20 cent coins.
 He takes at random a coin from his pocket.
 He records its value and puts the coin back into his pocket.
 He then takes at random a second coin from his pocket and records its value.

(a) Calculate the probability that he takes two 20 cent coins.

.....
(2)

(b) Calculate the probability that the second coin he takes has a higher value than the first coin he takes.

.....
(3)

(Total 5 marks)

Q19



20.

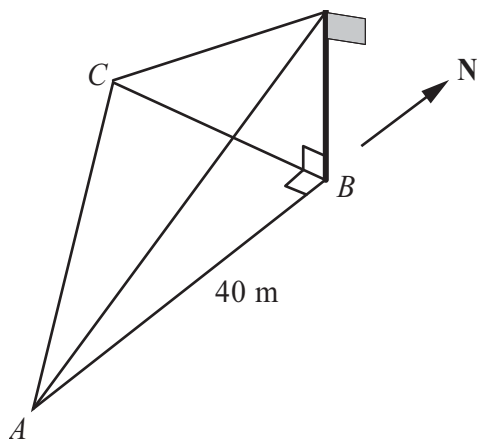


Diagram **NOT**
accurately drawn

Leave
blank

A , B and C are points on horizontal ground.

C is due West of B .

A is due South of B and $AB = 40$ m.

There is a vertical flagpole at B .

From A , the angle of elevation of the top of the flagpole is 13° .

From C , the angle of elevation of the top of the flagpole is 19° .

Calculate the distance AC .

Give your answer correct to 3 significant figures.

..... m

(Total 6 marks)

Q20



21. Solve the simultaneous equations

$$y = 2x^2$$
$$y = 3x + 14$$

.....

(Total 5 marks)

Q21

TOTAL FOR PAPER: 100 MARKS

END



Summer 2010 IGCSE Mathematics (4400) Mark Scheme - Paper 3H

Apart from Questions 4(c), 16 and 21 (where the mark scheme states otherwise), the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Q	Working	Answer	Mark	Notes
1 a	$\frac{15}{6}$ oe or $\frac{100}{6}$ oe inc value rounded or truncated to at least 1 dp eg 16.6, 16.7		2	M1
		250		A1 cao
b	$\frac{900}{6}$ or $\frac{5}{6}$ oe inc value rounded or truncated to at least 2 dp eg 0.83		2	M1
		750		A1 cao
				Total 4 marks

2 ai		62	2	B1 cao
ii		alternate		B1 Accept 'opposite and corresponding' (need both) or 'opposite, angle sum of triangle = 180° and sum of angles on a line = 180°' (need all three)
bi		71	2	B1 cao
ii		corresponding		B1 Accept 'opposite and alternate' (need both) or 'opposite, angle sum of triangle = 180° and sum of angles on a line = 180°' (need all three)
				Total 4 marks

3 a		6	1	B1 cao
b		7	1	B1 cao
				Total 2 marks

Q	Working	Answer	Mark	Notes
4 a		$5n + 30$	1	B1
b		y^6	1	B1 cao
c	$4x - 8 = 3$		3	M1 for correct expansion of $4(x-2)$ or for either $4x = 3 + 2$ or $4x = 5$ following $4x - 2 = 3$
	$4x = 8 + 3$ or $4x = 11$			M1 for $4x = 8 + 3$ or $4x = 11$
		$2\frac{3}{4}$ oe		A1 dep on 2 method marks
				Total 5 marks

5 a	$\frac{3}{10} \times \frac{5}{6}$		2	M1
		$\frac{15}{60}$ or $\frac{1}{4}$		A1 Accept $\frac{3}{12}$, $\frac{5}{20}$
b		24	2	B2 B1 for multiple of 24
				Total 4 marks

Q	Working	Answer	Mark	Notes
6 a		$400 < V \leq 500$	1	B1 Accept 400-500
b	$50 \times 2 + 150 \times 4 + 250 \times 6 + 350 \times 18$ $+ 450 \times 44 + 550 \times 6$ $= 100+600+1500+6300+19\ 800+3300$ $= 31\ 600$		4	M1 for finding at least 4 products $m \times f$ consistently within intervals (inc end points)
	$= 31\ 600$			M1 (dep) for use of at least 4 correct halfway values
	$31\ 600 \div 80$			M1 (dep on 1st M1) for adding and \div by 80
		395		A1
c		2 6 12 30 74 80	1	B1 cao
d		Points correct	2	B1 $\pm \frac{1}{2}$ sq ft from sensible table
		Curve or line segments		B1 ft from points if 4 or 5 correct or if points are plotted consistently within each interval at the correct heights
e	Use of 40 (or 40.5) on graph or 40 (or 40.5) stated		2	M1 for use of 40 (or 40.5) on cf graph or for 40 (or 40.5) stated
		approx 420		A1 If M1 scored, ft from cf graph If no indication of method, ft only from correct curve & if answer is correct ($\pm \frac{1}{2}$ sq tolerance) award M1 A1
				Total 10 marks

Q	Working	Answer	Mark	Notes
7	cos and 41 6.8 cos 41°		3	M1 or M1 for M1 6.8sin41° (4.461) and 6.8 ² – “4.461” ² (26.337) M1 for √“26.337” or M1 for correct statement of Sine Rule eg $\frac{6.8}{\sin 90^\circ} = \frac{x}{\sin 49^\circ}$ M1 for correct expression for x eg $x = \frac{6.8 \sin 49^\circ}{\sin 90^\circ}$
		5.13		A1 for ans rounding to 5.13 (5.132025...)
				Total 3 marks

8	$\frac{1786}{0.76}$ or $1786 \times \frac{100}{76}$ oe		3	M2 for $\frac{1786}{0.76}$ or $1786 \times \frac{100}{76}$ oe M1 for $\frac{1786}{76}$, 76% = 1786, $\frac{1786}{x} = 0.76$, 1786 = 0.76x or 23.5 seen
		2350		A1 cao
				Total 3 marks

Q	Working	Answer	Mark	Notes
9 a		reflection in the line $y = -x$	2	B2 B1 for reflection B1 for $y = -x$ oe [accept eg “in dotted line” or “in line through (-5,5) and (5, -5)”] These marks are independent but award no marks if the answer is not a single transformation
b		R correct Vertices are (2,-1)(3,-1)(3,-3)	2	B2 B1 for 2 vertices correct or for a translation of R or for a 90° clockwise rotation of Q about (-1,1)
c		reflection in the line $y = 1$	2	B2 B1 for reflection B1 for $y = 1$ oe [accept eg “in a horizontal line through (0,1) ft from (b), if B1 scored in (b)"] As in (a)
				Total 6 marks

10 a		$-4 \leq x < 3$	2	B2 Also accept ‘ $x < 3$ and $x \geq -4$ ’ B1 for $-4 \leq x \leq 3$, $-4 < x < 3$, $-4 < x \leq 3$, a double-ended inequality which is correct at one end (ignore the other end) Also award B1 for $x \geq -4$, $x < 3$, ‘ $x < 3$ or $x \geq -4$ ’
bi	$2x > -8$		4	M1 for $2x > -8$ or $x + 4.5 > 0.5$
		$x > -4$		A1 for $x > -4$ as final answer
ii		-3 -2 -1	2	B2 B1 for 3 correct and 1 wrong or for 2 correct and none wrong
				Total 6 marks

Q	Working	Answer	Mark	Notes
11 a	$\pi \times 8^2$		2	M1
		201		A1 for ans rounding to 201 ($\pi \rightarrow 201.061\dots$ 3.14 \rightarrow 200.96)
b	eg 8.5870... \times 587.71		2	M1 for correct evaluation of at least 2 of the terms inside the brackets (126.75, 192, 268.96 accept if rounded or truncated to at least 3sf) or for correct evaluation of brackets (587.71 - accept 587, 588 or 587.7)
		5050		A1 Accept any answer in the range 5040-5050 inclusive. ($\pi \rightarrow 5046.677\dots$ 3.14 \rightarrow 5044.119...)
				Total 4 marks

12 a		18 13 2 -9 -14	2	B2 for all correct B1 for 3 or 4 correct
b		Points Curve	2	B1 $\pm \frac{1}{2}$ sq ft from (a) if at least B1 in (a) B1 ft if B1 awarded for points or if there is not more than one point incorrectly plotted and at least B1 scored in (a) Award for single curve (not line segments) which does not miss. more than one plotted point by more than $\frac{1}{2}$ square
ci		$3x^2 - 12$	4	B2 B2 for $3x^2 - 12$ B1 for two of three terms differentiated correctly
ii	$3 \times 5^2 - 12$			M1 for substn $x = 5$ in their (c)(i) if at least B1 scored in (c)(i)
		63		A1 cao
				Total 8 marks

Q	Working	Answer	Mark	Notes
13	There are 4 independent requirements to consider when marking this question but the order in which they are satisfied will vary. Focus on these 4 key points, ignoring irrelevant or incorrect statements.			
	$\angle PQS = 36^\circ$ or $\angle SPR = 54^\circ$		4	B1 May be stated or marked on diagram
	angles in the same segment			B1 Award if 'same segment', 'same arc', or 'same chord'
	$\angle PQR = 90^\circ$ or $\angle PSR = 90^\circ$ and angle in a semicircle is a right angle			B1 Angle may be stated or marked on diagram. Condone omission of 'is a right angle' oe.
		54		B1 cao
				Total 4 marks

14	ai	15	2	B1 cao
	ii	8.25		B1 cao
	b	$\frac{1}{2} \times "15" \times "8.25"$	2	M1
		61.875		A1 Also accept 61.88
	c	$\frac{"8.25"}{25}$	3	M1 numerator "8.25" M1 denominator 25
		0.33		A1 cao
				Total 7 marks

Q	Working	Answer	Mark	Notes
15 a	$E = \frac{k}{r^2}$		3	M1 for $E = \frac{k}{r^2}$ but not for $E = \frac{1}{r^2}$
	$4 = \frac{k}{50^2}$			M1
		$\frac{10000}{r^2}$		A1 Award 3 marks if answer is $E = \frac{k}{r^2}$ but k is evaluated as 10 000 in any part
b		25	1	B1 ft from $\frac{"10000"}{400}$ except for $k = 1$, if at least M1 scored in (a)
c	$r^2 = \frac{10000}{1600}$ oe		2	M1 for substitution and rearrangement into form $r^2 = \frac{k}{1600}$ or $r = \frac{\sqrt{k}}{40}$ with their value of k except for $k = 1$
		2.5 oe		A1 cao
				Total 6 marks

16	eg $9 - 3\sqrt{5} - 3\sqrt{5} + \sqrt{5}^2$ $9 - 2 \times 3\sqrt{5} + \sqrt{5}^2$		2	B2 B1 for $9 + \sqrt{5}^2$ or $9 + \sqrt{5}\sqrt{5}$ or $9 + \sqrt{25}$ or $3^2 + \sqrt{5}^2$ or $3^2 + \sqrt{5}\sqrt{5}$ or $3^2 + \sqrt{25}$ B1 for $-3\sqrt{5} - 3\sqrt{5}$ or for $-2 \times 3\sqrt{5}$
				Total 2 marks

Q	Working	Answer	Mark	Notes
17	$\frac{18}{12}$ or 1.5 oe or 18 : 12 oe		3	M1 for $\frac{18}{12}$ or 1.5 oe or 18 : 12 oe Also award for $\frac{12}{18}$ or $\frac{2}{3}$ or 12 : 18 oe
	544×1.5^2			M1 for 1.5^2 or 2.25 or $\frac{9}{4}$ or 9 : 4 oe Also award for $(\frac{2}{3})^2$ or $\frac{4}{9}$ or 4 : 9 oe
		1224		A1 cao
				Total 3 marks

18	$\frac{x(x+6)}{(x+6)(x-6)}$		3	B1 for $x(x+6)$ Accept $(x+0)(x+6)$ B1 for $(x+6)(x-6)$
		$\frac{x}{x-6}$		B1 cao
				Total 3 marks

Q	Working	Answer	Mark	Notes	
19 a	$\frac{3}{6} \times \frac{3}{6}$		2	M1 for $\frac{3}{6} \times \frac{3}{6}$ oe	
		$\frac{9}{36}$ or $\frac{1}{4}$ oe		A1 Sample space method - award 2 marks for a correct answer, otherwise no marks	
b	$\frac{1}{6} \times \frac{5}{6} + \frac{2}{6} \times \frac{3}{6}$ OR $\frac{1}{6} \times \frac{2}{6} + \frac{1}{6} \times \frac{3}{6} + \frac{2}{6} \times \frac{3}{6}$ OR $\frac{3}{6} \times \frac{3}{6} + \frac{1}{6} \times \frac{2}{6}$		3	M1 for one of $\frac{1}{6} \times \frac{5}{6}, \frac{2}{6} \times \frac{3}{6},$ $\frac{1}{6} \times \frac{2}{6}, \frac{1}{6} \times \frac{3}{6},$ $\frac{3}{6} \times \frac{3}{6}$	SC M1 for one of $\frac{1}{6} \times \frac{2}{5}, \frac{1}{6} \times \frac{3}{5},$ $\frac{2}{6} \times \frac{3}{5}$
				M1 for sum of 2 or 3 products which, evaluated accurately, gives the correct answer	M1 for $\frac{1}{6} + \frac{2}{6} \times \frac{3}{5}$ or $\frac{1}{6} \times \frac{2}{5} + \frac{1}{6} \times \frac{3}{5}$ $+ \frac{2}{6} \times \frac{3}{5}$
		$\frac{11}{36}$		A1 Sample space method - award 3 marks for a correct answer, otherwise no marks. Accept 0.305̄, 0.30, 0.31, 0.305, 0.306 etc but not 0.3	
				Total 5 marks	

Q	Working	Answer	Mark	Notes
20	13° or 19° angle of elevation identified		6	B1 On diagram or implied by working
				M1 for 40 tan 13° or 9.2347... rounded or truncated to at least 2 sf or any complete, correct method of finding the height of the flagpole
	$\tan 19^\circ = \frac{\text{"9.2347..."}}{BC}$			M1 or for $\tan 71^\circ = \frac{BC}{\text{"9.2347..."}}$
	$(BC =) \frac{\text{"9.2347..."}}{\tan 19^\circ}$ or $\frac{40 \tan 13^\circ}{\tan 19^\circ}$ or 26.819...			M1 for correct expression for BC, which need not be evaluated eg also accept $40 \tan 13^\circ \tan 71^\circ$ If evaluated, accept 26.7 or 26.8 or any value which rounds to 26.7 or 26.8 $(\frac{9.2}{\tan 19^\circ} \rightarrow 26.718...$ $\frac{9.23}{\tan 19^\circ} \rightarrow 26.805...)$
	$40^2 + \text{"26.819..."}^2$			M1 dep on first two M1s for $40^2 + \text{"26.819..."}^2$ or for complete, correct method of finding length of AC
		48.2		A1 for ans rounding to 48.2 (48.1590...) Award 6 marks for an answer which rounds to 48.2, if it has been obtained by a mathematically correct method
				Total 6 marks

Q	Working	Answer	Mark	Notes
21	$2x^2 = 3x + 14$ May be implied by second M1		5	M1 $y = 2\left(\frac{y-14}{3}\right)^2$
	$2x^2 - 3x - 14 (= 0)$			M1 $2y^2 - 65y + 392 = 0$
	$(2x - 7)(x + 2) (= 0)$ or $\frac{3 \pm \sqrt{121}}{4}$ or $\frac{3}{4} \pm \frac{\sqrt{121}}{4}$			M1 $(2y - 49)(y - 8) (= 0)$ or $\frac{65 \pm \sqrt{1089}}{4}$ or $\frac{65}{4} \pm \frac{\sqrt{1089}}{4}$
		$x = \frac{7}{2}, x = -2$		A1 dep on all method marks $y = \frac{49}{2}, y = 8$
		$x = \frac{7}{2}, y = \frac{49}{2}$ $x = -2, y = 8$		A1 dep on all method marks $x = \frac{7}{2}, y = \frac{49}{2}$ $x = -2, y = 8$
				Total 5 marks

Total 100 marks

Centre No.						Paper Reference						Surname	Initial(s)	
Candidate No.						4	4	0	0	/	4	H	Signature	

Paper Reference(s)

4400/4H

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Friday 11 June 2010 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

--	--	--

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

Without sufficient working, correct answers may be awarded no marks.

You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.

If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 22 questions in this question paper. The total mark for this paper is 100.

There are 24 pages in this question paper. Any blank pages are indicated.

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

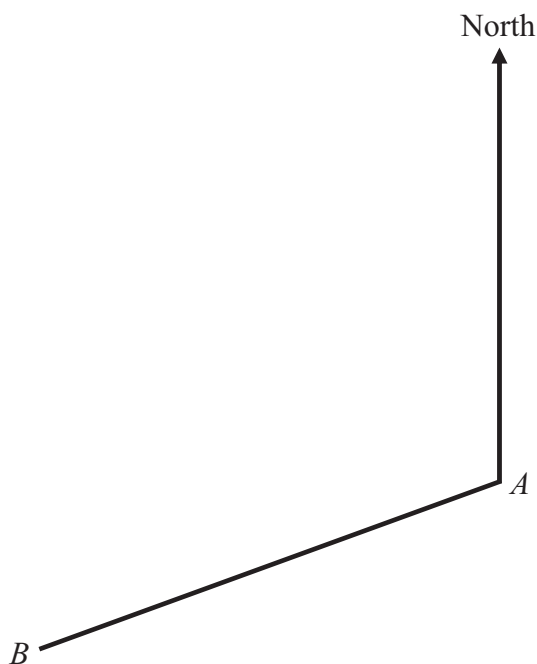
1. Solve $6y - 9 = 3y + 7$

$y = \dots\dots\dots$

(Total 3 marks)

Q1

2. The diagram shows two towns, A and B , on a map.



(a) By measurement, find the bearing of B from A .

$\dots\dots\dots^\circ$
(2)

(b) C is another town.
The bearing of C from A is 050° .
Find the bearing of A from C .

$\dots\dots\dots^\circ$
(2)

(Total 4 marks)

Q2



3. A spinner can land on red or blue or yellow.
The spinner is biased.
The probability that it will land on red is 0.5
The probability that it will land on blue is 0.2

(a) Imad spins the spinner once.
Work out the probability that it will land on yellow.

.....
(2)

(b) Janet spins the spinner 30 times.
Work out an estimate for the number of times the spinner will land on blue.

.....
(2)

(Total 4 marks)

Q3



4. (a) Rosetta drives 85 kilometres in 1 hour 15 minutes.
Work out her average speed in kilometres per hour.

..... km/h
(2)

- (b) Rosetta drives a total distance of 136 kilometres.
Work out 85 as a percentage of 136

..... %
(2)

- (c) Sometimes Rosetta travels by train to save money.
The cost of her journey by car is £12
The cost of her journey by train is 15% less than the cost of her journey by car.
Work out the cost of Rosetta's journey by train.

£.....
(3)

(Total 7 marks)

Q4



5.

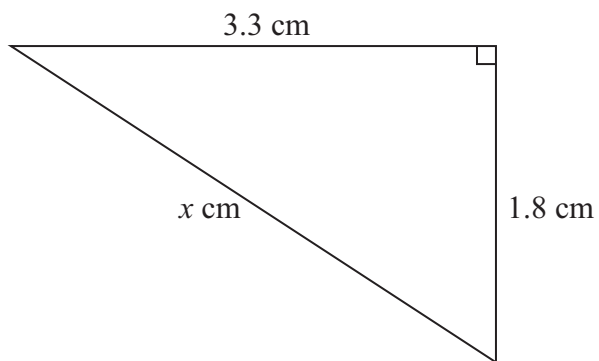


Diagram **NOT** accurately drawn

Calculate the value of x .
Give your answer correct to 3 significant figures.

$x = \dots\dots\dots$

Q5

(Total 3 marks)



6. (a) $A = \{2, 3, 4, 5\}$

$B = \{4, 5, 6, 7\}$

(i) List the members of $A \cap B$.

.....

(ii) How many members are in $A \cup B$?

.....

(2)

(b) $\mathcal{E} = \{3, 4, 5, 6, 7\}$

$P = \{3, 4, 5\}$

Two other sets, Q and R , each contain exactly three members.

$P \cap Q = \{3, 4\}$

$P \cap R = \{3, 4\}$

Set Q is not the same as set R .

(i) Write down the members of a possible set Q .

.....

(ii) Write down the members of a possible set R .

.....

(2)

Q6

(Total 4 marks)



7. Rectangular tiles have width $(x + 1)$ cm and height $(5x - 2)$ cm.

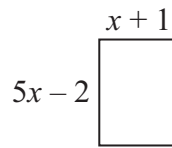


Diagram **NOT** accurately drawn

Some of these tiles are used to form a large rectangle. The large rectangle is 7 tiles wide and 3 tiles high.

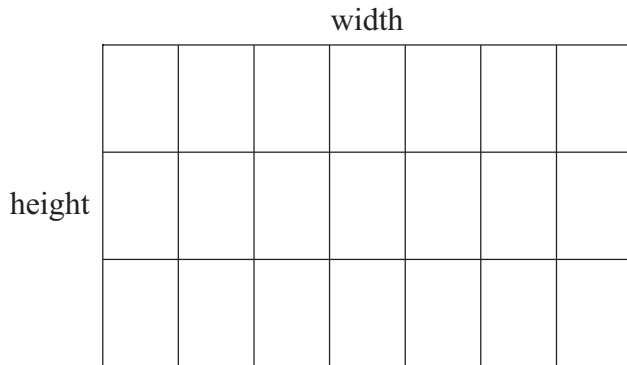


Diagram **NOT** accurately drawn

The perimeter of the large rectangle is 68 cm.

(a) Write down an equation in x .

..... (3)

(b) Solve this equation to find the value of x .

$x =$ (3)

(Total 6 marks)

Q7



8. Show that $1\frac{1}{2} \div 1\frac{1}{4} = 1\frac{1}{5}$

Q8

(Total 3 marks)

9. The depth of water in a reservoir increases from 14 m to 15.75 m.
Work out the percentage increase.

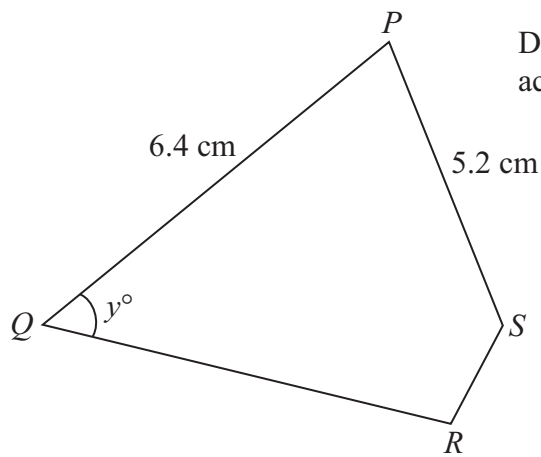
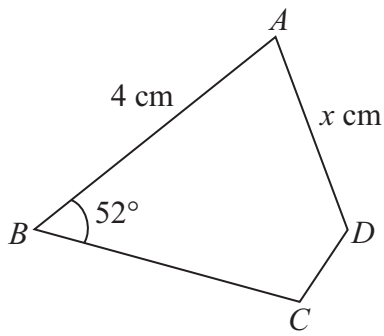
..... %

Q9

(Total 3 marks)



10. Quadrilaterals $ABCD$ and $PQRS$ are similar.



Diagrams **NOT** accurately drawn

AB corresponds to PQ .
 BC corresponds to QR .
 CD corresponds to RS .

Find the value of

(a) x

$x = \dots\dots\dots$
(2)

(b) y

$y = \dots\dots\dots$
(1)

(Total 3 marks)

Q10



Leave
blank

11. Simplify fully $\frac{x}{6} + \frac{3x}{4}$

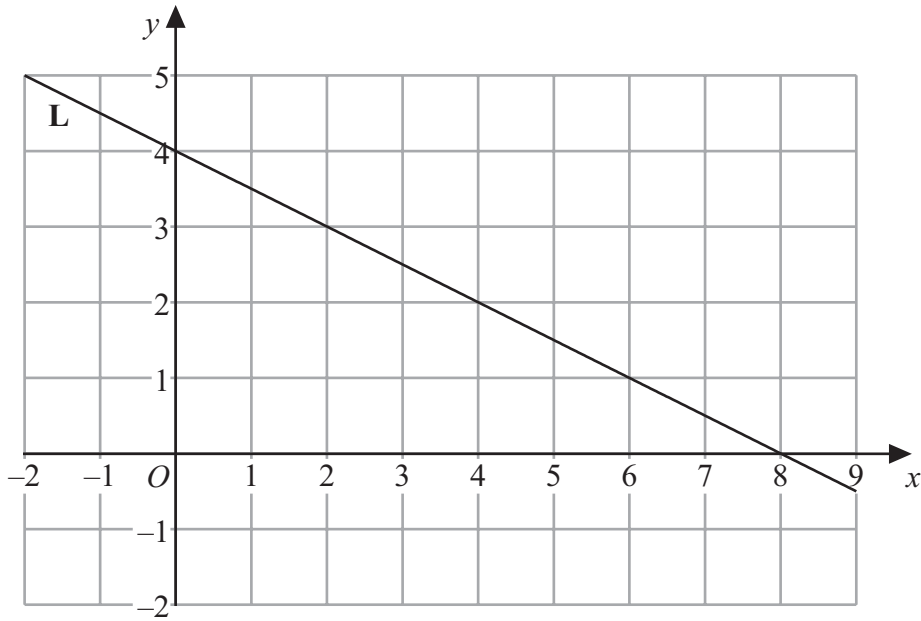
.....

(Total 3 marks)

Q11



12. (a)

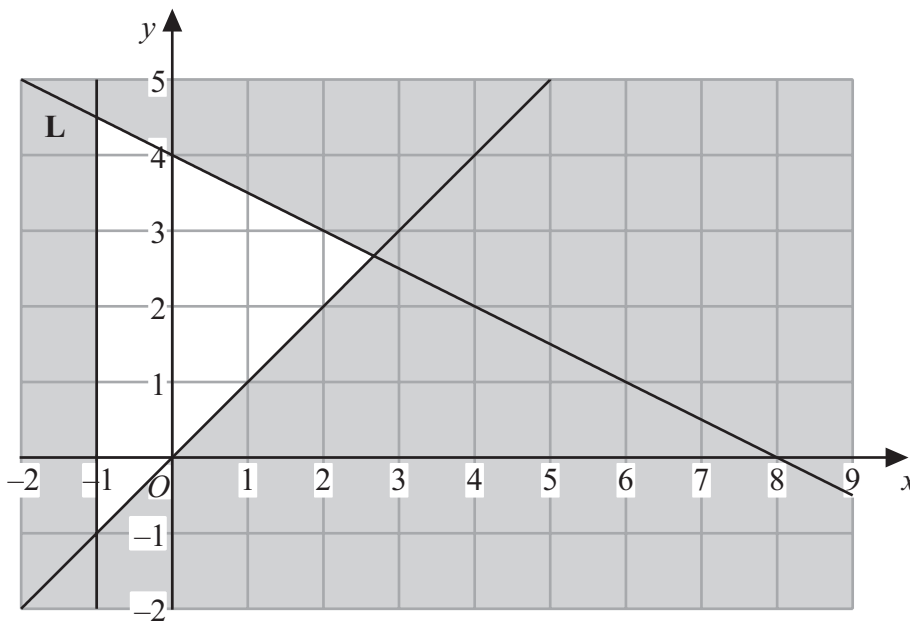


Find the equation of the line **L**.

.....
(3)



(b) Find the three inequalities that define the **unshaded** region shown in the diagram below.



.....

(3)

(Total 6 marks)

Q12



13. (a) Solve $x^2 - 8x + 12 = 0$

.....
(3)

(b) Solve the simultaneous equations

$$\begin{aligned} y &= 2x \\ 4x - 5y &= 9 \end{aligned}$$

$x =$

$y =$

(3)

(Total 6 marks)

Q13



14.

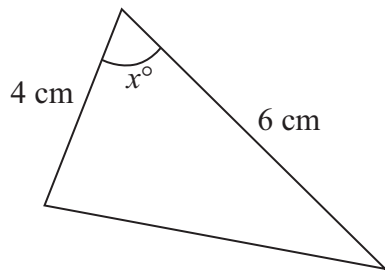


Diagram **NOT** accurately drawn

The area of the triangle is 6.75 cm^2 .
 The angle x° is acute.
 Find the value of x .
 Give your answer correct to 1 decimal place.

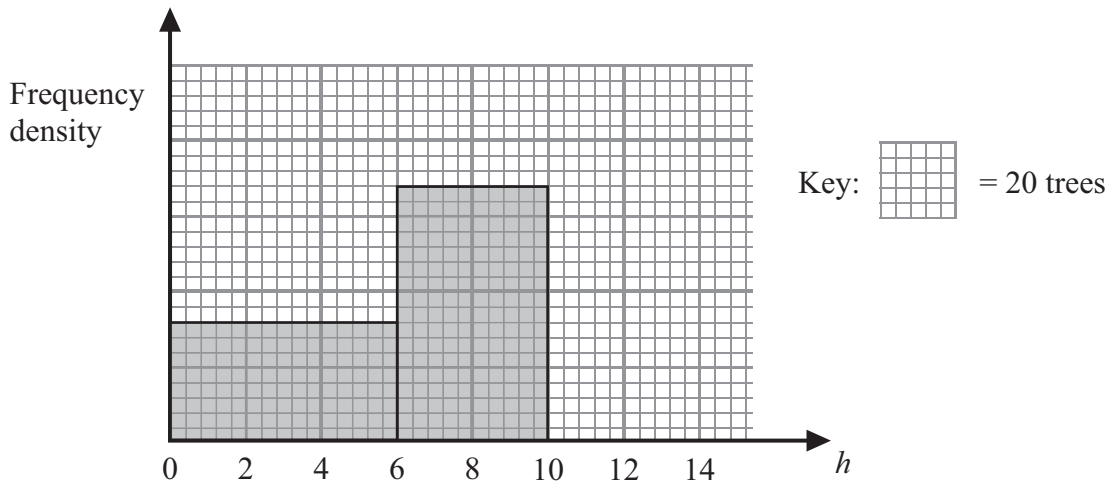
$x = \dots\dots\dots$

(Total 3 marks)

Q14



15. The unfinished histogram shows information about the heights, h metres, of some trees. A key is also shown.



(a) Calculate an estimate for the number of trees with heights in the interval $4.5 < h \leq 10$

.....
(3)

(b) There are 75 trees with heights in the interval $10 < h \leq 13$
Use this information to complete the histogram.

(2)

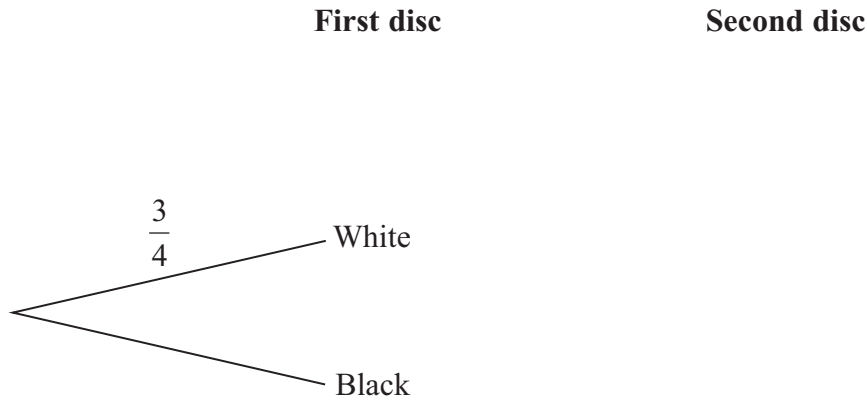
Q15

(Total 5 marks)



16. A bag contains 3 white discs and 1 black disc.
John takes at random 2 discs from the bag without replacement.

(a) Complete the probability tree diagram.



(3)

(b) Find the probability that both discs are white.

.....
(2)

(c) All the discs are now replaced in the bag.
Pradeep takes at random 3 discs from the bag without replacement.

Find the probability that the disc left in the bag is white.

.....
(3)

(Total 8 marks)

Q16



17. The diagram shows a sector of a circle, radius 45 cm, with angle 84° .

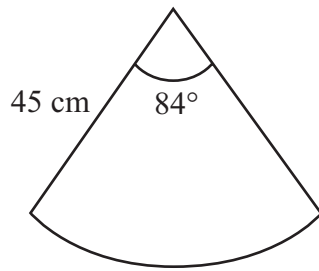


Diagram **NOT** accurately drawn

Calculate the area of the sector.
Give your answer correct to 3 significant figures.

..... cm²

Q17

(Total 3 marks)

18.

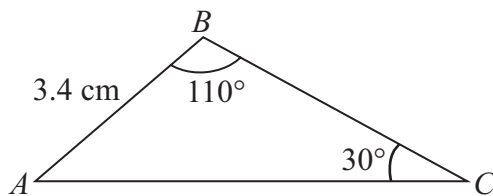


Diagram **NOT** accurately drawn

Calculate the length of AC.
Give your answer correct to 3 significant figures.

..... cm

Q18

(Total 3 marks)



19. A cone has slant height 4 cm and base radius r cm.

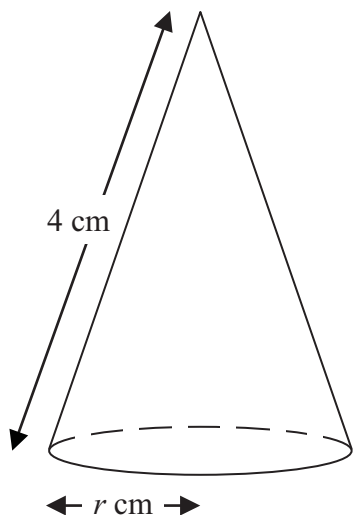


Diagram **NOT** accurately drawn

The **total** surface area of the cone is $\frac{33}{4} \pi \text{ cm}^2$.

Calculate the value of r .

$r = \dots\dots\dots$

(Total 4 marks)

Q19



20. $f(x) = (x - 1)^2$

(a) Find $f(8)$

.....
(1)

(b) The domain of f is all values of x where $x \geq 7$
Find the range of f .

.....
(2)

$$g(x) = \frac{x}{x - 1}$$

(c) Solve the equation $g(x) = 1.2$

.....
(2)

(d) (i) Express the inverse function g^{-1} in the form $g^{-1}(x) = \dots\dots$

$$g^{-1}(x) = \dots\dots\dots$$

(ii) Hence write down $gg(x)$ in terms of x .

$$gg(x) = \dots\dots\dots$$

(6)

Q20

(Total 11 marks)



21.

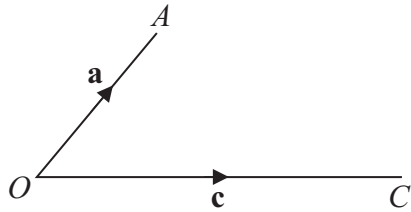


Diagram NOT accurately drawn

In the diagram $\vec{OA} = \mathbf{a}$ and $\vec{OC} = \mathbf{c}$.

(a) Find \vec{CA} in terms of \mathbf{a} and \mathbf{c} .

.....
(1)

(b) The point B is such that $\vec{AB} = \frac{1}{2} \mathbf{c}$.

Give the mathematical name for the quadrilateral $OABC$.

.....
(1)

(c) The point P is such that $\vec{OP} = \mathbf{a} + k\mathbf{c}$, where $k \geq 0$

State the two conditions relating to $\mathbf{a} + k\mathbf{c}$ that must be true for $OAPC$ to be a rhombus.

(2) Q21

(Total 4 marks)



22. (a) Work out $5.2 \times 10^2 + 2.3 \times 10^4$
Give your answer in standard form.

.....
(2)

(b) $a \times 10^2 + b \times 10^4 = c \times 10^4$

Express c in terms of a and b .

$c =$
(2)

(Total 4 marks)

Q22

TOTAL FOR PAPER: 100 MARKS

END



Summer 2010 IGCSE Mathematics (4400) Mark Scheme - Paper 4H

The following questions require a seen valid method before the accuracy mark can be awarded; Q1 , Q7, Q13, Q19, Q20c & d
For other questions a correct answer implies a correct method.

Q	Working	Answer	Mark	Notes	
1. (F13c)	$6y - 3y = 7 + 9$ $3y = 16$	$5\frac{1}{3}$ oe or 5.33(...)	3	M1 M1 A1	or better; correctly collect y's & constants 2dp at least for decimal ans if 16/3 not seen (A1 dep on at least 1 M1)
					Total 3 marks

2. (F14a)	(a)	$360 - (108 \text{ to } 112)$ or $180 + (72 \text{ to } 68)$	248 to 252	2	M1 A1	
(F14b)	(b)	$360 - (180 - 50)$ (=360 -130) or $180 + 50$ or $50 + 50 + 130$	230	2	M1 A1	cao
						Total 4 marks

3. (F16a)	(a)	$1 - (0.5 + 0.2)$ (= 1 - 0.7)	0.3oe	2	M1 A1	decimals, fractions % ok.
(F16b)	(b)	30×0.2	6	2	M1 A1	cao 6/30 =M1A0
						Total 4 marks

Q		Working	Answer	Mark	Notes	
4. (F17a)	(a)	85/1.25	68	2	M1 A1	accept 85/75 or 85/1.15 accept 85000 in place of 85 cao
(F17b)	(b)	85/136 × 100	62.5	2	M1 A1	cao
(F17c)	(c)	12 × 0.15 (= 1.8) or 180p or 180 pence 12 - "1.8"	10.20oe	3	M1 M1dep A1	1 - 0.15 = 0.85 "0.85" × 12 allow 10.2
Total 7 marks						

5. (F18)		$(x^2 =) 3.3^2 + 1.8^2$ (= 14.13) $\sqrt{\text{"14.13"}}$	3.76	3	M1 M1 A1	M2 for $\sqrt{(3.3^2 + 1.8^2)}$ dep awrt 3.76 isw for 3.758... or better in body.
Total 3 marks						

6. (F19)	(ai)		4, 5	1	B1	any order
(F19)	(aii)		6	1	B1	cao do not accept n(6)
(F19)	(bi)		(Q =) 3,4,6 or 3,4,7	1	B1	
(F19)	(bii)	sc B1 B0 for Q= <u>3,4,6 or 7</u> then R = <u>3,4,6 or 7</u>	(R =) 3,4,7 or 3,4,6	1	B1ft	R=3,4,7 if Q=3,4,6 // R=3,4,6, if Q=3,4,7
Total 4 marks						

Q		Working	Answer	Mark	Notes	
7. (F20a)	(a)	$7(x + 1)$ or $3(5x - 2)$ $7(x + 1) + 3(5x - 2)$	$7(x + 1) + 3(5x - 2)$ $= 34\text{oe}$	3	M1	or doubled or mult out correctly or doubled or mult out correctly (and stated intention to +) i.e. $14(x + 1) + 6(5x - 2) = 68$ (can isw)
	(F20b)	(b)			$7x + 7$ or $14x + 14$ or $15x - 6$ or $30x - 12$ $22x = 33$ or $44x = 66$	
			1.5oe	3	M1	
Total 6 marks						

8. (F21)		$\frac{3}{2}, \frac{5}{4}$ or $\frac{6}{4}, \frac{5}{4}$		3	B1	converting both correctly to improper fractions Stated intention to multiply (if 2nd fraction inverted) or divide if denominators are the same (correct fractions) Must be improper fraction from previous calculation Ignore all decimal treatments.
		$\frac{3}{2} \times \frac{4}{5}$ or $\frac{6}{4} \times \frac{4}{5}$ or $\frac{6}{4} \div \frac{5}{4}$ etc			B1	
		$\frac{6}{5}\text{oe}$			B1	
Total 3 marks						

9. (F22)		$15.75 - 14 (= 1.75)$	$\frac{15.75}{14} \times 100 (=112.5)$ "112.5" - 100	12.5	M1	allow $\frac{1.75}{15.75} \times 100 (=11.1)$ cao	$14/15.75 \times 100 (=88.9)$
		$\frac{1.75}{14} \times 100$			M1dep		$100 - "88.9" (=11.1)$
					A1		
Total 3 marks							

Q		Working	Answer	Mark	Notes	
10.	(a)	$4 \div 6.4 \times 5.2$ (0.625 x 5.2) or $(5.2 \div 1.6)$ etc)			M1	M1 for proper use of sf 1.6 or 0.625
			3.25	2	A1	(or $x/4 = 5.2/6.4$ oe) cao
	(b)		52	1	B1	
						Total 3 marks

11.		both denoms = same multiple of 12 $\frac{2x+9x}{12}$ or $\frac{4x+18x}{24}$ oe			M1	Any multiple of 12 acceptable
			$\frac{11x}{12}$	3	M1	$\frac{2x}{12} + \frac{9x}{12}$ or $\frac{4x}{24} + \frac{18x}{24}$ (intention to add correct fractions)
					A1	cao
						Total 3 marks

12.	(a)	(grad =) $-\frac{4}{8}$ oe (= - 0.5) Y intercept = 4	$y = "-0.5"x + 4$	3	B1 B1 B1ft	- 0.5 oe seen (can be implied from final answer) (correct y intercept) (ft grad only if $\frac{y}{h}$ seen) (correct form for equation) s.c. $y = 0.5x + 4$ without working = B2
	(b)		$x \geq -1$ oe $y \geq x$ oe $y \leq "-0.5x + 4"$ oe	3	B1 B1 B1ft	accept $x > -1$ accept $y > x$ ft (a) accept $y < "-0.5x + 4"$ must be a linear eqn in x Ignore contradictions sc B1 if all inequalities are facing the wrong way
				6	Total 6 marks	

Q	Working	Answer	Mark	Notes
13.	(a) $(x - 6)(x - 2) = 0$ or $\frac{8 \pm \sqrt{64 - 48}}{2}$			M2 M1 for 1 correct factor or $(x + 6)(x + 2)$
		$x = 6$ or 2	3	or $\frac{8 \pm \sqrt{-8^2 - 4 \times 12}}{2}$ condone one sign error A1 Ans only = M0M0A0 Answer depended on M2 achieved
	(b) $4x - 10x = 9$ or $2y - 5y = 9$ oe $-6x=9$ or $-3y=9$ oe			M1 correct sub/elimin to get 1 eqn 1 unknown
		$-1.5, -3$	3	A1 A1 Ans only = M0A0A0
				Total 6 marks

14.	$\frac{1}{2} \times 6 \times 4 \times \sin x^\circ = 6.75$ oe $\sin x^\circ = \frac{6.75}{12}$ or $\frac{9}{16}$ or 0.5625			M1 M1 A1
		34.2	3	isolating sin x awrt 34.2
				Total 3 marks

15.	(a) (6.8×20) or $(0.75 \times 1.6 \times 20)$ $24 + 136$			M1 M1 A1
		160	3	correct fd value marked (no errors) $(1.5 \times 16) + (4 \times 34)$ M2 for 20×8 or 200×0.8 cao
	(b) $75 \div 3 (=25)$ or $75 \div 20 (=3.75)$			M1
		block 10-13 ht 2.5cm	2	A1
				Total 5 marks

Q		Working	Answer	Mark	Notes	
16.	(a)		$\frac{1}{4}$ on Black branch Correct tree structure		B1 B1	
			Labels and values correct	3	B1	
	(b)	$\frac{3}{4} \times \frac{2}{3}$	$\frac{1}{2}$	2	M1 ft A1	Allow ft if ww selected from tree diagram or $\frac{3}{4} \times \frac{3}{4}$ cao
	(c)	$\frac{3}{4} \times \frac{2}{3} \times \frac{1}{2}$ or $\frac{3}{4} \times \frac{1}{3}$ or $\frac{1}{4}$ $(\frac{3}{4} \times \frac{2}{3} \times \frac{1}{2}) + (\frac{3}{4} \times \frac{1}{3}) + (\frac{1}{4})$	$\frac{3}{4}$	3	M1 M1 A1	i.e WWB or WB or B (1 correct branch) WWB + WB + B ans only: M2 A1
Total 8 marks						

17.		$\frac{84}{360}$ or $\frac{7}{30}$ or 0.23.. $\frac{84}{360} \times \pi \times 45^2$	1480	3	M1 M1 A1	$360 \div 84$ or 4.2857... or 4.29 or $\frac{30}{7}$ $\pi \times 45^2 \div "4.29"$ awrt 1480 (3 sf) sc 1485 or 1490 from $\pi=22/7$ seen M2A1
Total 3 marks						

18.		$\frac{AC}{\sin 110} = \frac{3.4}{\sin 30}$ oe $AC = 3.4 \times \frac{\sin 110}{\sin 30}$	6.39	3	M1 M1 A1	awrt 6.39
Total 3 marks						

Q	Working	Answer	Mark	Notes
19.	$\pi r \times 4 + \pi r^2 = \frac{33}{4} \pi$ oe $r^2 + 4r - \frac{33}{4} = 0$ oe $(4r^2 + 16r - 33 = 0)$ $(2r - 3)(2r + 11) = 0$	1.5	4	M1 ie correct equation based on areas. M1 correct equation = 0 M1 $\frac{-4 \pm \sqrt{4^2 + 4 \times \frac{33}{4}}}{2}$ or $\frac{-16 \pm \sqrt{16^2 + 16 \times 33}}{8}$ A1 not "1.5 and/or $-\frac{11}{2}$ " unless 1.5 clearly chosen A1 dependent on M3
				Total 4 marks

20.	(a)		49	1	B1	cao	
	(b)	$(7 - 1)^2$ or 36 seen	$f(x) \geq 36$ or $y \geq 36$	2	M1 A1	allow $f \geq 36$ $x \geq 36$: M1A0 (don't accept $>$)	
	(c)	$\frac{x}{x-1} = 1.2$ $x = 1.2(x-1)$		6	2	M1 Do not accept $g(1.2) = 6$ method A1 cao Answer only = M0 A0 Algebra method reqd.	
	(di)	$y = \frac{x}{x-1}$ $y(x-1) = x$ $xy - y = x$ $xy - x = y$ $x(y-1) = y$ $x = \frac{y}{y-1}$	$\frac{x}{x-1}$	5	M1 M1 M1 M1	$x = \frac{y}{y-1}$ $x(y-1) = y$ $xy - x = y$ $xy - y = x$ $y(x-1) = x$	
	(dii)		x	1	B1	accept $[x/(x-1)]/[x/(x-1) - 1]$ do not isw	
				Total 11 marks			

Q		Working	Answer	Mark	Notes	
21.	(a)		a - c oe	1	B1	
	(b)		trapezium	1	B1	
	(ci)		k = 1	1	B1	Accept {a + kc = a + c} or {kc = c} all imply k=1
	(cii)		(mag) a = (mag) c oe	1	B1	Accept a = c or {a=kc} (imply sides are equal in length) or a + kc bisects angle AOC
						Total 4 marks

22.	(a)	2352000	2.352×10^4	2	M1 A1	figs 235 or 2352 cao
	(b)	$a/100 \times 10^4 + b \times 10^4 (=c \times 10^4)$	0.01a + b oe	2	M1 A1	M1 for 0.01a seen or making index powers the same or a + 100b = 100c or dividing both sides by 10^4
						Total 4 marks

Total : 100 marks

Centre No.						Paper Reference						Surname	Initial(s)	
Candidate No.						4	4	0	0	/	3	H	Signature	

Paper Reference(s)

4400/3H

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Thursday 11 November 2010 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

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Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

Without sufficient working, correct answers may be awarded no marks.

You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.

If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 21 questions in this question paper. The total mark for this paper is 100.

There are 24 pages in this question paper. Any blank pages are indicated.

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. The table shows information about the numbers of children in 25 families.

Number of children in the family	Frequency
1	4
2	9
3	8
4	0
5	4

Work out the mean number of children in these 25 families.

.....

(Total 3 marks)

Q1



2. (a) Expand

(i) $4(c - 3)$

.....
(1)

(ii) $d(d^2 + 4)$

.....
(2)

(b) Factorise $3x - 2x^2$

.....
(2)

(Total 5 marks)

Q2



3. ABC is an isosceles triangle.
 $BA = BC$.
 PA is parallel to BC .
 Angle $ACB = 70^\circ$.

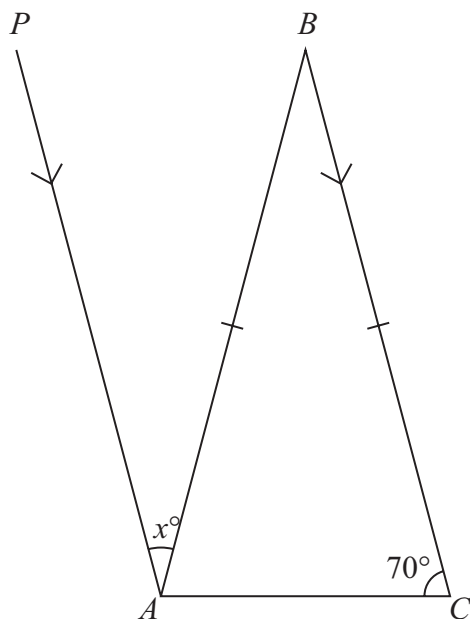


Diagram **NOT** accurately drawn

Find the value of x .
 Give a reason for each step in your working.

$x = \dots\dots\dots$

(Total 4 marks)

Q3



4.

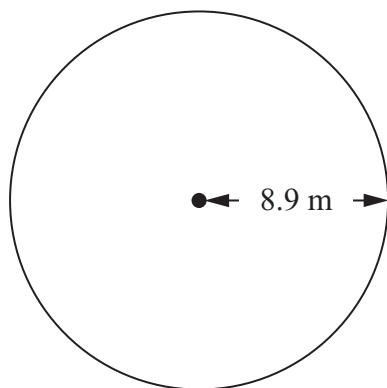


Diagram **NOT** accurately drawn

A circular pond has radius 8.9 m.

- (a) Find the area of the pond.
Write down all the figures on your calculator display.
State the units of your answer.

..... (3)

- (b) Give the value of your area correct to 2 significant figures.

..... (1)

(Total 4 marks)

Q4



5. (a) Show that $\frac{6}{7} \div 4 = \frac{3}{14}$

(2)

(b) Show that $3\frac{2}{5} - 1\frac{2}{3} = 1\frac{11}{15}$

(3)

Q5

(Total 5 marks)



6. (a) Solve $7x + 3 = 2x - 4$

$x = \dots\dots\dots$
(3)

(b) Solve $\frac{16 - 5y}{3} = 2$

$y = \dots\dots\dots$
(3)

(Total 6 marks)

Q6



- 7. $\mathcal{E} = \{\text{Clothes}\}$
- $A = \{\text{Mr Smith's clothes}\}$
- $B = \{\text{Hats}\}$
- $C = \{\text{Mrs Koshi's hats}\}$

(a) (i) Describe the members of the set $A \cap B$

.....

(ii) How many members has the set $A \cap C$?

.....

(2)

(b)

A	B	C	\mathcal{E}	ϵ	\emptyset	\cap	\cup
-----	-----	-----	---------------	------------	-------------	--------	--------

Use a letter or symbol from the box to make each of the following a true statement.

(i) $B \cup C = \dots\dots\dots$

(ii) Mr Smith's favourite shirt $\dots\dots\dots A$

(2)

(Total 4 marks)

Q7



8. (a)

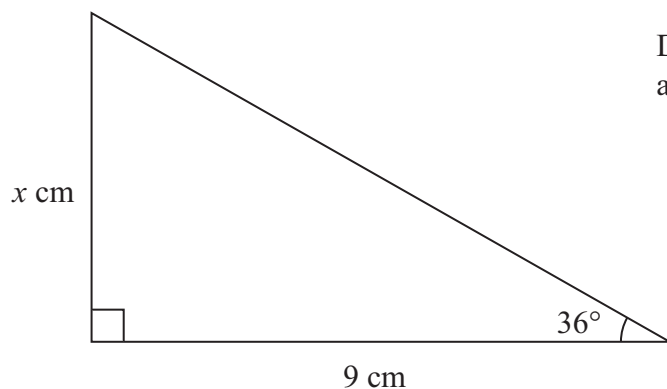


Diagram **NOT** accurately drawn

Calculate the value of x .
Give your answer correct to 3 significant figures.

$x = \dots\dots\dots$
(3)

(b)

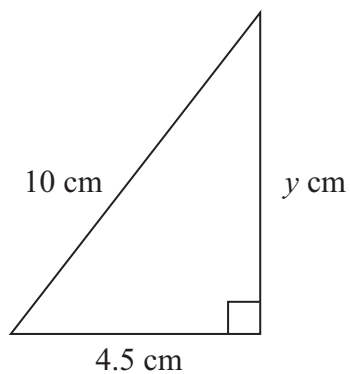


Diagram **NOT** accurately drawn

Calculate the value of y .
Give your answer correct to 3 significant figures.

$y = \dots\dots\dots$
(3)

(Total 6 marks)

Q8



9. (a) Three positive whole numbers are all different.
They have a median of 5 and a mean of 4
Find the three numbers.

.....
(2)

- (b) Find four whole numbers which have a mode of 5 and a median of 6

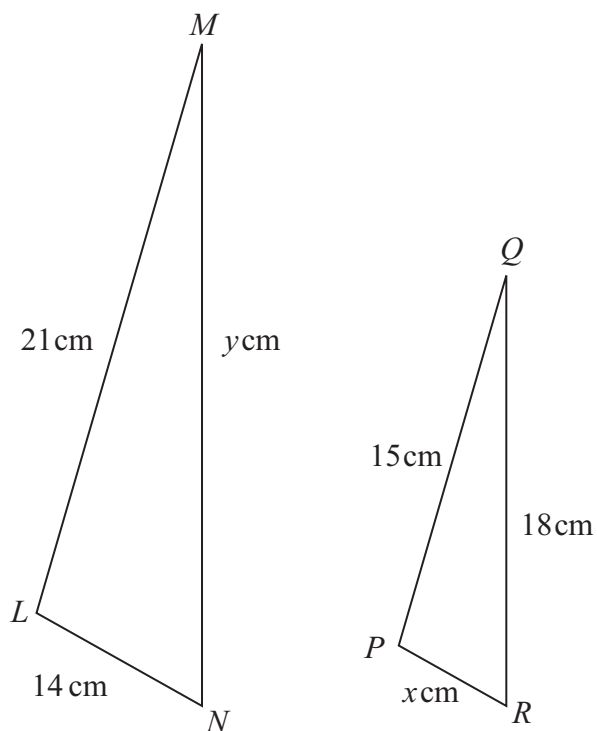
.....
(2)

(Total 4 marks)

Q9



10. Here are two similar triangles.



Diagrams **NOT** accurately drawn

LM corresponds to PQ .
 MN corresponds to QR .

(a) Find the value of x .

$x = \dots\dots\dots$
(2)

(b) Find the value of y .

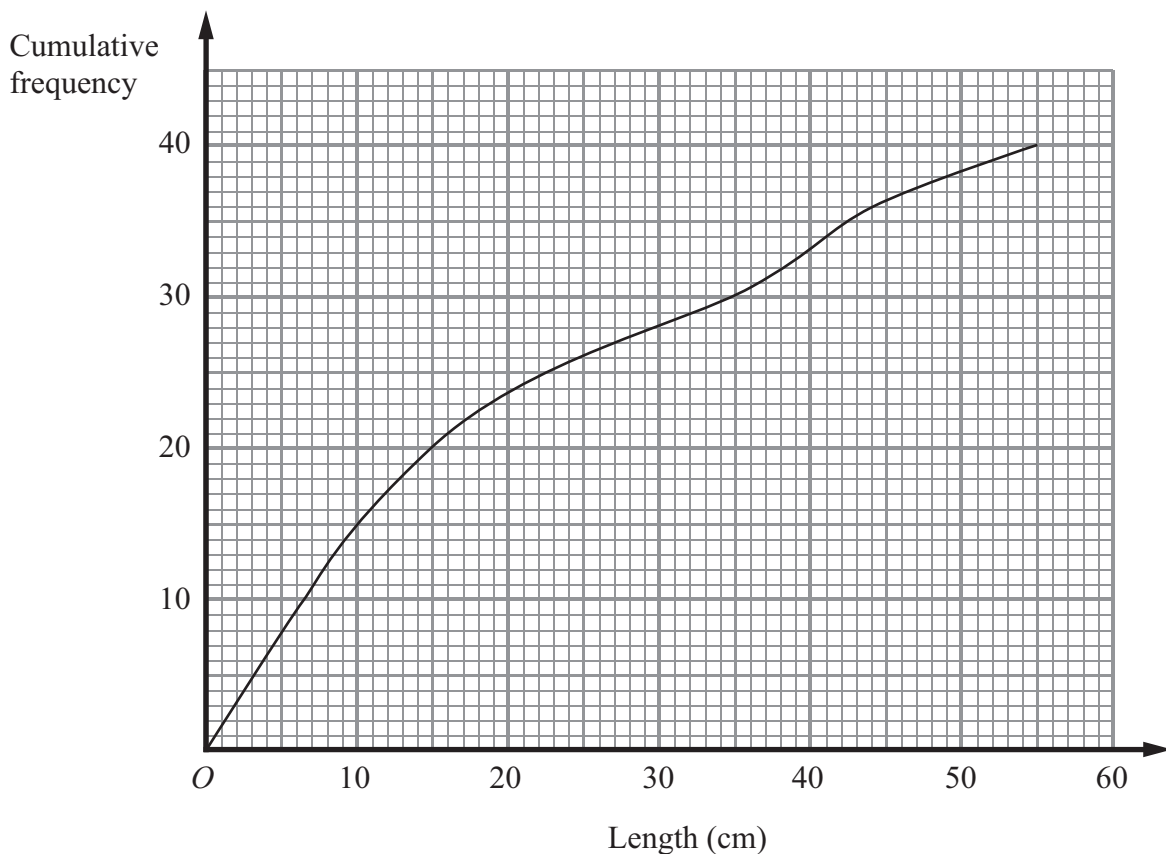
$y = \dots\dots\dots$
(2)

(Total 4 marks)

Q10



11. The cumulative frequency graph gives information about the lengths of 40 tree branches.



(a) Find an estimate for the median length.

..... cm
(2)

(b) Find an estimate for the interquartile range of the lengths.

..... cm
(2)

(c) Find an estimate for the number of branches with lengths of more than 44 cm.

.....
(1)

(Total 5 marks)

Q11



12. Solve the simultaneous equations

$$2x - 5y = 13$$

$$6x + 3y = 3$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(Total 3 marks)

Q12

13. (a) Factorise $x^2 - 8x + 15$

$$\dots\dots\dots$$

(2)

(b) Factorise $x^2 - 49$

$$\dots\dots\dots$$

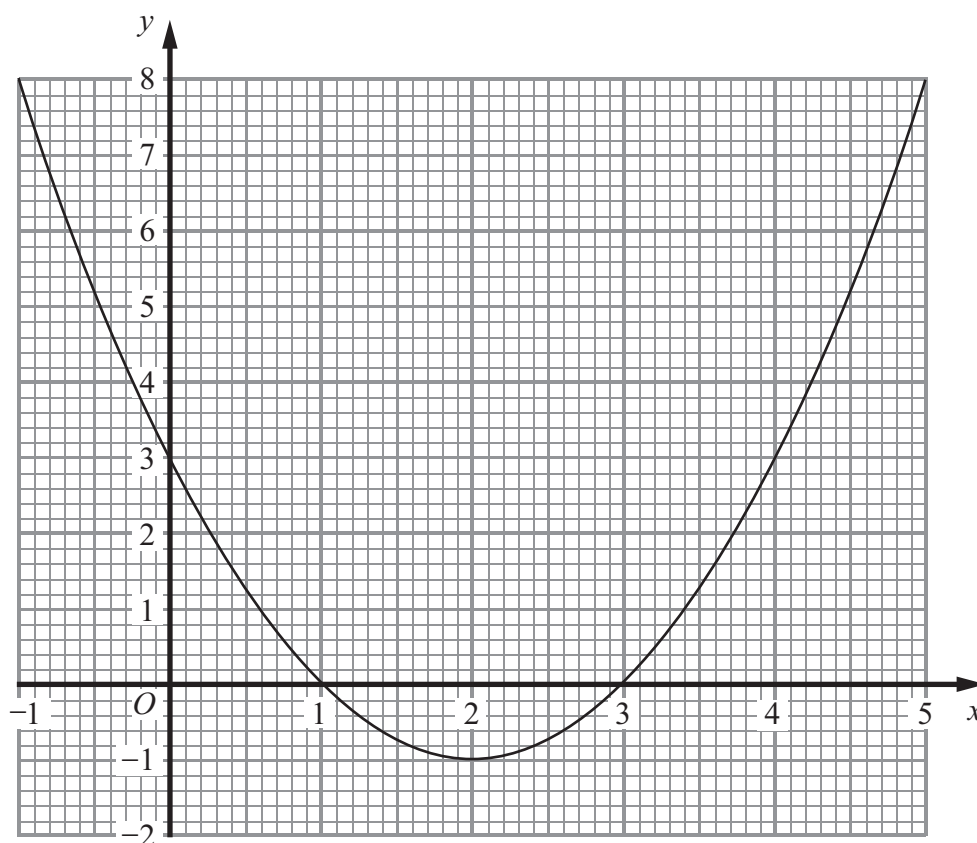
(1)

(Total 3 marks)

Q13



14. The diagram shows the graph of $y = x^2 - 4x + 3$ for $-1 \leq x \leq 5$



(a) Use the graph to solve the equation $x^2 - 4x + 3 = 2$

.....
(2)

(b) By drawing a suitable straight line on the diagram, solve the equation $x^2 - 4x + 3 = x + 1$

.....
(3)

(Total 5 marks)

Q14



15. A solid is made from a cylinder and a hemisphere.
 The cylinder has radius 1.5 cm and height 4 cm.
 The hemisphere has radius 1.5 cm.

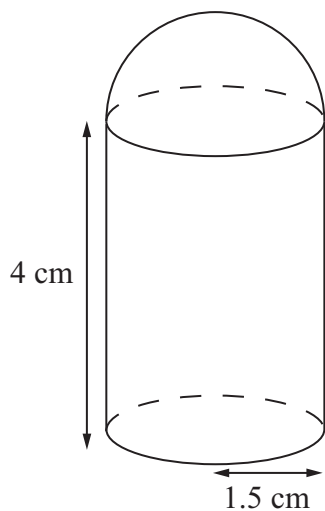


Diagram **NOT** accurately drawn

Work out the total volume of the solid.
 Give your answer correct to 3 significant figures.

..... cm³

(Total 5 marks)

Q15



16. A curve has equation $y = x^3 + 3x^2 - 24x$

(a) Find $\frac{dy}{dx}$

.....
(3)

(b) Find the coordinates of the turning points of the curve.

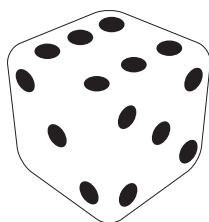
.....
(5)

(Total 8 marks)

Q16



17. Here is a fair dice.



It has six faces numbered 1, 2, 3, 4, 5 and 6
The dice shows a score of 6

Hari throws the dice three times.

(a) Work out the probability that the sum of the scores is 3

.....
(2)

(b) Work out the probability that the dice shows a score of 1 on exactly one of the three throws.

.....
(3)

(Total 5 marks)

Q17



18. Make x the subject of $P = \frac{100(y-x)}{x}$

$x = \dots\dots\dots$

(Total 4 marks)

Q18



19.

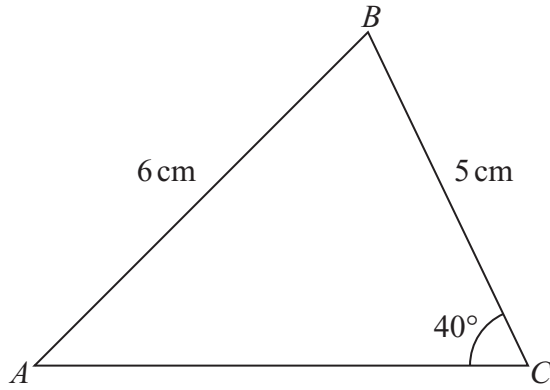


Diagram **NOT** accurately drawn

Calculate the area of triangle *ABC*.
Give your answer correct to 3 significant figures.

..... cm²

(Total 6 marks)

Q19



20. (a) Write $\frac{1}{16}$ as a power of 2

.....
(2)

(b) Write 2 as a power of 8

.....
(2)

(c) Rationalise the denominator of $\frac{a + \sqrt{a}}{\sqrt{a}}$ where a is a prime number.

Simplify your answer as much as possible.

.....
(2)

(Total 6 marks)

Q20



21. (a) $f(x) = 2x + 1$

Express the inverse function f^{-1} in the form $f^{-1}(x) = \dots$

$f^{-1}(x) = \dots\dots\dots$
(2)

(b) $g(x) = 2 + x$
 $h(x) = x^2$

Solve the equation $hg(x) = h(x)$.

$x = \dots\dots\dots$
(3)

(Total 5 marks)

Q21

TOTAL FOR PAPER: 100 MARKS

END



November 2010 IGCSE Mathematics (4400) Mark Scheme - Paper 3H

The following questions require a seen valid method before the accuracy mark can be awarded: Q6, Q12, Q14b, Q16b, Q21b

For all other questions a correct answer implies a correct method

Question	Working	Answer	Mark		Notes
1.	$1 \times 4 + 2 \times 9 + 3 \times 8 + 5 \times 4 (=66)$ "66" $\div (4+9+8+4)$	2.64	3		M1 M1 A1 Any 3 correct products with the intention to add dep allow 3 with working 3 without working = M0M0A0 2.6 without working =M2 A0
					Total 3 marks

2.	ai		$4c - 12$	1	B1	
	aii		$d^3 + 4d$	2	B2	B1 each term
	b		$x(3 - 2x)$	2	B2	B1 for x(expression with one correct term)
						Total 5 marks

3.			BAC= 70 isosceles triangle ABC = 40 or PAC = 110 or PA(CA ext)= 70 x = 40	4	B1 B1 B1 B1	(can be marked on diagram) dep on prev B1. Must not contain incorrect statements. look for values on diagram dep on reason. Either alternate (with ABC) or angles between parallel lines (=180) or alternate (with 110) or corresponding (with 70) answer only = B1B0B1B0
						Total 4 marks

Question		Working	Answer	Mark		Notes
4.	a	$\pi \times 8.9^2$	248.8..... m ² or sq metres oe	3	M1 A1 B1	or $3.14... \times 8.9^2$ or $\frac{22}{7} \times 8.9^2$ awrt 248.7 to 248.9 ind
	b		250	1	B1ft	ft (a) if given to ≥ 3 sig figs (ignore units). Do not award marks from part a).
						Total 4 marks

5.	a	$\frac{6}{7} \times \frac{1}{4}$ $\frac{6}{28}$ or $\frac{3}{7} \times \frac{1}{2}$		2	M1 A1	or $\frac{6}{7} \div \frac{28}{7}$ answer $\equiv \frac{3}{14}$ (but not $= \frac{3}{14}$) or cancelling
	b	$\frac{51}{15}$ and $\frac{25}{15}$ any multiple of 15 valid $\frac{51}{15} - \frac{25}{15}$ correct fractions subtracted $\frac{26}{15}$		3	M1 M1 A1	$\frac{6}{15}$ and $\frac{10}{15}$ dep $\frac{-4}{15}$ or $\frac{6}{15} - \frac{10}{15}$ (dep on M2) $2 - \frac{4}{15}$ oe (but not $1\frac{11}{15}$)
						Total 5 marks

6.	a	$7x - 2x = -4 - 3$ $5x = -7$	-1.4	3	M1 M1 A1	correct gathering of terms Accept -7/5 (not $-7 \div 5$) No working: M0A0
	b	$16 - 5y = 2 \times 3$ $-5y = -10$ oe	2	3	M1 M1 A1	$16/3 - 2 = 5y/3$ $10/3 = 5y/3$ Accept -10/-5 (not $-10 \div -5$) No working: M0A0
						Total 8 marks

Question		Working	Answer	Mark		Notes
7.	ai		Mr Smith's hats	1	B1	
	a ii		0	1	B1	none or zero, \emptyset or $\{\}$, "empty set" etc; allow "There aren't any"
	bi		B	1	B1	
	bii		C	1	B1	
						Total 4 marks

8.	a	$x/9 = \tan 36^\circ$ or $\tan 36^\circ$ or 0.726.. seen $9 \times \tan 36^\circ$	6.54	3	M1 M1 A1	$x^2 + 9^2 = (9/\cos 36^\circ)^2$ oe (e.g. $x^2 + 9^2 = 11.12^2$) $\sqrt{(9/\cos 36^\circ)^2 - 9^2}$ awrt 6.54 use isw if better seen in body
	b	$10^2 = 4.5^2 + y^2$ oe $\sqrt{10^2 - 4.5^2}$ or $\sqrt{79.75}$	8.93	3	M1 M1 A1	or $10^2 - 4.5^2$ M2 for $4.5 \times \tan(\cos^{-1} 4.5/10)$ awrt 8.93 use isw if better seen in body
						Total 6 marks

9.	a		1, 5, 6	2	B2	B1 three positive whole nos with med 5 or mean 4
	b		5, 5, 7, x	2	B2	$x > 7$ B1 four nos with single mode 5 or med 6
						Total 4 marks

10.	a	$14 \times 15 \div 21$ oe	10	2	M1 A1	Correct use of s.f. 2/3 or 3/2 or 5/7 or 7/5
	b	$18 \times 21 \div 15$ oe	25.2	2	M1 A1	Correct use of s.f. 5/7, 7/5, 6/5, 5/6, 18/"10", "10"/18, 14/"10", "10"/14 cao
						Total 4 marks

Question		Marking	Answer	Mark		Notes
11.	a	Read at cf = 20 or 20.5	15 → 15.5	2	M1 A1	answer only = M1 A1
	b	Read at cf = 10 & 30	28 → 30	2	M1 A1	or 34 → 35, and 6 → 7 seen answer only = M1A1
	c		4	1	B1	
						Total 5 marks

12.		2 lines where coefficients of x or y are equal	$x = 1.5, y = -2$	3	M1 A1 A1	e.g $6x - 15y = 39$, or $6x - 15y = 39$ $6x + 3y = 3$ $30x + 15y = 15$ and then add/subtract (condone 1 arithmetic error) leads to $18y = -36$ or $36x = 54$ or make x or y subject and substitute correctly
						Total 3 marks

13.	a		$(x - 5)(x - 3)$	2	B2	B1 for one bracket correct or $(x+5)(x+3)$
	b		$(x - 7)(x + 7)$	1	B1	
						Total 3 marks

Question		Working	Answer	Mark		Notes
14.	a		0.2 to 0.3, 3.7 to 3.8	2	B2	inclusive; B1 for each
	b	Draw $y = x + 1$	0.4 to 0.5 & 4.5 to 4.6	3	M1 A1 A1	for $0 \leq x \leq 5$ inclusive dep on M1 inclusive dep on M1
						Total 5 marks

15.		$\pi \times 1.5^2 \times 4$ (= 28.2...) $\frac{4}{3} \times \pi \times 1.5^3$ (=14.1...) "14.1" $\times 0.5$ (=7.06...) cyl vol + hemisphere vol	35.3	5	M1 M1 M1 M1 A1	Volume of cylinder Volume of sphere $0.5 \times$ their sphere vol dep M1M1 (allow cyl volume + sphere volume if hemisphere not calculated) 35.3 to 35.4 (not 11.25π)
						Total 5 marks

16.	a		$3x^2 + 6x - 24$	3	B3	B1 each term
	b	$"3x^2 + 6x - 24" = 0$ $(3x + 12)(x - 2)$ oe $x = -4$ or 2 sub both x values	$(-4, 80), (2, -28)$	5	M1ft M1ft A1 M1ft A1	Must be a 3 term quadratic or " $\frac{-6 \pm \sqrt{6^2 - 4 \times 3 \times -24}}{2 \times 3}$ " condone 1 sign error cao cao (needs first 2 M's)
						Total 8 marks

Question		Working	Answer	Mark		Notes
17	a	$(\frac{1}{6})^3$	$\frac{1}{216}$ oe	2	M1 A1	(or 0.00463 or better)
	b	$\frac{1}{6} \times (\frac{5}{6})^2$ $3 \times \frac{1}{6} \times (\frac{5}{6})^2$	$\frac{75}{216}$ oe	3	M1 M1 A1	1 correct combination 1, -1, -1 oe 25/72 (or 0.347 or better)
						Total 5 marks

18.		$xP = 100(y - x)$ or $P = \frac{100y - 100x}{x}$ $xP = 100y - 100x$ $x(P + 100) = 100y$	$\frac{100y}{P+100}$ oe	4	M1 M1 M1 A1	$P = 100y/x - 100x/x$ $P + 100 = 100y/x$ $x(P+100) = 100y$
						Total 4 marks

19.		$\sin A / 5 = \sin 40 / 6$ oe $\sin A = \frac{5 \sin 40}{6}$ or 0.535... $A = 32.3$ to 32.4 $(B=) 180 - 40 - "32.4"$ (= 107.6 to 107.7) $0.5 \times 5 \times 6 \times \sin "107.6"$ (2 sides & a trapped angle)	14.3	6	M1 M1 A1 M1 ft M1ft A1	dep on M2. or Height = $5 \sin 40$ (=3.21) and base = $6 \cos "32.4" + 5 \cos 40$ (= 8.9) $0.5 \times 3.21 \times "8.9"$ (must be a correct calculation for height and base) awrt 14.3
						Total 6 marks

Question		Working	Answer	Mark		Notes
20.	a	2^4 or -4 seen	2^{-4}	2	M1 A1	
	b	2^3 or $1/3$ seen	$8^{1/3}$	2	M1 A1	accept $8^{0.3\text{rec}}$
	c	$\frac{(a + \sqrt{a})}{\sqrt{a}} \times \frac{\sqrt{a}}{\sqrt{a}}$	$\sqrt{a} + 1$	2	M1 A1	multiply numerator & denominator by \sqrt{a} or $(a/\sqrt{a} + a)/a$
						Total 6 marks

21.	a	$y = 2x + 1$ $x = \frac{y-1}{2}$	$f^{-1}(x) = \frac{(x-1)}{2}$ oe	2	M1 A1	$x = 2y + 1$ $y = \frac{x-1}{2}$ answer only = M1A1
	b	$(2 + x)^2 = x^2$ $4 + 4x + x^2 = x^2$	$x = -1$	3	M1 M1 A1	M1 for $(2 + x)^2$ or $2 + x = -x$ (from rooting both sides) Answer only = M0A0A0
						Total 5 marks

TOTAL FOR PAPER : 100 MARKS					
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Centre No.						Paper Reference						Surname	Initial(s)	
Candidate No.						4	4	0	0	/	4	H	Signature	

Paper Reference(s)

4400/4H

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Tuesday 16 November 2010 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

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Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

Without sufficient working, correct answers may be awarded no marks.

You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.

If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 22 questions in this question paper. The total mark for this paper is 100.

There are 20 pages in this question paper. Any blank pages are indicated.

You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. (a) Use your calculator to work out the value of

$$\frac{3.7 \times 2.9}{5.3} + 1.4$$

Give your answer as a decimal.

Write down all the figures on your calculator display.

.....
(2)

- (b) Give your answer to part (a) correct to 2 decimal places.

.....
(1)

(Total 3 marks)

Q1

2. Anya flew from Kuala Lumpur to Singapore.
The average speed for the journey was 248 km/h.
The journey time was 1 hour 15 minutes.

Work out the distance from Kuala Lumpur to Singapore.

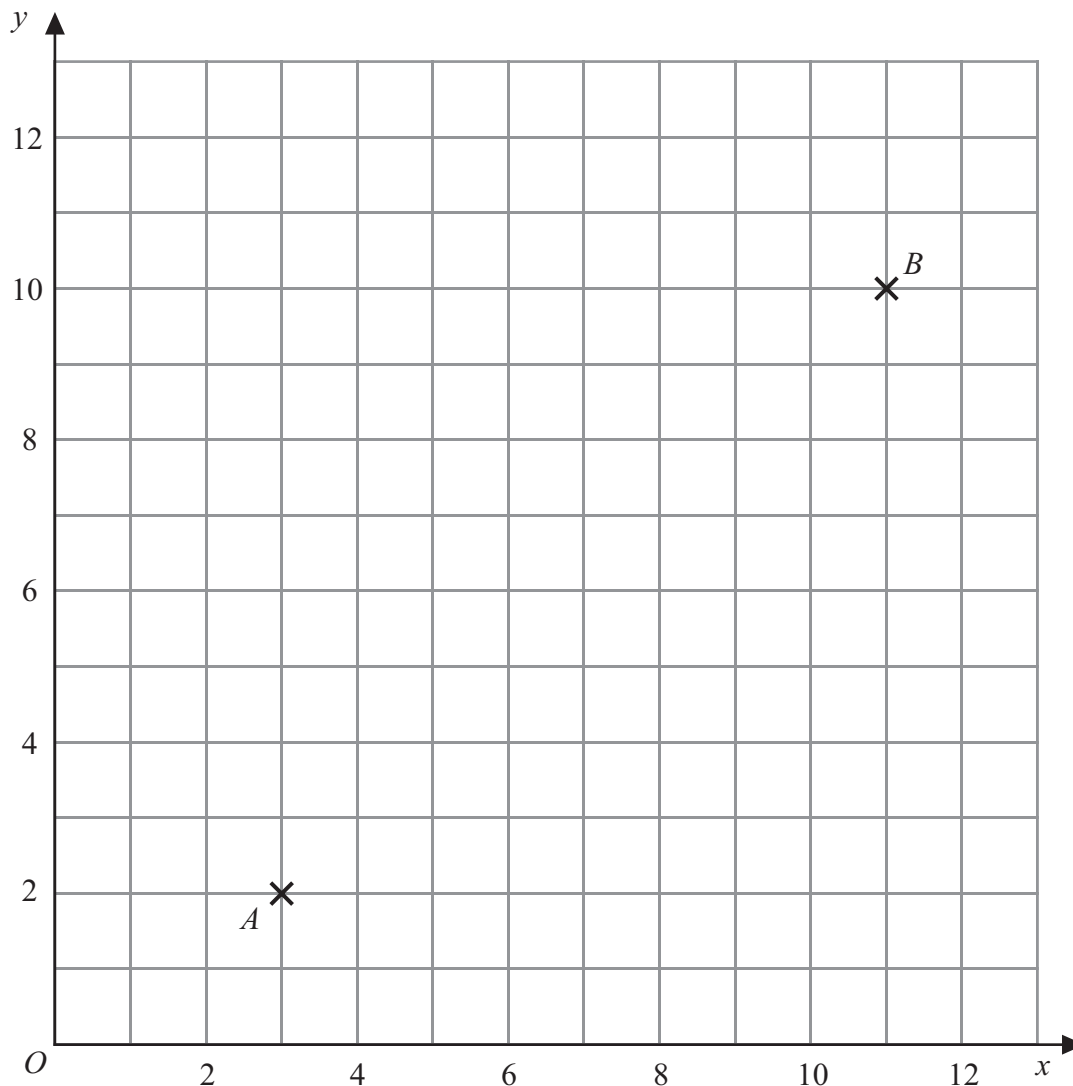
..... km

(Total 3 marks)

Q2



3.



The point A has coordinates $(3, 2)$ and the point B has coordinates $(11, 10)$.

(a) Find the coordinates of the midpoint of AB .

(..... ,)
(2)

AB is a diameter of a circle.
 CD is another diameter of this circle.
 CD is perpendicular to AB .

(b) Find the coordinates of C and the coordinates of D .

C (..... ,)
 D (..... ,)
(2)

(Total 4 marks)

Q3



4. A bag contains some shapes.
Each shape is a circle or a triangle or a square.
Lewis takes at random a shape from the bag.
The probability that he will take a circle is 0.3
The probability that he will take a triangle is 0.1

(a) Work out the probability that he will take a square.

.....
(2)

(b) Work out the probability that he will take a shape with straight sides.

.....
(2)

Grace takes at random one of the shapes from the bag and then replaces the shape.
She does this 160 times.

(c) Work out an estimate for the number of times she will take a circle.

.....
(2)

(Total 6 marks)

Q4



5.

1 euro = £0.72
£1 = 221 Sri Lankan rupees

Change 50 euros to Sri Lankan rupees.

..... Sri Lankan rupees

(Total 2 marks)

Q5

6. $V = \frac{2}{3}hy^2$

(a) $h = 2.6$ $y = 1.5$
Work out the value of V .

$V =$
(2)

(b) $V = 35$ $y = 2.5$
Work out the value of h .

$h =$
(2)

(c) Make y the subject of the formula $V = \frac{2}{3}hy^2$

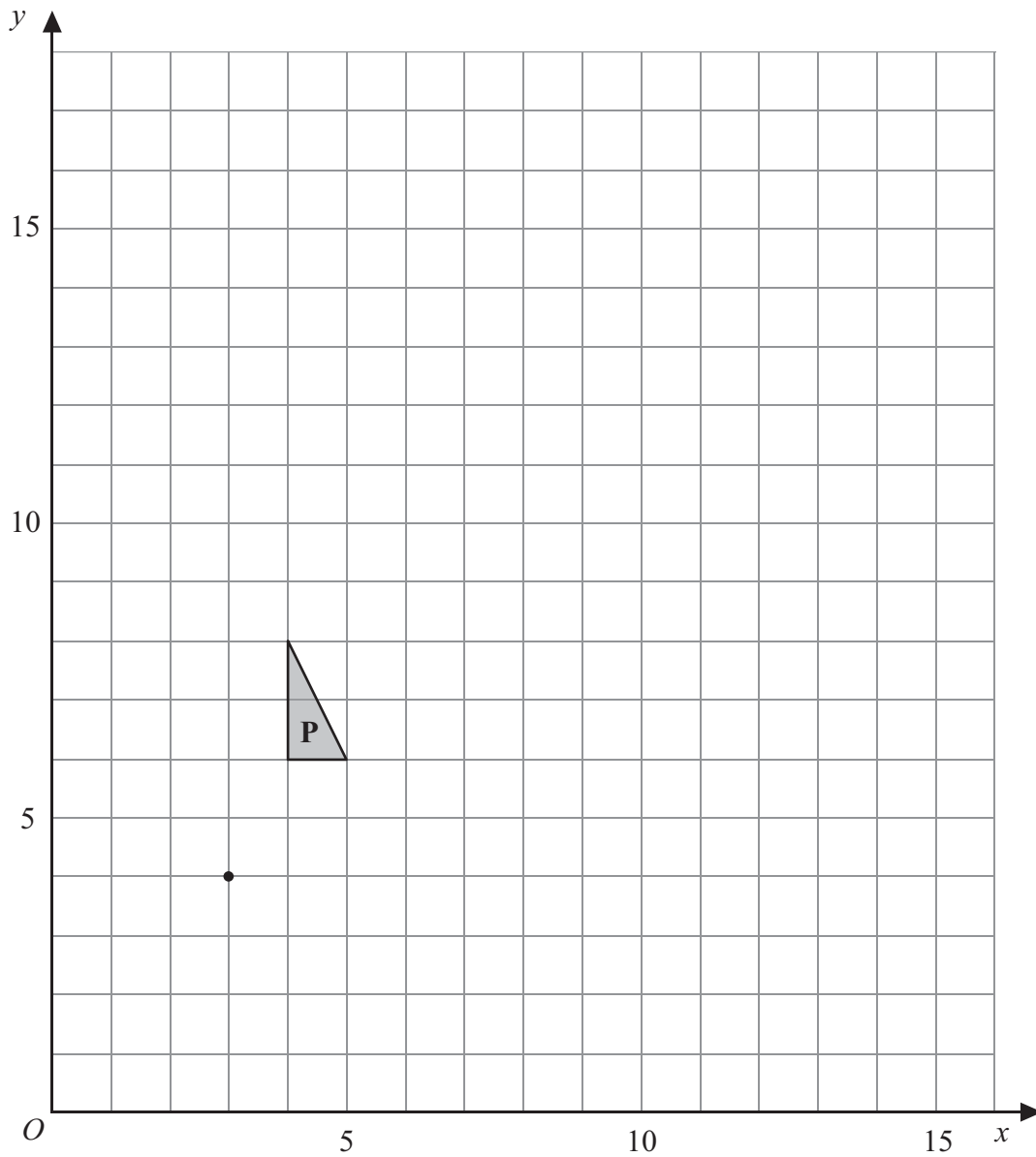
$y =$
(2)

(Total 6 marks)

Q6



7.



(a) On the grid, enlarge triangle **P** with scale factor 3 and centre (3, 4).
Label the new triangle **Q**. (3)

(b) On the grid, translate triangle **Q** by the vector $\begin{pmatrix} 4 \\ -8 \end{pmatrix}$
Label the new triangle **R**. (2)

(c) Describe fully the single transformation which maps triangle **P** onto triangle **R**.
.....
..... (2)

(Total 7 marks)

Q7



8. The scale of a map is 1 : 50 000
 On the map, the distance between two schools is 19.6 cm.

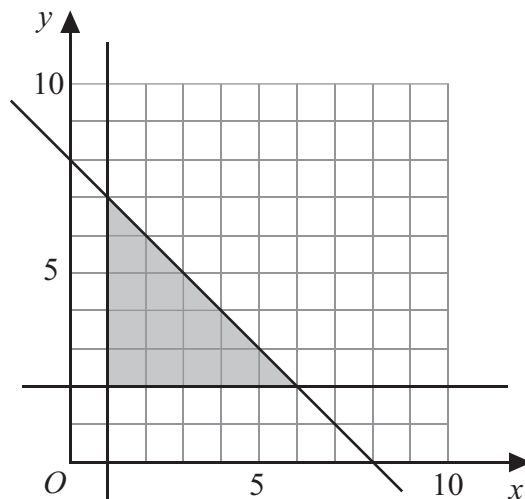
Work out the real distance between the schools.
 Give your answer in kilometres.

..... km

(Total 3 marks)

Q8

- 9.



Write down the 3 inequalities that define the shaded region.

.....

.....

.....

(Total 3 marks)

Q9



10.

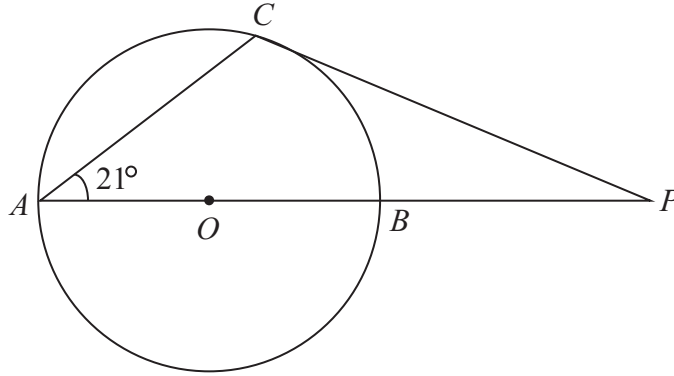


Diagram **NOT** accurately drawn

A , B and C are points on a circle, centre O .
 AB is a diameter of the circle.
 PC is a tangent to the circle.
 ABP is a straight line.
 Angle $BAC = 21^\circ$.

Work out the size of angle APC .

.....^o **Q10**
 (Total 4 marks)



11. Tom buys a painting for \$1350
He sells it for \$1269

(a) Work out his percentage loss.

..... %
(3)

Kelly bought a boat.
Later, she sold the boat for \$9519
She made a profit of 14%.

(b) Work out the original price of the boat.

\$
(3)

(Total 6 marks)

Q11



12. The line **L** cuts the y -axis at $(0, 5)$.
L also passes through the point $(2, 1)$.

(a) Find the equation of the line **L**.

.....
(3)

(b) Find the equation of the line which is parallel to **L** and which passes through the point $(3, 0)$.

.....
(2)

(Total 5 marks)

Q12

13. The size of each interior angle of a regular polygon is 11 times the size of each exterior angle.

Work out the number of sides the polygon has.

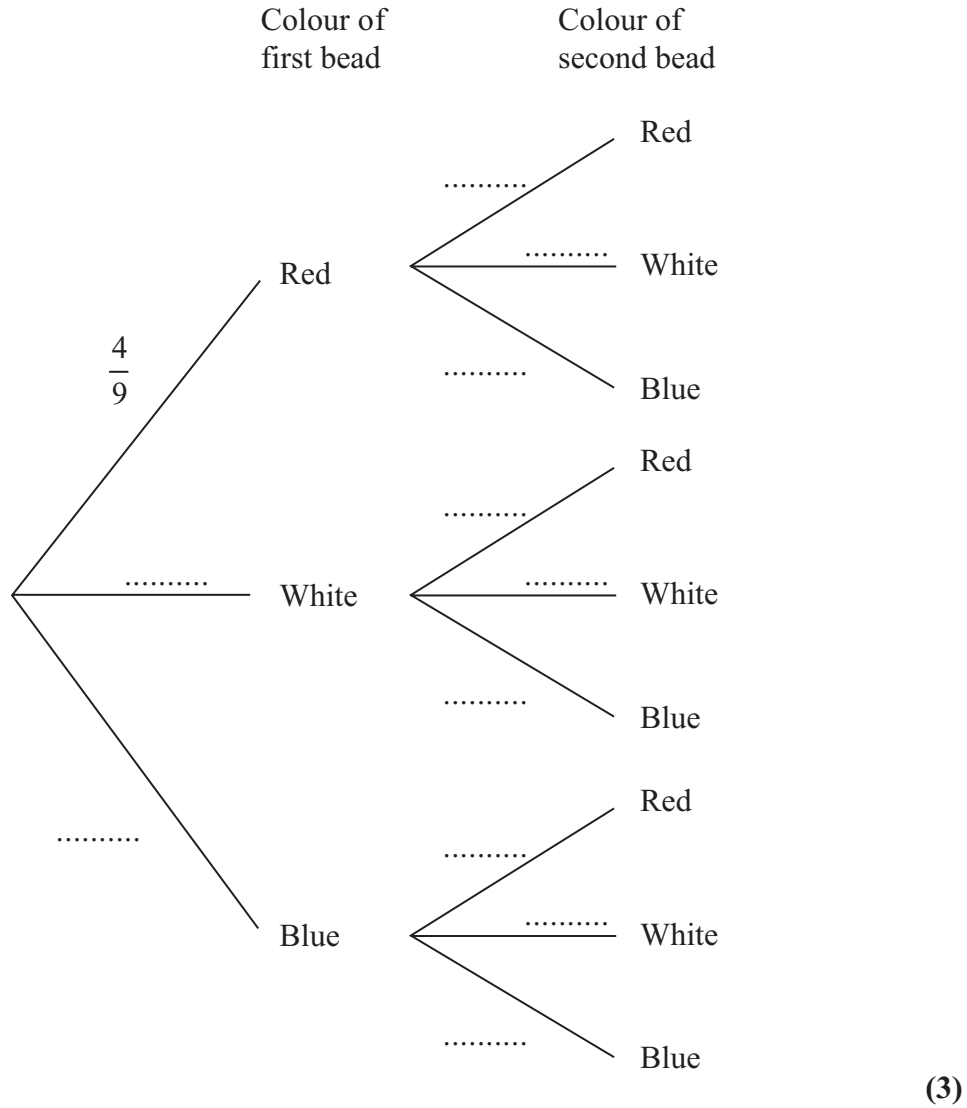
.....
(Total 4 marks)

Q13



14. There are 9 beads in a bag.
 4 of the beads are red.
 3 of the beads are white.
 2 of the beads are blue.
 Sanjay takes at random a bead from the bag and does not replace it.
 He then takes at random a second bead from the bag.

(a) Complete the probability tree diagram.



(b) Calculate the probability that one of Sanjay's beads is red and his other bead is blue.

.....
(3)
(Total 6 marks)

Q14



15. (a) Work out $(9 \times 10^8) \times (4 \times 10^6)$
 Give your answer in standard form.

.....
(1)

(b) $x = 7 \times 10^m$ and $y = 5 \times 10^n$, where m and n are integers.

(i) It is given that $xy = 3.5 \times 10^{12}$
 Show that $m + n = 11$

(ii) It is also given that $\frac{x}{y} = 1.4 \times 10^{27}$
 Find the value of m and the value of n .

$m =$

$n =$

(5) **Q15**

(Total 6 marks)



16. P is inversely proportional to V .
 $P = 18$ when $V = 24$

(a) Express P in terms of V .

.....
(3)

(b) Find the positive value of V when $P = 3V$

$V =$
(2)

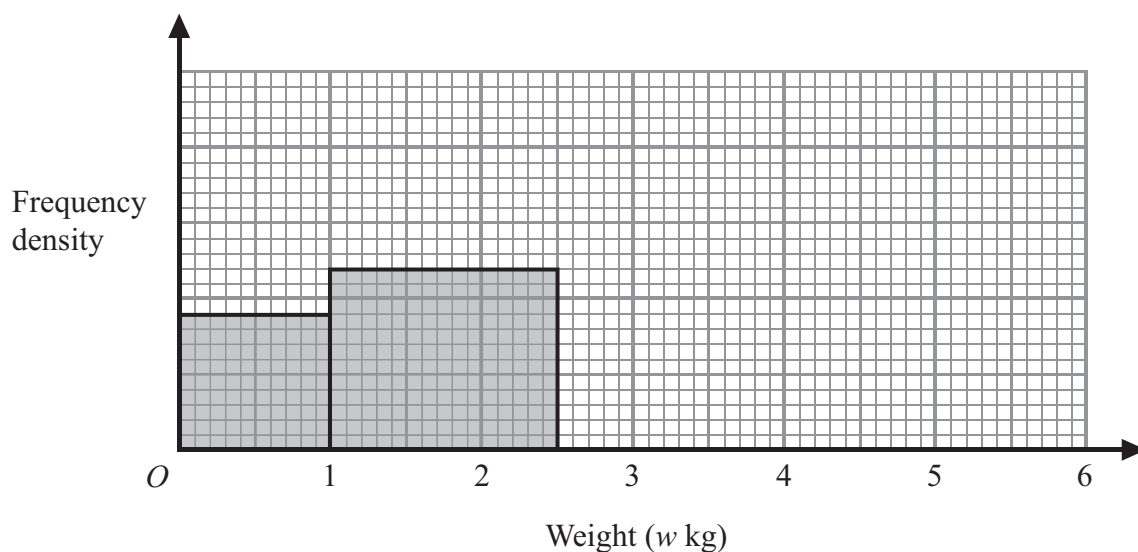
(Total 5 marks)

Q16



17. The incomplete table and histogram show information about the weights of some books.

Weight (w kg)	Frequency
$0 < w \leq 1$	
$1 < w \leq 2.5$	36
$2.5 < w \leq 4$	57
$4 < w \leq 6$	24



(a) Use the information in the histogram to complete the table. (1)

(b) Use the information in the table to complete the histogram. (2)

(Total 3 marks)

Q17



18. Solve $3x^2 + 8x + 2 = 0$
Give your solutions correct to 3 significant figures.

.....

(Total 3 marks)

Q18



19.

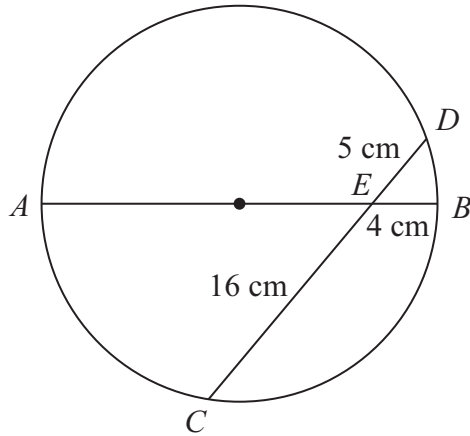


Diagram **NOT** accurately drawn

AB is a diameter of a circle.
CD is a chord of the circle.
AB and *CD* intersect at *E*.
 $BE = 4$ cm, $CE = 16$ cm and $DE = 5$ cm.

(a) Calculate the length of *AE*.

..... cm
(2)

(b) (i) Find the radius of the circle.

..... cm

(ii) Calculate the size of angle *AED*.
 Give your answer correct to 1 decimal place.

.....
(5)

(Total 7 marks)

Q19



20. Solve the simultaneous equations

$$y = x^2$$

$$y = 7x - 10$$

.....
Q20

(Total 5 marks)



21.

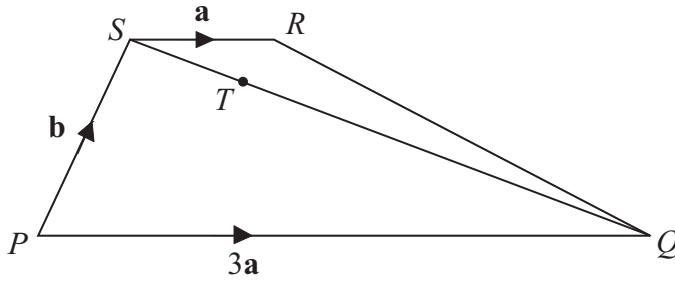


Diagram NOT accurately drawn

$PQRS$ is a trapezium with PQ parallel to SR .

$$\overrightarrow{SR} = \mathbf{a} \quad \overrightarrow{PQ} = 3\mathbf{a} \quad \overrightarrow{PS} = \mathbf{b}$$

T is the point on SQ such that $ST = \frac{1}{4}SQ$.

(a) Find, in terms of \mathbf{a} and \mathbf{b} ,

(i) \overrightarrow{PR}

.....

(ii) \overrightarrow{SQ}

.....

(iii) \overrightarrow{PT}

.....

(3)

(b) $\overrightarrow{PT} = k \overrightarrow{PR}$ where k is a fraction.

(i) What does this result tell you about the points P , T and R ?

.....

(ii) Find the value of k .

$k =$

(2)

(Total 5 marks)

Q21



22. Simplify fully $1 + \frac{x^2 + x - 6}{(x + 4)(x - 2)}$

.....
Q22

(Total 4 marks)

TOTAL FOR PAPER: 100 MARKS

END



November 2010 IGCSE Mathematics (4400) Mark Scheme - Paper 4H

Apart from Questions 18, 20 and 21(b)(ii) (where the mark scheme states otherwise), the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark		Notes
1. a	$\frac{10.73}{5.3} + 1.4 = 2.0245\dots + 1.4$		2	M1	for 10.73 or 2.0245... or 1.6014...
		3.424528302		A1	for at least first 5 figures
b		3.42	1	B1	ft from (a) if non-trivial
					Total 3 marks

2.	248 × 1.25 oe		3	M2	M1 for 248 × 1.15 or 285.2 or 248 × 75 or 18 600
		310		A1	cao
					Total 3 marks

3. a		(7, 6)	2	B2	B1 for 7 B1 for 6
b		C (3, 10) D (11, 2) or C (11, 2) D (3, 10)	2	B2	B1 for (3, 10) B1 for (11,2)
					Total 4 marks

Question	Working	Answer	Mark		Notes
4 a	$1 - (0.3 + 0.1)$		2	M1	
		0.6		A1	cao
b	$0.1 + \text{"0.6"} \text{ or } 1 - 0.3$		2	M1	do not award if ans to (a) > 1
		0.7		A1	ft from (a) if ans to (b) < 1
c	0.3×160		2	M1	for 0.3×160 or 0.3×200 or $\frac{48}{60}$
		48		A1	cao
					Total 6 marks

5.	$50 \times 0.72 \times 221$		2	M1	for $\times 0.72$ or $\times 221$
		7956		A1	cao
					Total 2 marks

6. a	$\frac{2}{3} \times 2.6 \times 1.5^2$		2	M1	for correct substitution
		3.9		A1	cao
b	$35 = \frac{2}{3} \times h \times 2.5^2$ or $(h =) \frac{35}{\frac{2}{3} \times 2.5^2}$ oe		2	M1	for correct substitution or correct rearrangement
		8.4		A1	cao
c	$y^2 = \frac{3V}{2h}$		2	M1	for $y^2 = \frac{3V}{2h}$ oe
		$\sqrt{\frac{3V}{2h}}$		A1	for $\sqrt{\frac{3V}{2h}}$ or $\pm \sqrt{\frac{3V}{2h}}$ oe
					Total 6 marks

Question	Working	Answer	Mark		Notes
7. a		Q correct Vertices (6, 10) (9, 10) (6, 16)	3	B3	B2 for translation of correct shape or 2 correct vertices B1 for right-angled triangle with base 3 or height 6 in the same orientation as P
b		R correct Vertices (10, 2) (13, 2) (10, 8)	2	B2	for R correct or ft their Q B1 for translation of 4 to the right or 8 down ft their Q
c	Enlargement with scale factor 3 and centre (1, 8)		2	B2	B1 for Enlargement 3 B1 for (1, 8)
					Award no marks if answer is not a single transfn
					Total 7 marks

8.	$\frac{19.6 \times 50000}{100 \times 1000}$		3	M1	for 19.6×50000 or 980 000 or number with digits 98 or $\frac{50000}{100 \times 1000}$ or $\frac{1}{2}$ km
				M1	for completing calculation "980000" $\frac{980000}{100 \times 1000}$ or $19.6 \times \frac{1}{2}$
		9.8		A1	cao
					Total 3 marks

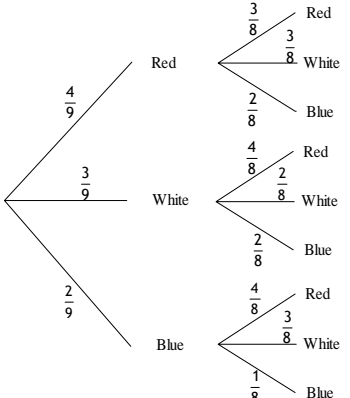
Question	Working	Answer	Mark		Notes
9.		$x \geq 1$	3	B1	for $x \geq 1$ or $x > 1$ oe
		$y \geq 2$		B1	for $y \geq 2$ or $y > 2$ oe
		$x + y \leq 8$ oe		B1	for $x + y \leq 8$ or $x + y < 8$ oe
					SC B1 if all inequalities reversed
					Total 3 marks

10.		$\angle ACO = 21^\circ$ or $\angle COB = 42^\circ$ or $\angle ACB = 90^\circ$		4	B1	Angles may be stated or marked on diagram
		$\angle OCP = 90^\circ$ or $\angle CBP = 111^\circ$ or $\angle BCP = 21^\circ$			B1	
		$180 - 21 - (90 + 21)$ or $180 - 42 - 90$ or $180 - 21 - 111$			M1	
			48		A1	Award 4 marks for an answer of 48, unless obtained by a clearly incorrect method.
						Total 4 marks

Question	Working	Answer	Mark		Notes
11. a	1350 - 1269 or 81		3	M1	
	$\frac{81}{1350} \times 100$ or $\frac{81}{1269} \times 100$			M1	for $\frac{81}{1350}$ or $\frac{81}{1269}$ or 0.06 or 0.0638... or M1 for $\frac{1350}{1269}$ or 0.94 or 94 M1 for 1-“0.94” ” or 100-“94” ” or M1 for $\frac{1350}{1269}$ or 1.06... or 106... M1 for “1.06...”-1 or “106”-100 0
					Award both method marks for an answer of 6.4, 6.38 or better.
		6		A1	cao Do not award this mark if a denominator of 1269 used.
b	$\frac{9519}{1.14}$ or $9519 \times \frac{100}{114}$ oe		3	M2	M2 for $\frac{9519}{1.14}$ or $9519 \times \frac{100}{114}$ oe M1 for $\frac{9519}{114}$, 83.5 seen, $114\% = 9519, \frac{9519}{x} = 1.14,$ $9519 = 1.14x$
		8350		A1	cao
					Total 6 marks

Question	Working	Answer	Mark		Notes
12. a	$-\frac{5-1}{2}$ oe		3	M1	for clear attempt to use <u>vert difference</u> <u>horiz difference</u>
	$m = -2$			A1	for $m = -2$
		$y = -2x + 5$ oe		B1	ft from their m SC If M0A0, award B1 for $y = mx + 5$
b	$y = "-2"x + c$		2	M1	$c \neq 5$
		$y = -2x + 6$ oe		A1	ft from (a)
					SC If M0, award B1 for $-2x + 6$ or $L = -2x + 6$ ft
Total 5 marks					

Question	Working	Answer	Mark		Notes
13.	$11x + x = 180$ or $12x = 180$ or for $\frac{360}{n}$ or $\frac{180(n-2)}{n}$		4	M1	May be implied by $\frac{180}{12}$ or 15
	(exterior angle =) 15 or $\frac{360}{n} \times 11 = \frac{180(n-2)}{n}$ oe or $180 - \frac{360}{n} = 11 \times \frac{360}{n}$			A1	
	$\frac{360}{15}$ or simplified correct equation "15" in which n appears only once eg $360 \times 11 = 180(n-2)$ or $360 \times 11 = 180n - 360$ or $12 \times \frac{360}{n} = 180$			M1	
		24		A1	cao Award 4 marks for an answer of 24 unless clearly obtained by an incorrect method.
					Total 4 marks

Question	Working	Answer	Mark		Notes
14. a			3	B3	B1 $\frac{3}{9}$ and $\frac{2}{9}$ correct on LH branches B2 All RH branches correct (B1 one RH branch correct ie 3 probabilities)
b	$\frac{4}{9} \times \frac{2}{8} + \frac{2}{9} \times \frac{4}{8}$ oe		3	M1	for $\frac{4}{9} \times \frac{2}{8}$ or $\frac{2}{9} \times \frac{4}{8}$ oe Award for correct use of probabilities (must be < 1)
				M1	for sum of both products from their tree diagram.
		$\frac{16}{72}$ or $\frac{2}{9}$ oe		A1	for $\frac{16}{72}$ or $\frac{2}{9}$ oe
Total 6 marks					

Question	Working	Answer	Mark		Notes
15. a		3.6×10^{15}	1	B1	cao
bi	Correct expression for xy stated or clearly implied with 7×5 evaluated eg $35 \times 10^{m+n}$ $3.5 \times 10^{(1)} \times 10^m \times 10^n$		5	M1	
	States or clearly implies that $xy = 3.5 \times 10^{m+n+1}$ oe or $3.5 \times 10^{(1)} \times 10^{m+n}$ oe or $m+n+1$ *			A1	SC If A1 not scored, award B1 for 35×10^{11} seen. *dep on $(3.5 \times) 10^{(1)} \times 10^m \times 10^n$ $= (3.5 \times) 10^{12}$
bii	$m - n = 27$ oe			B1	for $m - n = 27$ oe inc $m = n + 27$
	$2m = 38$ or $2n = -16$			M1	Adding or subtracting $m + n = 11$ and $m - n = 27$
		$m = 19$ $n = -8$		A1	for both values correct Award 3 marks for both values correct, unless clearly obtained by an incorrect method.
					Total 6 marks

Question	Working	Answer	Mark		Notes
16. a	$P = \frac{k}{V}$		3	M1	for $P = \frac{k}{V}$ but not for $P = \frac{1}{V}$ Also award for a correct equation in P , V and a constant or $P = \text{some numerical value} \times \frac{1}{V}$
	$18 = \frac{k}{24}$			M1	for $18 = \frac{k}{24}$ or for correct substitution into an equation which scores first method mark (may be implied by correct evaluation of the constant)
		$P = \frac{432}{V}$		A1	Award 3 marks if answer is $P = \frac{k}{V}$ but k is evaluated as 432 in <i>any</i> part
b	$3V^2 = 432$ or $3V \times V = 432$		2	M1	for $3V^2 = 432$ or $3V \times V = 432$ or $V^2 = 144$
		12		A1	Also accept ± 12
					Total 5 marks

17. a		18	1	B1	cao
b	(2.5-4) bar height 19 little squares		2	B1	Allow $\pm \frac{1}{2}$ sq
	(4-6) bar height 6 little squares			B1	Allow $\pm \frac{1}{2}$ sq
					Total 3 marks

Question	Working	Answer	Mark		Notes
18.	$\frac{-8 \pm \sqrt{8^2 - 4 \times 3 \times 2}}{2 \times 3}$ or for this expression with one or more of 8^2 , $4 \times 3 \times 2$ or 2×3 correctly evaluated		3	M1	for correct substitution
	obtains $\sqrt{40}$ or $\sqrt{64 - 24}$ or $2\sqrt{10}$ or 6.32...			M1	(independent)for correct simplification of discriminant
		-0.279, -2.39		A1	dep on <u>both</u> method marks for values rounding to -0.279 and -2.39 (-0.27924... , -2.38742...)
					Total 3 marks

Question	Working	Answer	Mark		Notes
19. a	$AE \times 4 = 16 \times 5$		2	M1	
		20		A1	cao
bi		12	5	B1	cao
bii	$(\cos x^\circ =) \frac{5^2 + 8^2 - 12^2}{2 \times 8 \times 5} \text{ or } \frac{5^2 + OE^2 - "12"{}^2}{2 \times OE \times 5}$ $(\cos \angle OEC =) \frac{16^2 + 8^2 - 12^2}{2 \times 16 \times 8} \text{ or } \frac{16^2 + OE^2 - "12"{}^2}{2 \times 16 \times OE}$ <p>or, using the midpoint of CD, $\cos \angle OEC = \frac{5.5}{8}$</p> <p>or $\frac{5.5}{OE}$</p> <p>or complete, correct method of finding $\sin \angle OEC$ or $\tan \angle OEC$</p>		M2	M1 for $12^2 = 5^2 + 8^2 - 2 \times 8 \times 5 \cos x^\circ$ or $"12"{}^2 = 5^2 + OE^2 - 2 \times OE \times 5 \cos x^\circ$ or $12^2 = 16^2 + 8^2 - 2 \times 16 \times 8 \times \cos \angle OEC$ or $"12"{}^2 = 16^2 + OE^2 - 2 \times 16 \times OE \times \cos \angle OEC$	
		133.4		A2	for answer rounding to 133.4 (133.4325...) A1 for $\frac{-55}{80}$ oe or -0.6875 If $\angle OEC$ is used, award A1 for $\frac{176}{256}$ oe or 0.6875 or value rounding to 46.6 seen. If midpoint of CD is used, award A1 for $\frac{5.5}{8}$ oe or 0.6875 or value rounding to 46.6 seen.
					Total 7 marks

Question	Working	Answer	Mark		Notes
20.	$x^2 = 7x - 10$ (may be implied by 2nd M1)		5	M1	$y = \left(\frac{y+10}{7}\right)^2$
	$x^2 - 7x + 10 (= 0)$ oe			M1	$y^2 - 29y + 100 (= 0)$ oe
	$(x - 5)(x - 2) (= 0)$ oe or $\frac{7 \pm \sqrt{9}}{2}$ or $\frac{7 \pm \sqrt{49 - 40}}{2}$ or $\frac{7 \pm 3}{2}$			M1	$(y - 4)(y - 25) (= 0)$ or $\frac{29 \pm \sqrt{441}}{2}$ or $\frac{29 \pm \sqrt{841 - 400}}{2}$ or $\frac{29 \pm 21}{2}$
		$x = 2, x = 5$		A1	$y = 4, y = 25$ dep on all method marks
		$x = 2, y = 4$ $x = 5, y = 25$		A1	dep on all method marks (may be implied by 2nd M1)
					Total 5 marks

21. ai		a + b	3	B1	
aii		3a - b		B1	
aiii	$\frac{3}{4}a + \frac{3}{4}b$ or $b + \frac{1}{4}(3a - b)$ or $3a - \frac{3}{4}(3a - b)$ oe		B1		
bi	collinear, in a (straight) line oe	2	B1		
bii		$\frac{3}{4}$		B1	dep on B1 in both (a)(i) and (a)(iii)
					Total 5 marks

Question	Working	Answer	Mark		Notes
22.	$1 + \frac{(x+3)(x-2)}{(x+4)(x-2)}$ or $\frac{(x+4)(x-2) + x^2 + x - 6}{(x+4)(x-2)}$ or $\frac{(x+4)(x-2) + x^2 + x - 6}{x^2 + 2x - 8}$		4	B1	for correct factorisation or for correct single fraction, even if unsimplified
	$1 + \frac{x+3}{x+4}$ or $\frac{2x^2 + 3x - 14}{(x+4)(x-2)}$ or $\frac{2x^2 + 3x - 14}{x^2 + 2x - 8}$ or $\frac{(x-2)[(x+4) + (x+3)]}{(x+4)(x-2)}$			B1	
	$\frac{x+4+x+3}{x+4}$ or $\frac{x+4}{x+4} + \frac{x+3}{x+4}$ or $\frac{(2x+7)(x-2)}{(x+4)(x-2)}$			B1	
		$\frac{2x+7}{x+4}$		B1	
					Total 4 marks

				TOTAL FOR PAPER: 100 MARKS
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Write your name here

Surname

Other names

Centre Number

Candidate Number

Edexcel IGCSE

Mathematics A

Paper 3H



Higher Tier

Monday 6 June 2011 – Afternoon

Time: 2 hours

Paper Reference

4MA0/3H

You must have:

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
Anything you write on the formulae page will gain **NO** credit.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ►

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6/6/6/6/4/3



P 3 8 5 7 9 A 0 1 2 4

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Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 (a) Use your calculator to work out the value of

$$\frac{24.1}{8.4 - 7.8} - 6.2^2$$

Write down all the figures on your calculator display.

.....
(2)

- (b) Give your answer to part (a) correct to 3 significant figures.

.....
(1)

(Total for Question 1 is 3 marks)



2

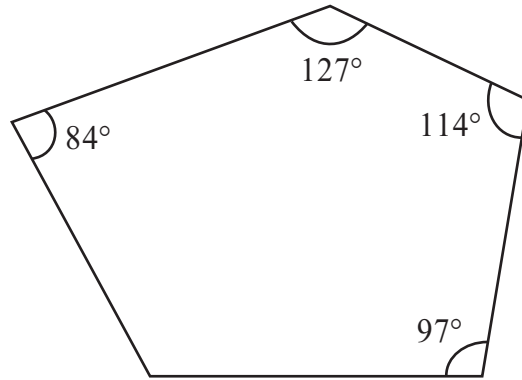


Diagram **NOT**
accurately drawn

Four of the angles of a pentagon are 97° , 114° , 127° and 84° .

Work out the size of the fifth angle.

.....^o

(Total for Question 2 is 4 marks)



3 (a) Factorise $w^2 - 9w$.

.....
(2)

(b) Solve $5x - 1 = 2x - 7$

$x =$
(3)

(c) Expand and simplify $(y - 7)(y + 3)$.

.....
(2)

(Total for Question 3 is 7 marks)



4 Every morning, Samath has one glass of fruit juice with his breakfast. He chooses at random orange juice or pineapple juice or mango juice. The probability that he chooses orange juice is 0.6
The probability that he chooses pineapple juice is 0.3

(a) Work out the probability that he chooses mango juice.

.....
(2)

(b) There are 30 days in April.

Work out an estimate for the number of days in April on which Samath chooses orange juice.

.....
(2)

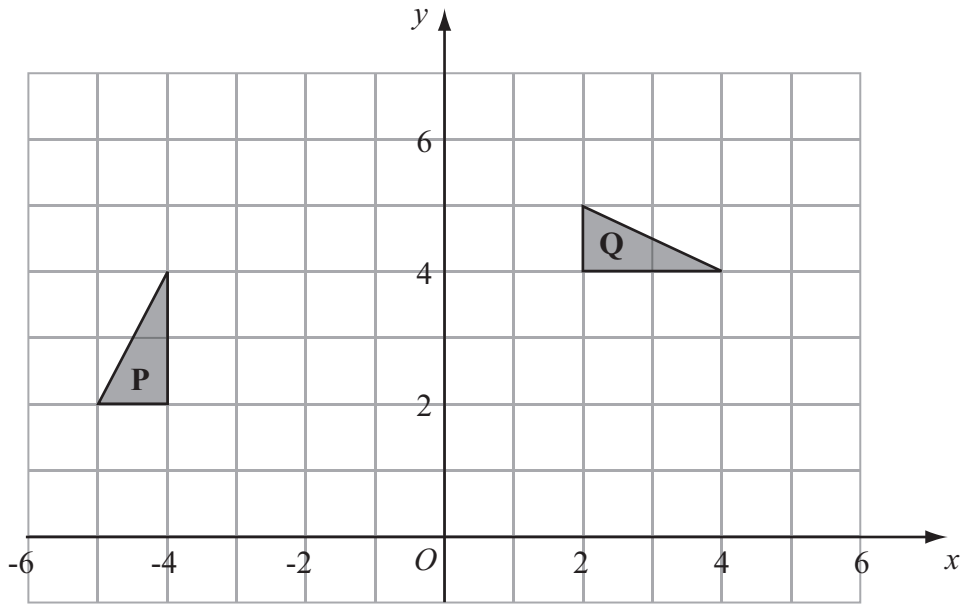
(Total for Question 4 is 4 marks)

5 Show that $\frac{5}{6} - \frac{3}{4} = \frac{1}{12}$

(Total for Question 5 is 2 marks)



6



(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

(3)

(b) Reflect triangle **Q** in the line $y = x$.

Label the new triangle **R**.

(2)

(Total for Question 6 is 5 marks)

7 The perimeter of a triangle is 90 cm.
The lengths of the sides of the triangle are in the ratios 3 : 5 : 7
Work out the length of the longest side of the triangle.

..... cm

(Total for Question 7 is 3 marks)



- 8 $\mathcal{E} = \{2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$
 $A = \{\text{odd numbers}\}$
 $P = \{\text{prime numbers}\}$

List the members of the set

(i) $A \cap P,$

.....

(ii) $A \cup P.$

.....

(Total for Question 8 is 2 marks)

- 9 Ella invested \$8000 for 3 years at 5% per annum **compound interest**.

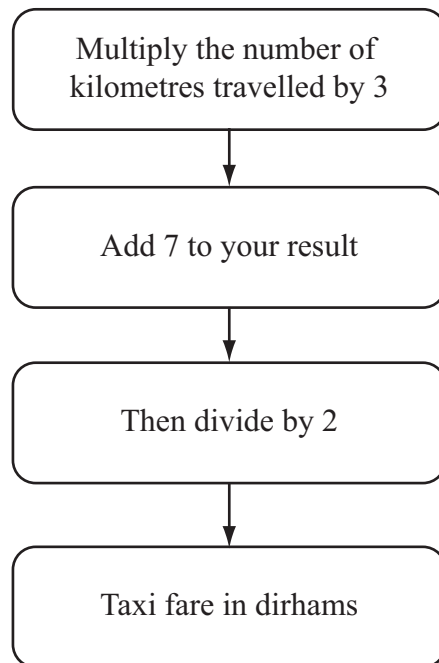
Calculate the value of her investment at the end of 3 years.

\$

(Total for Question 9 is 3 marks)



10 This rule can be used to work out the fare, in dirhams, for a taxi journey in Dubai.



Find a formula for the fare, C dirhams, for a taxi journey of d kilometres.

.....
(Total for Question 10 is 3 marks)



11 The table shows information about the weights of 80 parcels.

Weight (w kg)	Frequency
$0 < w \leq 2$	8
$2 < w \leq 4$	14
$4 < w \leq 6$	26
$6 < w \leq 8$	17
$8 < w \leq 10$	10
$10 < w \leq 12$	5

(a) Work out an estimate for the total weight of the 80 parcels.

..... kg
(3)

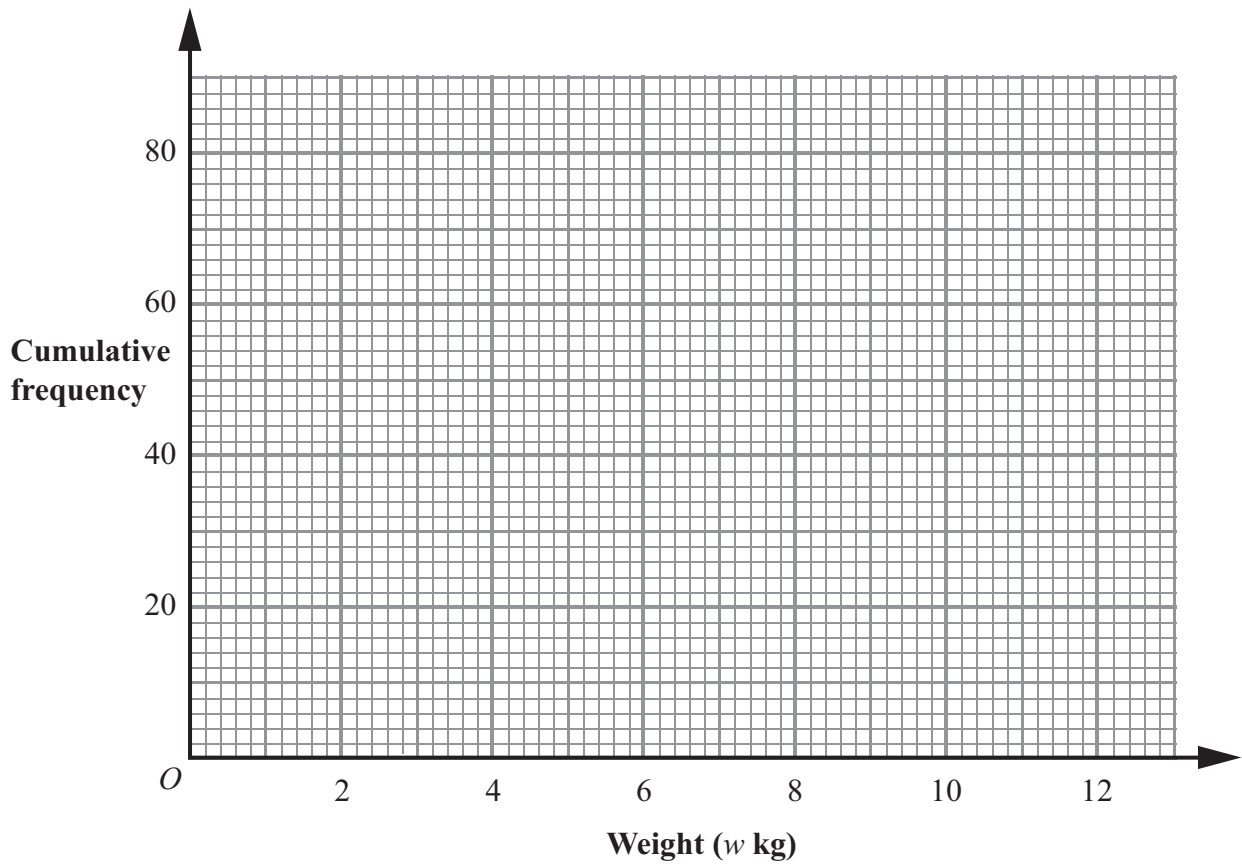
(b) Complete the cumulative frequency table.

Weight (w kg)	Cumulative frequency
$0 < w \leq 2$	
$0 < w \leq 4$	
$0 < w \leq 6$	
$0 < w \leq 8$	
$0 < w \leq 10$	
$0 < w \leq 12$	

(1)



(c) On the grid, draw a cumulative frequency graph for your table.



(2)

(d) Use the graph to find an estimate for the number of parcels which weighed less than 5.2 kg.

.....
(2)

(Total for Question 11 is 8 marks)



12

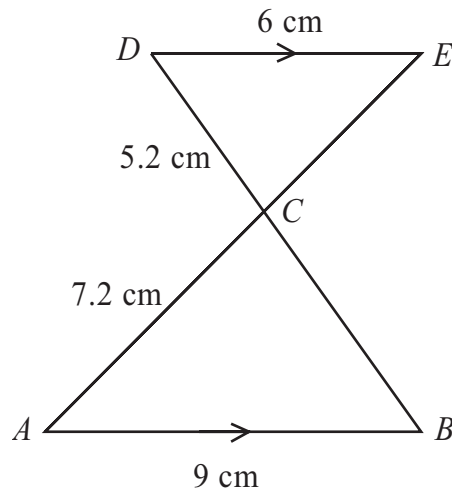


Diagram **NOT** accurately drawn

AB is parallel to DE .
 ACE and BCD are straight lines.
 $AB = 9$ cm.
 $AC = 7.2$ cm.
 $CD = 5.2$ cm.
 $DE = 6$ cm.

(a) Calculate the length of BC .

..... cm
(2)

(b) Calculate the length of CE .

..... cm
(2)

(Total for Question 12 is 4 marks)



13 Solve $\frac{2x-1}{4} + \frac{x-1}{5} = 2$

$x = \dots\dots\dots$

(Total for Question 13 is 4 marks)

14 $y = 1.8$ correct to 1 decimal place.

Calculate the lower bound for the value of $4y + 1$

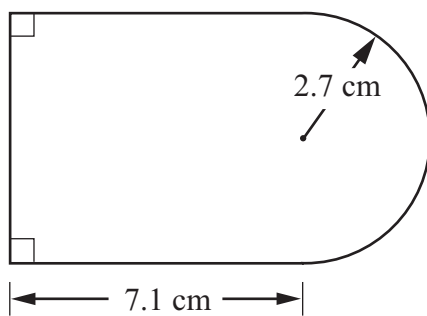
$\dots\dots\dots$

(Total for Question 14 is 2 marks)



15 (a) Here is a shape made from a rectangle and a semicircle.

Diagram **NOT**
accurately drawn



The length of the rectangle is 7.1 cm.
The radius of the semicircle is 2.7 cm.

Work out the area of the shape.
Give your answer correct to 3 significant figures.

..... cm²
(4)



(b) Here is another shape made from a rectangle and a semicircle.

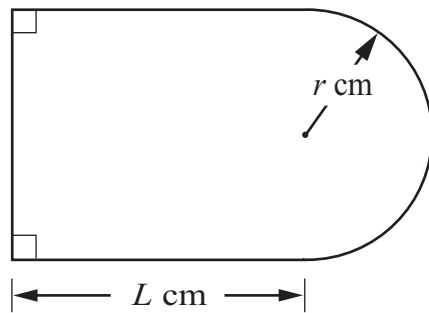


Diagram **NOT**
accurately drawn

The length of the rectangle is L cm.

The radius of the semicircle is r cm.

The perimeter, P cm, of the shape is given by the formula

$$P = \pi r + 2L + 2r$$

Make r the subject of the formula $P = \pi r + 2L + 2r$.

$$r = \dots\dots\dots$$

(3)

(Total for Question 15 is 7 marks)



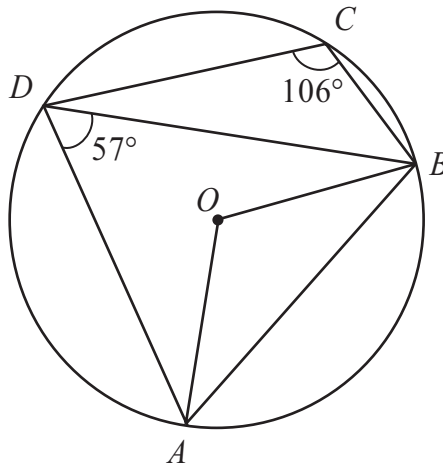


Diagram **NOT** accurately drawn

A, B, C and D are points on a circle, centre O .
 Angle $ADB = 57^\circ$.
 Angle $BCD = 106^\circ$.

(a) (i) Calculate the size of angle AOB .

.....
 °

(ii) Give a reason for your answer.

.....

 (2)

(b) Calculate the size of angle BAD .

.....
 (1)

(Total for Question 16 is 3 marks)



17 Here are seven counters.
Each counter has a number on it.



Ali puts the seven counters in a bag.
He takes, at random, a counter from the bag and does **not** replace the counter.
He then takes, at random, a second counter from the bag.

Calculate the probability that

(i) the number on the second counter is 2 more than the number on the first counter,

.....

(ii) the number on the second counter is 1 more than the number on the first counter.

.....

(Total for Question 17 is 5 marks)



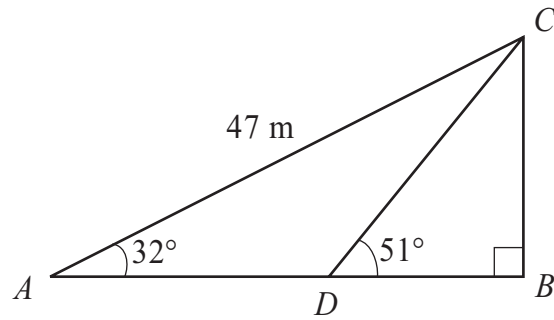


Diagram **NOT**
accurately drawn

Triangle ABC is right-angled at B .

Angle $BAC = 32^\circ$

$AC = 47\text{ m}$.

D is the point on AB such that angle $BDC = 51^\circ$

Calculate the length of BD .

Give your answer correct to 3 significant figures.

..... m

(Total for Question 18 is 5 marks)



19 P is directly proportional to the cube of Q .
When $Q = 15$, $P = 1350$

(a) Find a formula for P in terms of Q .

$$P = \dots\dots\dots$$

(3)

(b) Calculate the value of P when $Q = 20$

$$P = \dots\dots\dots$$

(1)

(Total for Question 19 is 4 marks)

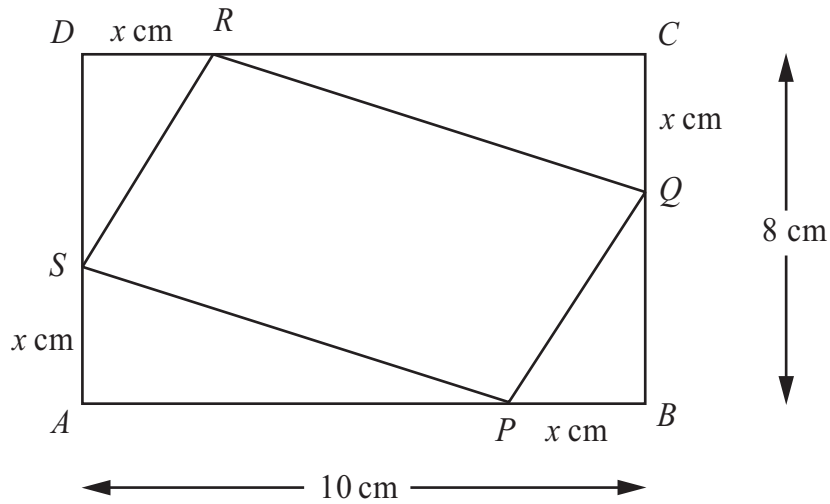
20 $x = a \times 10^n$ where n is an integer and $\sqrt{10} \leq a < 10$

Find, in standard form, an expression for x^2 .
Give your expression as simply as possible.

.....

(Total for Question 20 is 3 marks)





$ABCD$ is a rectangle.

$AB = 10$ cm.

$BC = 8$ cm.

P , Q , R and S are points on the sides of the rectangle.

$BP = CQ = DR = AS = x$ cm.

(a) Show that the area, A cm², of the quadrilateral $PQRS$ is given by the formula

$$A = 2x^2 - 18x + 80$$

(3)



(b) For $A = 2x^2 - 18x + 80$

(i) find $\frac{dA}{dx}$,

(ii) find the value of x for which A is a minimum.

$x =$

(iii) Explain how you know that A is a minimum for this value of x .

.....
.....
(5)

(Total for Question 21 is 8 marks)



22 Solve the simultaneous equations

$$y = 2x - 3$$

$$x^2 + y^2 = 2$$

.....
(Total for Question 22 is 6 marks)



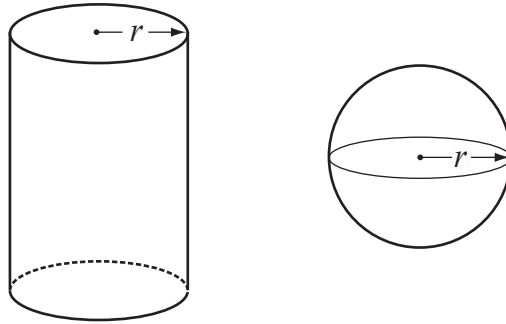


Diagram **NOT**
accurately drawn

The diagram shows a solid cylinder and a solid sphere.
The cylinder has radius r .
The sphere has radius r .

Given that $\frac{\text{Total surface area of cylinder}}{\text{Surface area of sphere}} = 2$

find the value of $\frac{\text{Volume of cylinder}}{\text{Volume of sphere}}$

.....
(Total for Question 23 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS



Question Number	Working	Answer	Mark	Notes
1. (a)	$\frac{24.1}{0.6} - 38.44 = 40.166... - 38.44$		2	M1 for 0.6 or $\frac{3}{5}$ or 40.166... (4 figures correct rounded or truncated) or $40\frac{1}{6}$ or 38.44 or $38\frac{11}{25}$
		1.726666667		A1 Accept if first 4 figures correct (rounded or truncated) Also accept 1.726 or $\frac{259}{150}$ or $1\frac{109}{150}$
(b)		1.73	1	B1 ft from (a) if answer to (a) is a decimal with more than 3 sf
Total 3 marks				
Question Number	Working	Answer	Mark	Notes
2 .	$(5 - 2) \times 180$ or 3×180 or $(2 \times 5 - 4) \times 90$ or 6×90 or $360 + 180$		4	M1 360-(83+66+53+96) Condone 1 incorrect ext angle
	540			A1 540 seen scores M1A1 62
	"540" - (97 + 114 + 127 + 84)			M1 dep on first M1 180 - "62"
		118		A1 cao
Total 4 marks				

IGCSE Mathematics (4MA0) Paper 3H Summer 2011

Question Number	Working	Answer	Mark	Notes
3. (a)		$w(w - 9)$	2	B2 Award B2 also for $(w \pm 0)(w - 9)$ B1 for factors which, when expanded & simplified, give two terms, one of which is correct except B0 for $(w + 3)(w - 3)$ SC B1 for $w(w - 9w)$
(b)	$3x = -6$ or $3x = 1 - 7$ or $5x - 2x = -6$ oe		3	M2 for correct rearrangement with x terms on one side and numbers on the other AND correct collection of terms on at least one side M1 for $5x - 2x = 1 - 7$ oe ie correct rearrangement with x terms on one side and numbers on the other
		-2		A1 cao dep on M2
(c)	$y^2 + 3y - 7y - 21$		2	M1 for 3 correct terms out of 4 or for 4 correct terms ignoring signs or for $y^2 - 4y + n$ for any non-zero value of n
		$y^2 - 4y - 21$		A1 cao
				Total 7 marks

Question Number	Working	Answer	Mark	Notes
4. (a)	$1 - (0.6 + 0.3)$		2	M1
		0.1		A1 Also accept $\frac{1}{10}$ or 10%
(b)	30×0.6		2	M1
		18		A1 cao Do not accept $\frac{18}{30}$
				Total 4 marks

Question Number	Working	Answer	Mark	Notes	
5.	$\frac{10}{12}$ and $\frac{9}{12}$ eg $\frac{10-9}{12}$, $\frac{10}{12} - \frac{9}{12}$		2	B2	<p>B1 for $\frac{10}{12}$ or $\frac{9}{12}$ Also accept $\frac{5 \times 2}{6 \times 2}$ or $\frac{3 \times 3}{4 \times 3}$</p> <p>Alternative method B1 for both fractions correctly expressed as equivalent fractions with denominators that are common multiples of 6 and 4 eg $\frac{20}{24}$ and $\frac{18}{24}$ or $\frac{5 \times 4}{6 \times 4}$ and $\frac{3 \times 6}{4 \times 6}$ B1 (dep on first B1) for evaluation as a correct fraction which is equivalent to $\frac{1}{12}$ eg $\frac{2}{24}$</p> <p>SC B1 for multiplying both sides by 12 ie $10 - 9 = 1$</p>
				Total 2 marks	

Question Number	Working	Answer	Mark	Notes	
6. (a)		Rotation	3	B1	Accept 'rotate', 'rotated' etc
		90° clockwise		B1	Also accept quarter turn clockwise, -90° or 270°
		(0, 0)		B1	Also accept origin, O
(b)	vertices (4,4), (4,2), (5,2)	R correct	2	B2	Condone omission of label B1 for 2 correct vertices
				Total 5 marks	

Question Number	Working	Answer	Mark	Notes	
7.	3+5+7 or 15		3	M1	15 may be denominator of fraction or coefficient in an equation such as $15x = 90$
	$90 \div (3+5+7)$ or $90 \div "15"$ or 6 or $\frac{7}{15}$ oe			M1	dep
		42		A1	Also award for 18 : 30 : 42
				Total 3 marks	

Question Number	Working	Answer	Mark	Notes	
8. (i)		3, 5, 7, 11	2	B1	cao
(ii)		2, 3, 5, 7, 9, 11		B1	cao (B0 if 3 or 5 or 7 or 11 repeated)
				Total 2 marks	

Question Number	Working	Answer	Mark	Notes	
9.	eg $\frac{5}{100} \times 8000 = 400$	OR 8000×1.05^3	3	M1 for eg $\frac{5}{100} \times 8000$ or 400	OR M2 for 8000×1.05^3 (M1 for 8000×1.05 or 8400 or 8000×1.05^2 or 8000×1.05^4)
	$\frac{5}{100} \times (8000 + "400")$ = 420 $\frac{5}{100} \times (8000 + "400" + "420")$ = 441 $8000 + "400" + "420" + "441"$			M1 for completing method	
				Accept $(1 + 0.05)$ as equivalent to 1.05 throughout.	
				SC If no other marks gained, award M1 for 8000×1.15 oe or 9200	
		9261		A1	Cao
				Total 3 marks	

Question Number	Working	Answer	Mark	Notes
10.		$C = \frac{3d+7}{2}$ oe	3	B3 B2 for $\frac{3d+7}{2}$ oe B2 for $C = 3d + 7 \div 2$ oe B1 for $3d + 7 \div 2$ B1 for $C =$ linear expression in d
				Total 3 marks

Question Number	Working	Answer	Mark	Notes
11. (a)	$1 \times 8 + 3 \times 14 + 5 \times 26 + 7 \times 17 + 9 \times 10 + 11 \times 5$ or $8 + 42 + 130 + 119 + 90 + 55$		3	M1 for finding at least four products $f \times x$ consistently within intervals (inc end points) and summing them
		444		M1 (dep) for use of halfway values
				A1 Cao
(b)		8 22 48 65 75 80	1	B1 Cao
(c)		Points correct	2	B1 $\pm \frac{1}{2}$ sq ft from sensible table
		Curve or line segments		B1 ft from points if 4 or 5 correct or if points are plotted consistently within each interval at the correct heights Accept curve which is not joined to the origin
(d)	5.2 indicated on cf graph		2	M1 for 5.2 indicated on cf graph
		approx 36-40 from correct graph		A1 If M1 scored, ft from cf graph If M1 not scored, ft only from correct curve & if answer is correct ($\pm \frac{1}{2}$ sq tolerance), award M1 A1
				Total 8 marks

Question Number	Working	Answer	Mark	Notes
12. (a)	$\frac{BC}{5.2} = \frac{9}{6}$ oe		2	M1 for correct, relevant proportionality statement with 3 values substituted
		7.8		A1 cao
(b)	$\frac{CE}{7.2} = \frac{6}{9}$ oe or $\frac{CE}{6} = \frac{7.2}{9}$ oe or $\frac{CE}{7.2} = \frac{5.2}{7.8}$ oe or $\frac{CE}{5.2} = \frac{7.2}{7.8}$ oe		2	M1 for correct, relevant proportionality statement with 3 values substituted
		4.8		A1 cao
				Total 4 marks

Question Number	Working	Answer	Mark	Notes
13.	$\frac{20(2x-1)}{4} + \frac{20(x-1)}{5} = 2 \times 20$ or $5(2x-1) + 4(x-1) = 40$ or $\frac{5(2x-1) + 4(x-1)}{20} = 2$ or $\frac{5(2x-1)}{20} + \frac{4(x-1)}{20} = 2$		4	M1 for clear intention to multiply both sides by 20 or a multiple of 20 or to express LHS as a single fraction with a denominator of 20 or a multiple of 20 or to express LHS as the sum of two fractions with denominators of 20 or a multiple of 20 May be implied by first B1
	$10x - 5 + 4x - 4 = 40$ or $\frac{10x - 5 + 4x - 4}{20} = 2$ or $\frac{10x - 5}{20} + \frac{4x - 4}{20} = 2$			B1 expanding brackets (dep on M1)
	$14x = 49$ or $14x - 9 = 40$ or $10x + 4x - 9 = 40$ or $14x - 49 = 0$			B1 dep on both preceding marks ie for a correct rearrangement of a correct equation
			3.5	A1 dep on all preceding marks
				Total 4 marks

Question Number	Working	Answer	Mark	Notes
14.	1.75 seen		2	M1
			8	A1
				Total 2 marks

Question Number	Working	Answer	Mark	Notes
15. (a)	Splits shape into rectangle & semicircle		4	M1 May be implied by working
	$\frac{\pi \times 2.7^2}{2}$ or value rounding to 11.4 or 11.5			M1 $\pi \rightarrow 11.451105...$ 3.14 \rightarrow 11.4453 3.142 \rightarrow 11.45259 Also award for equivalent multiple of π eg 3.645π , $\frac{729\pi}{200}$
	$2 \times 2.7 \times 7.1$ or 38.34			M1 Also accept 38.3
		49.8		A1 for 49.8 or for answer rounding to 49.78 or 49.79
(b)	$P - 2L = \pi r + 2r$ oe		3	M1 for rearranging with both r terms on one side
	$P - 2L = (\pi + 2)r$ oe			M1 for factorising a correct expression (does not depend on a correct rearrangement)
		$\frac{P - 2L}{\pi + 2}$ oe		A1
				Total 7 marks

Question Number	Working	Answer	Mark	Notes
16. (a)(i)		114	2	B1 cao
(ii)	eg angle at the centre = 2 × angle at circumference			B1 Three key points must be mentioned 1. Angle at centre/middle/O/origin 2. Twice, double, 2× or half/ $\frac{1}{2}$ as appropriate 3. angle at circumference/edge/perimeter (NOT e.g. angle <i>D</i> , angle <i>ADB</i> , angle at top, angle at outside)
(b)		74	1	B1 cao
				Total 3 marks

Question Number	Working	Answer	Mark	Notes
17. (i)	$\frac{1}{7} \times \frac{2}{6}$ and no other terms		2	M1
		$\frac{2}{42}$ or $\frac{1}{21}$ oe		A1 Also accept 0.05, 0.04, 0.047, 0.048 etc Sample space method - award 2 marks for a correct answer; otherwise no marks
(ii)	$\frac{1}{7} \times \frac{1}{6}$ or $\frac{2}{7} \times \frac{3}{6}$		3	M1
	$\frac{1}{7} \times \frac{1}{6} + \frac{2}{7} \times \frac{3}{6}$			M1
		$\frac{7}{42}$ or $\frac{1}{6}$ oe		A1 Also accept 0.16 ⁸ , 0.16, 0.17, 0.166, 0.167 etc but not 0.2 Sample space method - award 3 marks for a correct answer; otherwise no marks
				Total 5 marks

Question Number	Working	Answer	Mark	Notes
18.	$(BC =) 47 \sin 32^\circ$		5	M1 or for $(CD =) \frac{47 \sin 32^\circ}{\sin 129^\circ}$
	24.906... at least 3 sf (may be implied by correct BD)			A1 or for $CD = 32.048...$ at least 2 sf (may be implied by correct BD)
	$\tan 51^\circ = \frac{\text{"24.906..."}}{BD}$ or $\tan 39^\circ = \frac{BD}{\text{"24.906..."}}$			M1 or for $\cos 51^\circ = \frac{BD}{\text{"32.048..."}}$
	$(BD =) \frac{\text{"24.906..."}}{\tan 51^\circ}$ or $\text{"24.906..." } \tan 39^\circ$			M1 or for $(BD =) \text{"32.048..." } \cos 51^\circ$
		20.2		A1 for answer rounding to 20.2 (20.1686...)
				Total 5 marks

Question Number	Working	Answer	Mark	Notes
19. (a)	$P = kQ^3$		3	M1 for $P = kQ^3$ but not for $P = Q^3$
	$1350 = k \times 3375$			M1 for $1350 = k \times 3375$ Also award for $1350 = k \times 15^3$
		$P = 0.4Q^3$ oe		A1 $P = 0.4Q^3$ oe Award 3 marks if answer is $P = kQ^3$ oe but k is evaluated as 0.4 in part (a) or part (b)
(b)		3200	1	B1 ft from "0.4" $\times 8000$ except for $k = 1$, if at least M1 scored in (a) (at least 1 d.p. accuracy in follow through)
				Total 4 marks

Question Number	Working	Answer	Mark	Notes
20.	$a^2 \times 10^{2n}$		3	M1
		$\frac{a^2}{10} \times 10^{2n+1}$		A1 for $\frac{a^2}{10}$ oe A1 for $\times 10^{2n+1}$ oe Award M1 A1 A1 for $\frac{a^2}{10} \times 10^{2n+1}$ even if M1 not awarded. Award M1 A1 A0 if $\frac{a^2}{10}$ oe seen. Award M1 A0 A1 if $\times 10^{2n+1}$ oe seen.
				Total 3 marks

Question Number	Working	Answer	Mark	Notes
21. (a)	Use of areas to obtain a correct expression for A, which must be correctly punctuated. For example $(A =) 80 - 2 \times \frac{1}{2}x(10 - x) - 2 \times \frac{1}{2}x(8 - x)$ or $10 \times 8 - \frac{1}{2}x(10 - x) - \frac{1}{2}x(10 - x) - \frac{1}{2}x(8 - x) - \frac{1}{2}x(8 - x)$ or $80 - x(10 - x) - x(8 - x)$ or $80 - 2\left(\frac{10x - x^2}{2}\right) - 2\left(\frac{8x - x^2}{2}\right)$		3	B2 B1 for expression for area of triangle or pair of congruent triangles, for example $\frac{1}{2}x(10 - x)$ or $\frac{1}{2}x(8 - x)$ or $x(10 - x)$ or $x(8 - x)$ Condone omission of brackets for award of B1
	Correct simplification of a correct expression for A to obtain an expression which is equivalent to $2x^2 - 18x + 80$ For example $(A =) 80 - 10x + x^2 - 8x + x^2$ or $80 - (10x - x^2) - (8x - x^2)$ or $80 - (5x - \frac{1}{2}x^2) - (5x - \frac{1}{2}x^2) - (4x - \frac{1}{2}x^2) - (4x - \frac{1}{2}x^2)$			B1 dep on B2
(b)(i)		$4x - 18$	5	B2 B1 for 2 of 3 terms differentiated correctly
(ii)	" $4x - 18$ " = 0			M1
		4.5 oe		A1 cao
(iii)		eg positive coefficient of x^2 or U shape or $\frac{d^2A}{dx^2} = 4$ which > 0		B1
				Total 8 marks

Question Number	Working	Answer	Mark	Notes
22.	$x^2 + (2x - 3)^2 = 2$		6	M1 for correct substitution
	$x^2 + 4x^2 - 6x - 6x + 9 = 2$ or $x^2 + 4x^2 - 12x + 9 = 2$			B1 (indep) for correct expansion of $(2x - 3)^2$ even if unsimplified
	$5x^2 - 12x + 7 (= 0)$			B1 for correct simplification Condone omission of '= 0'
	$(5x - 7)(x - 1) (= 0)$ or $\frac{12 \pm \sqrt{4}}{10}$ or $\frac{12}{10} \pm \frac{\sqrt{4}}{10}$ or $\frac{6}{5} \pm \frac{1}{5}$			B1 for correct factorisation or for correct substitution into quadratic formula and correct evaluation of ' $b^2 - 4ac$ ' or for using square completion correctly as far as indicated
	$x = 1$ or $x = 1\frac{2}{5}$			A1 for both values of x dep on all preceding marks
		$x = 1, y = -1$ $x = 1\frac{2}{5}, y = -\frac{1}{5}$		A1 for complete, correct solutions (need not be paired) dep on all preceding marks No marks for $x = 1, y = -1$ with no working
				Total 6 marks

Question Number	Working	Answer	Mark	Notes
23.	$\frac{2\pi r^2 + 2\pi rh}{4\pi r^2} = 2$		5	M1 Also award for $\frac{\pi r^2 + 2\pi rh}{4\pi r^2} = 2$
	$2\pi r^2 + 2\pi rh = 2 \times 4\pi r^2$ oe			M1 for $2\pi r^2 + 2\pi rh = 2 \times 4\pi r^2$ oe or $\frac{2\pi r(r+h)}{4\pi r^2} = 2$ If first M1 awarded for $\frac{\pi r^2 + 2\pi rh}{4\pi r^2} = 2$ award this second M1 also for $\pi r^2 + 2\pi rh = 2 \times 4\pi r^2$ oe
	$h = 3r$ oe			A1 If first M1 awarded for $\frac{\pi r^2 + 2\pi rh}{4\pi r^2} = 2$ and second M1 for $\pi r^2 + 2\pi rh = 2 \times 4\pi r^2$ oe Award this A1 also for $h = 3.5r$ oe
	$\frac{\pi r^2 \times "3r"}{\frac{4}{3}\pi r^3}$ oe			M1 dep on first two M1s h must be of the form kr
		$\frac{9}{4}$ oe		A1
				Total 5 marks

Write your name here

Surname

Other names

Centre Number

Candidate Number

Edexcel IGCSE

Mathematics A

Paper 4H



Higher Tier

Friday 10 June 2011 – Morning

Time: 2 hours

Paper Reference

4MA0/4H

You must have:

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ►

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Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** In a sale, normal prices are reduced by 15%.
The normal price of a television was \$640
Work out the sale price of the television.

\$.....

(Total for Question 1 is 3 marks)

- 2** John throws a biased coin 120 times.
It shows heads 90 times.
(a) John throws the coin once more.
Work out an estimate for the probability that the coin shows **tails**.

.....
(2)

- Carly throws the same coin 200 times.
(b) Work out an estimate for the number of times the coin shows **tails**.

.....
(2)

(Total for Question 2 is 4 marks)



3 Here is a list of ingredients for making Apple and Raspberry Crumble for 6 people.

Apple and Raspberry Crumble

Ingredients for 6 people

120 grams	plain flour
230 grams	apples
200 grams	raspberries
160 grams	soft brown sugar
90 grams	butter

Sam wants to make Apple and Raspberry Crumble for 15 people.
She has enough plain flour, soft brown sugar and butter.

Work out the amount of apples and the amount of raspberries Sam needs.

apples grams

raspberries grams

(Total for Question 3 is 3 marks)

4 The length of Rachael's journey from her home to work is 72 km.
The journey takes 1 hour 20 minutes.

Work out her average speed in km/h.

..... km/h

(Total for Question 4 is 3 marks)



5 (a) Simplify

(i) $a \times a \times a \times a$,

.....

(ii) $5a \times 6b$,

.....

(iii) $q^8 \div q^2$.

.....

(3)

(b) Solve $5 - 2y = 12$

$y =$

(2)

(c) $v = w^2 - 2w$.

Work out the value of v when $w = 6$

$v =$

(2)

(Total for Question 5 is 7 marks)



6 The diagram shows a trapezium $PQRS$.

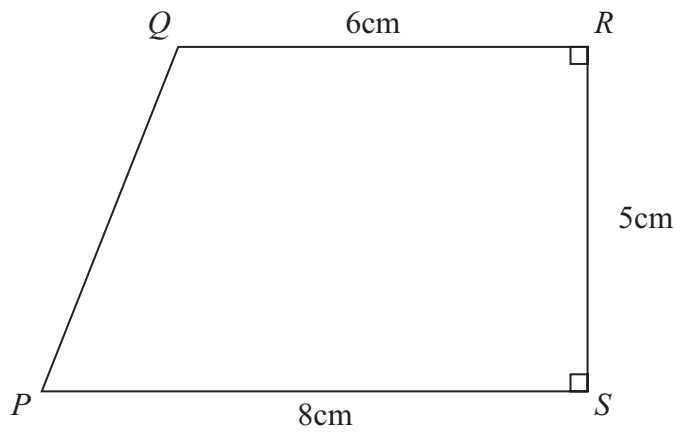


Diagram **NOT**
accurately drawn

(a) Calculate the area of the trapezium $PQRS$.

..... cm^2
(2)

(b) Calculate the length PQ .
Give your answer correct to 3 significant figures.

..... cm
(4)

(Total for Question 6 is 6 marks)



7 Six numbers have a mean of 5

Five of the numbers are

3 2 7 6 2

The other number is x .

Work out the value of x .

$x = \dots\dots\dots$

(Total for Question 7 is 3 marks)

Do NOT write in this space



- 8 Use compasses and a ruler only to construct the perpendicular bisector of the line PQ .
You must show all construction lines.



(Total for Question 8 is 2 marks)



9 The length of a fence is 137 metres, correct to the nearest metre.

Write down

(i) the lower bound for the length of the fence,

..... metres

(ii) the upper bound for the length of the fence.

..... metres

(Total for Question 9 is 2 marks)

10 Express 126 as a product of its prime factors.

.....

(Total for Question 10 is 3 marks)



11

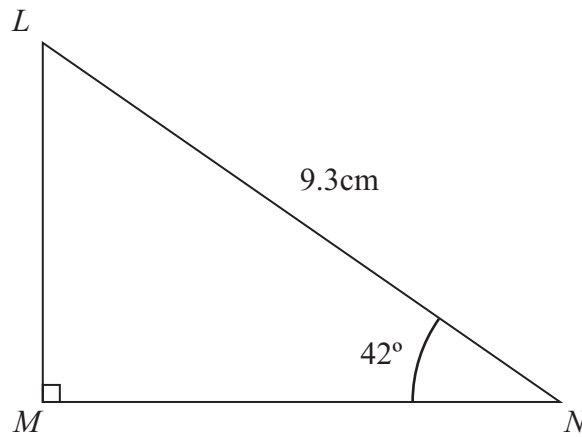


Diagram NOT accurately drawn

Calculate the length of LM .
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 11 is 3 marks)

12 (i) Solve the inequality $2x + 13 \geq 6$

.....

(ii) n is a **negative** integer.

Write down all the values of n which satisfy $2n + 13 \geq 6$

.....

(Total for Question 12 is 4 marks)



13 The table gives the diameters, in metres, of four planets.

Planet	Diameter (metres)
Mercury	4.88×10^6
Venus	1.21×10^7
Earth	1.28×10^7
Mars	6.79×10^6

(a) Which planet has the largest diameter?

.....
(1)

(b) Write 6.79×10^6 as an ordinary number.

.....
(1)

(c) Calculate the difference, in metres, between the diameter of Venus and the diameter of Mercury.

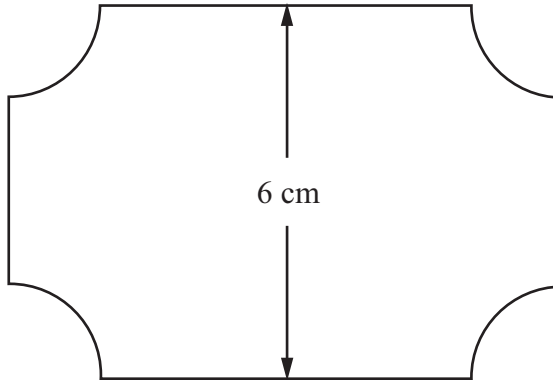
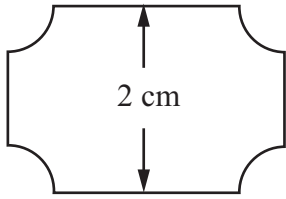
Give your answer in standard form.

..... metres
(2)

(Total for Question 13 is 4 marks)



14 Here are two supermarket price tickets.



Diagrams **NOT** accurately drawn

The two supermarket price tickets are mathematically similar.

The area of the smaller ticket is 7 cm^2 .

Calculate the area of the larger ticket.

..... cm^2

(Total for Question 14 is 2 marks)

Do NOT write in this space



15 (a) Simplify $\frac{8(x-3)^2}{4(x-3)}$

.....
(2)

(b) Factorise $a^2 - 144$

.....
(2)

(c) Make q the subject of the formula $p = \sqrt{q} - 5r$

$q =$
(2)

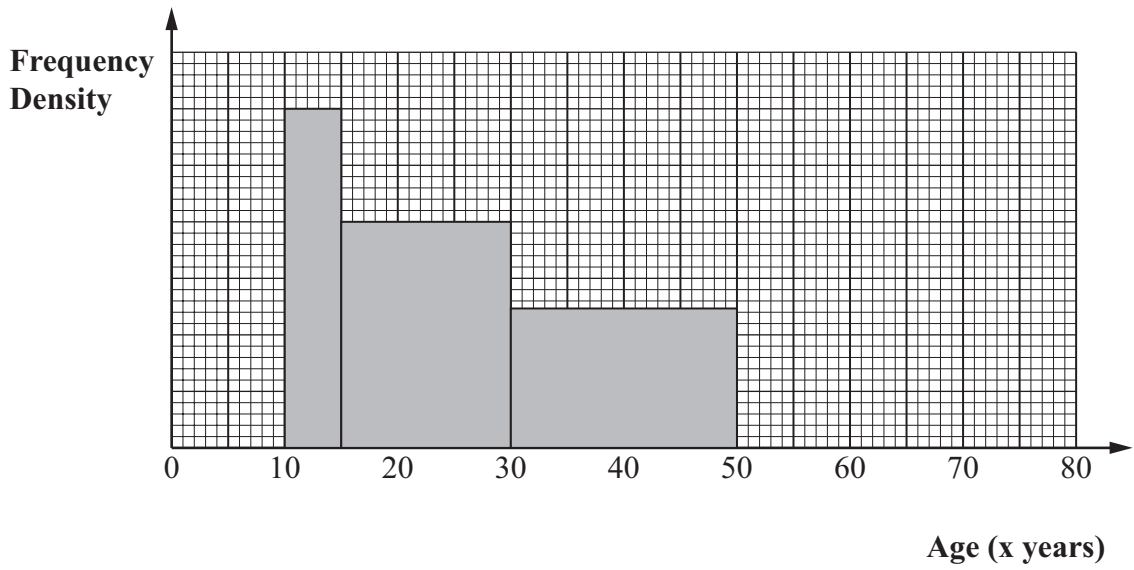
(d) Solve $\frac{4}{y-4} = 5$

$y =$
(3)

(Total for Question 15 is 9 marks)



16 The incomplete histogram and table give information about the ages of people living in a village.



Age (x years)	Frequency
$0 \leq x < 10$	100
$10 \leq x < 15$	60
$15 \leq x < 30$	
$30 \leq x < 50$	
$50 \leq x < 75$	50
$75 \leq x < 80$	20

(i) Use the histogram to complete the table.

(ii) Use the table to complete the histogram.

(Total for Question 16 is 4 marks)

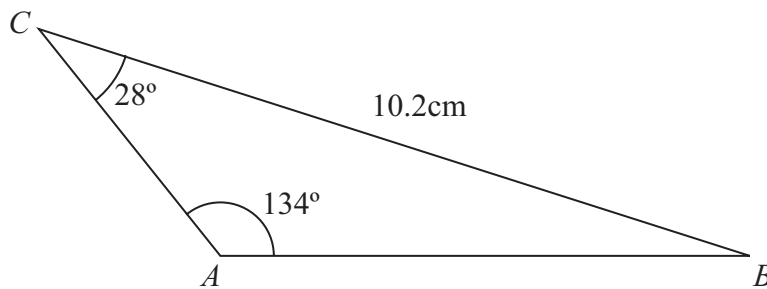


18 Show that the recurring decimal $0.\dot{3}9\dot{6} = \frac{44}{111}$

(Total for Question 18 is 2 marks)

19 The diagram shows triangle ABC .

Diagram NOT
accurately drawn



Angle $BCA = 28^\circ$
Angle $CAB = 134^\circ$
 $BC = 10.2$ cm.

Calculate the length of AB .
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 19 is 3 marks)



20 $f(x) = \frac{2}{x}$

$$g(x) = \frac{x+1}{x}$$

(a) State which value of x cannot be included in the domain of f or g .

.....
(1)

(b) Solve $gf(a) = 3$

$a =$
(3)

(c) Express the inverse function g^{-1} in the form $g^{-1}(x)$

$g^{-1}(x) =$
(3)

(Total for Question 20 is 7 marks)



21 Clare buys some shares for $\$50x$.
Later, she sells the shares for $\$(600 + 5x)$.
She makes a profit of $x\%$

(a) Show that $x^2 + 90x - 1200 = 0$

(3)

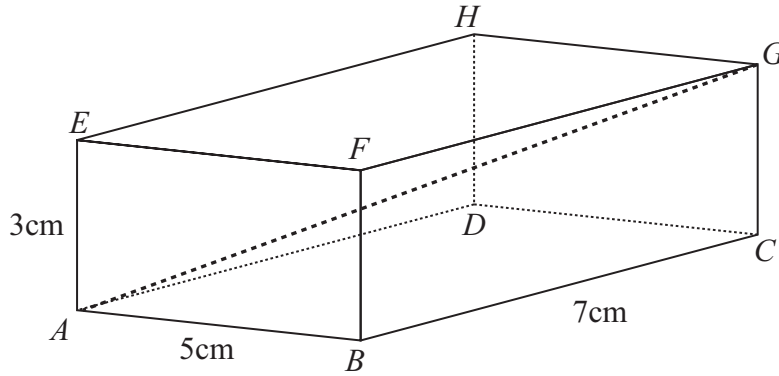
(b) Solve $x^2 + 90x - 1200 = 0$
Find the value of x correct to 3 significant figures.

$x = \dots\dots\dots$
(3)

(Total for Question 21 is 6 marks)



Diagram **NOT**
accurately drawn



The diagram shows a cuboid $ABCDEFGH$.

$AB = 5\text{cm}$

$BC = 7\text{cm}$

$AE = 3\text{cm}$

- (a) Calculate the length of AG .
Give your answer correct to 3 significant figures.

..... cm
(3)

- (b) Calculate the size of the angle between AG and the plane $ABCD$.
Give your answer correct to 1 decimal place.

..... °
(2)

(Total for Question 22 is 5 marks)



23 Express $\sqrt{48} + \sqrt{108}$ in the form $k\sqrt{6}$ where k is a surd.

.....
(Total for Question 23 is 3 marks)

Do NOT write in this space



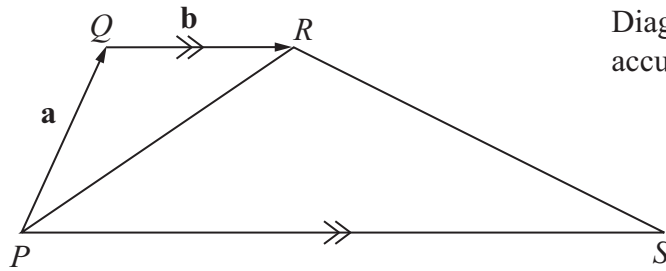


Diagram NOT accurately drawn

The diagram shows a trapezium $PQRS$.
 PS is parallel to QR .
 $PS = 4QR$.

$\vec{PQ} = \mathbf{a}$ $\vec{QR} = \mathbf{b}$

(a) Find, in terms of \mathbf{a} and/or \mathbf{b} ,

(i) \vec{PS}

(ii) \vec{PR}

(iii) \vec{RS} .

.....

(3)

The point T lies on the line PR such that $PT : TR = 4 : 1$

(b) Given that $\vec{TS} = k \vec{QT}$, find the value of k .

$k =$
 (3)

(Total for Question 24 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS



IGCSE Maths June 2011 – Paper 4H Mark scheme

Apart from questions 5b, 8, 15d, 20b, 21b, 23, 24b (where the mark scheme states otherwise) the correct answer, unless clearly obtained by an incorrect method, should be taken to imply correct working.

Q	Working	Answer	Mark	Notes
1.	15/100 x 640 (=96) 640 – “96”	544	3	M1 M1 dep A1 or M2 for 640 x 0.85
Total 3 marks				
2.	(a) 120 – 90 (=30)	30/120 oe	2	M1 or 1 – 90/120 A1
	(b) “30/120” X 200 oe	50	2	M1 ft or 200 – “90/120” x 200 (i.e. 200 – “heads”/120 x 200) A1 ft ft if final ans < 200
Total 4 marks				
3.	15÷6 (=2.5) or 6÷15 (=0.4) or 230÷6 (=38.33) or 200÷6 (=33.33) or 6÷230 (=0.026) or 6÷200 (=0.03) 230 x “15/6” or 200 x “15/6” oe	apples = 575 & raspberries = 500	3	M1 M1 dep (i.e “correct” calculation for apples OR raspberries) A1 cao both correct SC M1M1A0 if answers wrong way round with/without working
Total 3 marks				

4.	$72 \div 1\frac{1}{3}$ oe	54	3	B1M1 accept $72 \div 1.33$ (2dp or better) or 0.9×60 (B1 M0 for $72 \div 1.2(0)\{=60\}$ or $72 \div 80 \{=0.9\}$ or $72 \div 1.3 \{=55.4$ or better}) or $72000 \div 1.33$ (or better) A1 cao
Total 3 marks				
5. (a) (i)		a^4	1	B1 not a^4 accept upper case A
(a) (ii)		30ab	1	B1 accept ab30, 30ba, a30b,b30a (no x signs allowed) accept upper case A and/or B
(a) (iii)		q^6	1	B1 accept upper case Q
(b)	$5 - 12 = 2y$ oe	- 3.5 oe	2	M1 or $5 - 12 \div 2$ or $12 - 5 \div - 2$ A1 ans dependent on M1 (above numerical methods acceptable)
(c)	$6^2 - 2 \times 6$ oe	24	2	M1 accept $36 - 12$ A1
Total 7 marks				
6. (a)	$\frac{1}{2} (6+8) \times 5$ or $\frac{1}{2} \times 2 \times 5 + 6 \times 5$	35	2	M1 A1
(b)	$8 - 6 (=2)$ and 5 seen (PQ ² =) (" $8 - 6$ ") ² +5 ² (=29) (PQ=) $\sqrt{\text{"29"}}$	5.39	4	B1 could be seen on diagram M1 (dep) (θ =) $\tan^{-1} (5/\text{"8 - 6"})$ (=68.2 or better) M1 (dep) (PQ=) " $8-6$ " / \cos "68.2" or $5 / \sin$ "68.2" A1 5.38516..... awrt 5.39
Total 6 marks				
7.	$6 \times 5 (= 30)$ or $3+2+7+6+2$ (=20) or $(3+2+7+6+2 + "x")/6=5$ "30" - "20"	10	3	M1 M1 dep A1

					Total 3 marks

8.		Intersecting arcs from P and Q Perpendicular bisector joining both arcs	2	B1 arcs must intersect above and below line PQ B1 dep
				Total 2 marks

9. (i)		136.5	1	B1
(ii)		137.5 or 137 .49 recurring or 137.499..	1	B1 dot above 9 for recurring or 137.499..... (i.e .499 or better)
				Total 2 marks

10.	3 or more correct factors of which 2 are from 2,3,3,7			M1 e.g 2 x 3 x 21 or 2, 3, 21 must multiply to 126 could be implied from a factor tree or division ladder
	All 4 correct prime factors & no extras (ignore 1's)	2, 3, 3, 7 or 2, 3, 3, 7, 1 or 2x3x3x7x1 2 x 3 x 3 x 7	3	M1 could be implied from a factor tree or division ladder A1 any order, do not accept inclusion of 1's must be a product on answer line (dots or crosses)
				Total 3 marks

11.	Use of sin 42 or cos (90 – 42) 9.3 x sin 42 or 9.3 cos (90 – 42)	6.22	3	M1 $9.3^2 - (9.3 \cos 42)^2 (=38.72..)$ M1 $\sqrt{("38.72..")}$ (M1 dep) A1 awrt 6.22 6.22(2914...)
				Total 3 marks

12. (i)	$2x \geq 6 - 13$ oe			M1 Condone $2x > 6 - 13$ oe A1 mark response on answer line (do not isw) correct answer with no working = M1A1
(ii)		$x \geq -3.5$ oe -3, -2, -1	2	B2 any order B1 for -3, -2, -1, 0

					Total 4 marks
13. (a)		Earth	1	B1	or 1.28×10^7
(b)		6790000	1	B1	
(c)	$1.21 \times 10^7 - 4.88 \times 10^6$ oe	7.22×10^6	2	M1 A1	or sight of digits 722
					Total 4 marks
14.	7×3^2	63	2	M1 for 3^2 or 9 or $\frac{1}{9}$ or $(\frac{1}{3})^2$ A1	
					Total 2 marks
15. (a)	Correct cancelling 8 & 4 or brackets	$2(x - 3)$ oe	2	M1 A1	
(b)		$(a + 12)(a - 12)$	2	B2	B1 for $(a \pm 12)(a \pm 12)$
(c)	$p + 5r$ ($=\sqrt{q}$)	$(p+5r)^2$ oe	2	M1 A1	do not isw (e.g. proceed onto $p^2 + 25r^2$)
(d)	$4 = 5(y - 4)$ oe $4 + (5 \times 4) = 5y$	must be 5×4 or 20 or LHS = 24 4.8 oe	3	M1 M1 A1	or $(y-4)/4 = 1/5$ $4/5 = y - 4$ dep on M2 correct answer only = M0M0A0
					Total 9 marks
16. (i)		120 ,100	2	M1 A1	1 square = 10 people or any correct fd value seen in correct place with no errors both values correct
(ii)		Blocks at 5, 1, 2 squares	2	B1B1	for all 3 correct blocks, B1B0 for 1 or 2 correct blocks.
					Total 4 marks
17. (a)		$\frac{7}{8}$ for not late Correct binary structure ALL labels and values correct	3	B1 B1 B1	on lower first branch 4 branches needed on RHS

(b)	$(1/8) \times "(7/8)"$ or $"(7/8)" \times (1/8)$ or $(1/8) \times (1/8)$ $(1/8) \times "(7/8)" + "(7/8)" \times (1/8) + (1/8) \times (1/8)$	$\frac{15}{64}$	3	M1 ft Any 1 "correct" product M1 ft 3 "correct" products with intention to add. Only ft probabilities < 1 or M2 for $1 - \left(\frac{7}{8}\right)^2$ A1 cao (0.234375)
				Total 6 marks
18.	$x = 0.396396\dots$ $1000x = 396.396\dots$ $999x = 396$	$\frac{44}{111}$	2	M1 A1 must reach $\frac{396}{999}$ or equivalent fraction (but not $\frac{44}{111}$)
				Total 2 marks
19.	$\frac{AB}{\sin 28} = \frac{10.2}{\sin 134}$ $(AB =) \sin 28 \times \frac{10.2}{\sin 134}$	6.66	3	M1 M1 isolate AB correctly (14.17 or 14.18 or 14.2 for $\frac{10.2}{\sin 134}$) A1 (6.65695....) awrt 6.66
				Total 3 marks
20. (a)		$(x \neq) 0$	1	B1 Accept $(x) \neq 0$
(b)	$\left(\frac{2}{a} + 1\right) / \frac{2}{a} = 3$ $\frac{2}{a} + 1 = \frac{6}{a}$ or $1 + \frac{a}{2} = 3$ oe	4	3	M1 (Any letter in place of a acceptable) Solve $g(x)=3$ ($x=0.5$) M1 Solve $f(a)=0.5$

				A1 dep on M2
(c)	$y = \frac{x+1}{x}$ $x(y-1) = 1$ $x = \frac{1}{y-1}$			M1 M1 one occurrence of x A1 reverse labels x and y
		$\frac{1}{x-1}$	3	$x = \frac{y+1}{y}$ reverse labels x and y $y(x-1) = 1$ one occurrence of y
				Total 7 marks

21. (a)	$\frac{(600+5x)-50x}{50x} \times 100 = x$ oe $100(600+5x-50x) = 50x^2$ oe $2(600-45x) = x^2$ oe (but not ans)	$50x \times [1 + \frac{x}{100}] = 600 + 5x$ oe $5000x + 50x^2 = 60000 + 500x$ $x^2 = 1200 - 90x$		M1 $\frac{\text{actual profit}}{\text{original}} \times 100 = x$ M1 dep (removing denominator) A1 reducing to $1x^2$ dep on M2	$(\frac{600+5x}{50x} - 1) \times 100 = x$ oe $(600+5x-50x) \times 100 = 50x^2$ $1200 - 90x = x^2$
(b)	$x = \frac{-90 \pm \sqrt{90^2 - 4 \times 1 \times -1200}}{2}$ $x = \frac{-90 \pm \sqrt{8100 + 4800}}{2}$	11.789.....	3	M1 condone 1 sign error {working can be seen in part a} sign error = +90 instead of -90 or +1200 instead of -1200 M1 A1 dep on M2 awrt 11.8 (ignore negative root).	
				Total 6 marks	

22. (a)	$(AC^2 =) 5^2 + 7^2 (=74)$ $(AG^2 =) "74" + 3^2 (=83)$ $(AG =) \sqrt{"83"}$	9.11	3	M1 or $AC = 8.6..$ or $(BG^2) = 3^2 + 7^2 (=58)$ or $(AF^2) = 3^3 + 5^2$ $(AG^2 =) "58" + 5^2 (=83)$ M1 ft (dep on M1) M1M1 for $\sqrt{(5^2 + 7^2 + 3^2)}$ A1 awrt 9.11
(b)	$\sin \theta = 3 / \sqrt{"83"}$			M1 or $\cos \theta = \sqrt{"74"} / \sqrt{"83"}$ or $\tan \theta = 3 / \sqrt{"74"}$

			19.2	2	or $\cos \theta = \frac{"74" + "83" - 9}{2 \times \sqrt{"74"} \times \sqrt{"83"}}$ A1 awrt 19.2 or 160.8
					Total 5 marks

23.	$\sqrt{(8 \times 6)} + \sqrt{(18 \times 6)}$ $(2\sqrt{2} \times \sqrt{6}) + (3\sqrt{2} \times \sqrt{6})$	must see intention to add $(k=) \sqrt{50} \text{ or } 5\sqrt{2} \text{ or } \frac{10}{\sqrt{2}}$	M1 M1 A1	or $\sqrt{(16 \times 3)} + \sqrt{(36 \times 3)} (= 10\sqrt{3})$ $10\sqrt{3} \times \frac{\sqrt{2}}{\sqrt{2}} \text{ or } \frac{10\sqrt{3}}{\sqrt{6}}$ dep on at least 1 M1 sight of decimals <i>used in working</i> loses M marks at that stage and A mark	or $\sqrt{(4 \times 12)} + \sqrt{(9 \times 12)} (= 5\sqrt{12})$ $5\sqrt{12} \times \frac{\sqrt{2}}{\sqrt{2}} \text{ or } 5 \times \sqrt{(6 \times 2)}$
					Total 3 marks

24. (a) (i)		4b	1	B1	4 x b etc Do not accept upper case letters
(a)		a + b	1	B1	Do not accept upper case letters
(ii)					
(a)		3b - a oe	1	B1	needs not be simplified (e.g -b -a +4b) No upper case
(iii)					
(b)	TS=1/5 (a+b)+3 b - a QT= - a +4/5(a+b) TS= - 4/5 a +16/5 b QT= - 1/5 a +4/5 b TS=4/5(- a +4 b) and QT=1/5(- a +4 b)		k=4	3	M1 for any correct route from T to S <u>or</u> from Q to T using capitals or lower case e.g. TS =TR + RS or QT = QP + PT M1 for <u>both</u> correct simplified routes from T to S <u>and</u> Q to T (must be lower case vectors here) A1 dep on B1 in aii) and aiii) and at least M1
					Total 6 marks
					TOTAL FOR PAPER: 100 MARKS

Write your name here

Surname

Other names

Edexcel

International GCSE

Centre Number

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Candidate Number

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Mathematics A

Paper 3H



Higher Tier

Wednesday 11 January 2012 – Morning

Time: 2 hours

Paper Reference

4MA0/3H

You must have:

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
Anything you write on the formulae page will gain **NO** credit.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ►

P40612A

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6/6/4/4



P 4 0 6 1 2 A 0 1 2 0

PEARSON

Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** In January 2007 the population of Canada was 32 million.
7 million of these Canadian people spoke French as their first language.

- (a) Express 7 million as a percentage of 32 million.
Give your answer correct to 1 decimal place.

..... %
(2)

Between January 2007 and January 2009 the population of Canada increased by 4%.

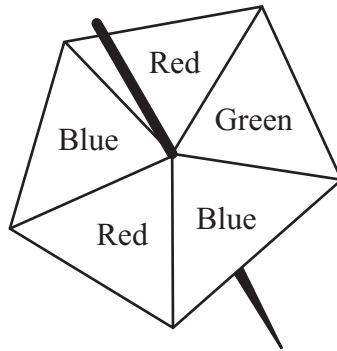
- (b) Increase 32 million by 4%.
Give your answer correct to the nearest million.

..... million
(3)

(Total for Question 1 is 5 marks)



2 Here is a fair 5-sided spinner.



Hans spins the spinner 30 times.

Work out an estimate for the number of times the spinner lands on Red.

.....

(Total for Question 2 is 2 marks)

3

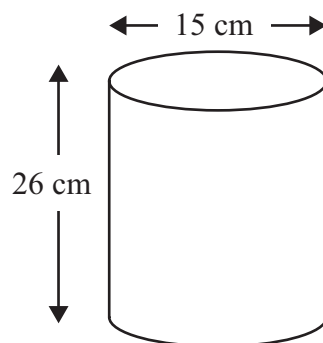


Diagram **NOT** accurately drawn

A cylinder has a diameter of 15 cm and a height of 26 cm.

Work out the volume of the cylinder.

Give your answer correct to 3 significant figures.

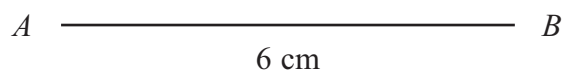
..... cm³

(Total for Question 3 is 3 marks)



- 4 The lengths of the sides of a rhombus are 6 cm.
The length of the longer diagonal of the rhombus is 10 cm.
 AB is a side of the rhombus.

Construct an accurate, full-size drawing of the rhombus.
You must show all construction lines.



(Total for Question 4 is 4 marks)



5 (a) Factorise $5a - 3a^2$

.....
(2)

(b) Expand

(i) $2(4 - 3w)$

(ii) $y^2(y + 10)$

.....
(3)

(c) $W = \frac{5.6a}{b^2}$

$a = 1.28 \quad b = 0.8$

Work out the value of W .

$W =$
(2)

(Total for Question 5 is 7 marks)



- 6 (a) $\mathcal{E} = \{\text{Students in Year 12}\}$
 $G = \{\text{Students who study German}\}$
 $F = \{\text{Students who study French}\}$
 $M = \{\text{Students who study Maths}\}$

(i) $G \cap M = \emptyset$

Use this information to write a statement about the students who study German in Year 12

- (ii) Preety is a student in Year 12
Preety $\notin F$.

Use this information to write a statement about Preety.

(2)

- (b) $A = \{2, 4, 6, 8, 10\}$
 $A \cap B = \{2, 4\}$
 $A \cup B = \{1, 2, 3, 4, 6, 8, 10\}$

List all the members of set B .

(2)

(Total for Question 6 is 4 marks)

Do NOT write in this space.



7 The table shows information about the numbers of text messages sent by 40 teenagers in one day.

Number of text messages	Number of teenagers	Mid-interval value	
0 to 2	3	1	
3 to 5	6	4	
6 to 8	10		
9 to 11	15		
12 to 14	5		
15 to 17	1		

(a) Write down the modal class.

.....
(1)

(b) (i) Work out an estimate for the mean number of texts sent by the 40 teenagers in one day.

.....
(5)

(ii) Explain why your answer to part (b)(i) is an estimate.

.....
(Total for Question 7 is 6 marks)



8 A bag contains 60 beads.
 x of the beads are red and the rest are green.
Altaaf takes at random a bead from the bag.

(a) State, in terms of x , the probability that Altaaf takes a red bead.

.....
(1)

Altaaf puts his bead back in the bag.
Another 20 **red** beads are added to those in the bag.
The probability that Altaaf takes a red bead is now doubled.

(b) (i) Use this information to write down an equation in x
and show that your equation can be expressed as $8x = 3(x + 20)$

(ii) Solve $8x = 3(x + 20)$
Show your working clearly.

$x =$
(5)

(Total for Question 8 is 6 marks)



9

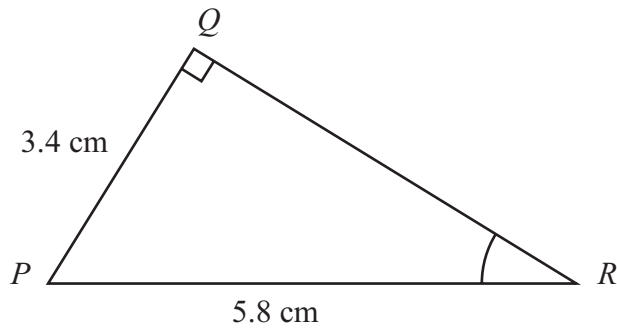


Diagram **NOT**
accurately drawn

Triangle PQR has a right angle at Q .

$PQ = 3.4$ cm and $PR = 5.8$ cm.

- (a) Work out the size of angle QRP .
Give your answer correct to 1 decimal place.

.....
.....
(3)

The length 5.8 cm, of PR , is correct to 2 significant figures.

- (b) (i) Write down the upper bound of the length of PR .

..... cm

- (ii) Write down the lower bound of the length of PR .

..... cm
(2)

(Total for Question 9 is 5 marks)



10 A bank pays compound interest of 6% per annum on its savings accounts.
Julia invests \$7500 for 3 years.

Calculate the total interest gained after 3 years.

\$

(Total for Question 10 is 3 marks)

11 Make y the subject of $3(y + 2x - 1) = x + 5y$

$y =$

(Total for Question 11 is 3 marks)



12 $ABCD$ and $APQR$ are two similar quadrilaterals.

- $PQ = 9$ cm.
- $BC = 6$ cm.
- $AD = 5$ cm.
- $QR = 12$ cm.

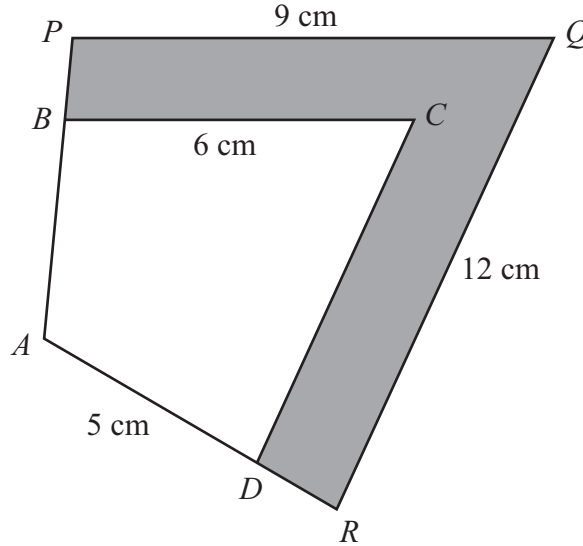


Diagram **NOT** accurately drawn

(a) Find the length of DC .

..... cm
(2)

(b) Find the length of AR .

..... cm
(2)

The area of the quadrilateral $ABCD$ is 32 cm².

(c) Calculate the area of the shaded region.

..... cm²
(3)

(Total for Question 12 is 7 marks)



13

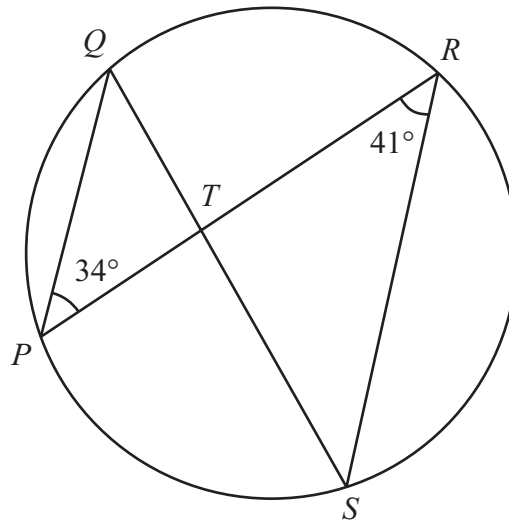


Diagram **NOT** accurately drawn

P, Q, R and S are points on the circumference of a circle.

PR and QS intersect at T .

Angle $QPR = 34^\circ$ and angle $PRS = 41^\circ$

(a) (i) Find the size of angle PQS .

.....^o

(ii) Give a reason for your answer.

.....
.....
(2)

(b) (i) Find the size of angle PTS .

.....^o

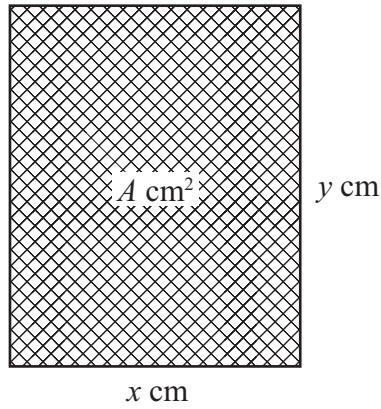
(ii) Explain why T cannot be the centre of the circle.

.....
.....
(2)

(Total for Question 13 is 4 marks)



14



The diagram shows a rectangular photo frame of area $A \text{ cm}^2$.
 The width of the photo frame is $x \text{ cm}$.
 The height of the photo frame is $y \text{ cm}$.
 The perimeter of the photo frame is 72 cm .

(a) Show that $A = 36x - x^2$

(3)

(b) Find $\frac{dA}{dx}$

.....
(2)

(c) Find the maximum value of A .

$A =$
(3)

(Total for Question 14 is 8 marks)



15 Two small magnets attract each other with a force, F newtons.
 F is inversely proportional to the square of the distance, d cm, between them.

When $d = 2$, $F = 12$

(a) Express F in terms of d .

.....
(3)

(b) Calculate the value of F when $d = 5$

$F =$
(1)

(c) Calculate the value of d when $F = 3$

$d =$
(2)

(Total for Question 15 is 6 marks)



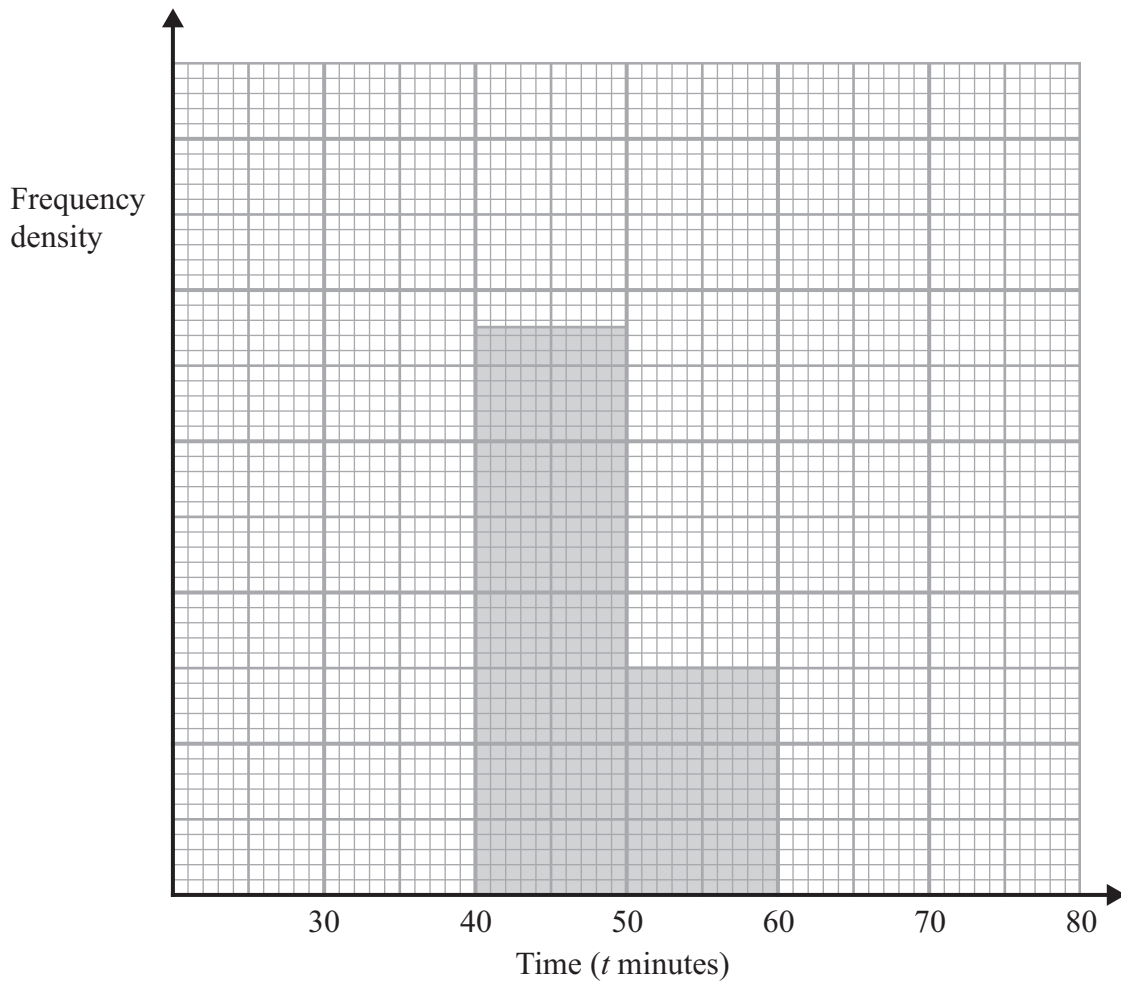
16 The incomplete table shows information about the times, in minutes, that runners took to complete a race.

Time (t minutes)	$30 \leq t < 35$	$35 \leq t < 40$	$40 \leq t < 50$	$50 \leq t < 60$	$60 \leq t < 80$
Number of runners	12	20		12	16

(a) Use the histogram to calculate the number of runners who took between 40 and 50 minutes to complete the race.

(2)

(b) Complete the histogram for the remaining results.



(2)



Runners who achieved a time between 37 and 48 minutes to complete the race were each awarded a silver medal.

(c) Calculate an estimate of the number of runners awarded silver medals.

.....
(2)

(Total for Question 16 is 6 marks)

17 Show that the recurring decimal $0.1\dot{7} = \frac{8}{45}$

(Total for Question 17 is 2 marks)



18

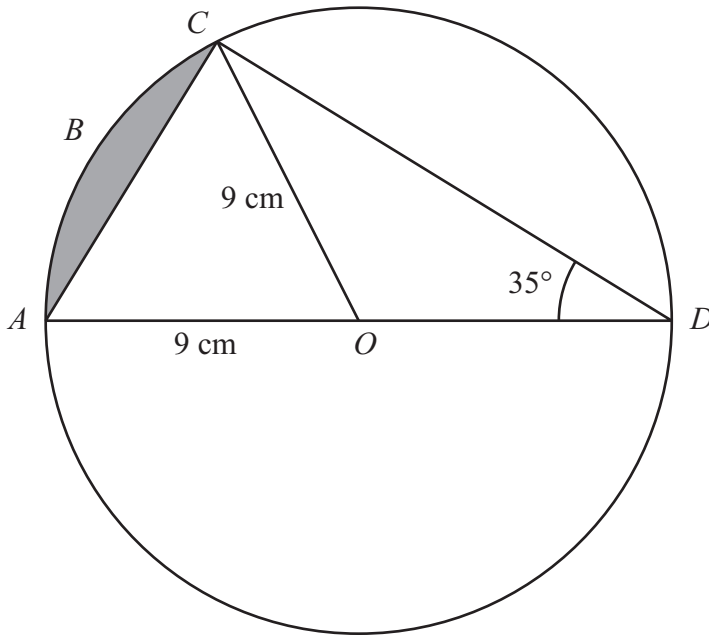


Diagram **NOT** accurately drawn

AOD is a diameter of a circle, with centre O and radius 9 cm.
 ABC is an arc of the circle.
 AC is a chord.
Angle $ADC = 35^\circ$

Calculate the area of the shaded segment.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 18 is 6 marks)



19 Show that $\frac{\sqrt{3} + \sqrt{27}}{\sqrt{2}}$ can be expressed in the form \sqrt{k} where k is an integer.

State the value of k .

$k = \dots\dots\dots$

(Total for Question 19 is 3 marks)

20 Simplify fully $\frac{4}{x} + \frac{3}{2-x}$

(Total for Question 20 is 3 marks)



21

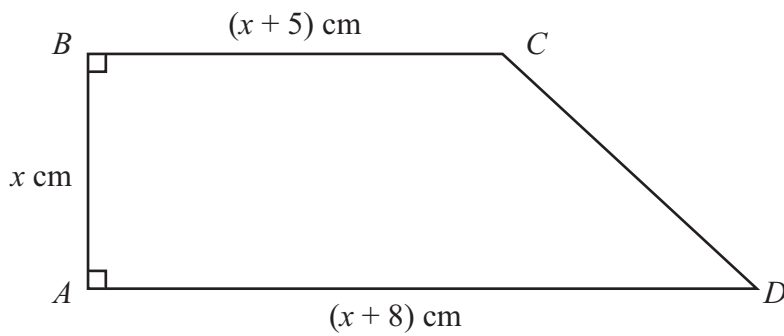


Diagram **NOT**
accurately drawn

The diagram shows a trapezium $ABCD$ with AD parallel to BC .
 $AB = x$ cm, $BC = (x + 5)$ cm and $AD = (x + 8)$ cm.
The area of the trapezium is 42 cm².

(a) Show that $2x^2 + 13x - 84 = 0$

(2)

(b) Calculate the perimeter of the trapezium.

..... cm

(5)

(Total for Question 21 is 7 marks)

TOTAL FOR PAPER IS 100 MARKS



January 2012 International GCSE Mathematics (4MA0) Paper 3H Mark Scheme

Question	Working	Answer	Mark	Notes
1. (a)	7/32 x 100 oe	21.9	2	M1 A1 (21.875) accept awrt to 21.9
(b)	4/100 x 32 (=1.28) or 4/100 x 32000000 (=1280000) 32 + "1.28" or 32000000 + "1280000"	33	3	M1 M2 for 32 x 1.04 oe or 32000000 x 1.04 oe M1 (dep) A1 (33.28) accept 33.3, 33000000, 33300000, 33280000
				Total 5 marks
2.	2/5 x 30	12	2	M1 A1 12 out of 30 = M1A1 12/30 = M1A0
				Total 2 marks
3.	$\pi \times 7.5^2 \times 26$	4590	3	M2 M1 for $\pi \times 15^2 \times 26$ or 18369 → 18386 inc A1 (4594.579....) accept answers 4592 → 4597 inc
				Total 3 marks
4.	Arcs of length 6cm from A and B		4	M1
	Arc of length 10 cm from A or B			M1
	Arc of length 6 cm from correct top vertex			M1
	Correct rhombus within overlay tolerance			A1 Dependent on M3 sc B1 for correct rhombus with no construction lines.
				Total 4 marks
5. (a)		$a(5 - 3a)$	2	B2 B1 for factors which when expanded & simplified give 2 terms for which one is correct.
(b) (i)		$8 - 6w$	1	B1
(ii)		$y^3 + 10y^2$	2	B2 B1 for y^3 or $10y^2$
(c)	7.168 / 0.64	11.2	2	B2 B1 for 7.168 or 0.64
				Total 7 marks

6. (a) (i)		Does not study Maths No student studies (both) German and Maths Students who study German do not study Maths etc	1	B1	Accept general answers (e.g. no student belongs in both sets).
(ii)		(Preety) does not study French (Preety) is not a member of (set) F	1	B1	Accept she /he in place of Preety or omission of name. Penalise extra incorrect statements (e.g. Preety studies Maths and German but not French)
(b)		1,2,3,4	2	B2	B1 for any 3 correct with no repetitions or additions.
					Total 4 marks

7. (a)		9 to 11	1	B1	
(b) (i)	$(1 \times 3) + (4 \times 6) + (7 \times 10) + (10 \times 15) + (13 \times 5) + (16 \times 1)$ (=328) "328" ÷ ("3+6+10+15+5+1")	8.2	4	M2 M1 A1	All products, $t \times f$ using $\frac{1}{2}$ way points correctly, and intention to add. Award M1 if all products, $t \times f$ using their $\frac{1}{2}$ way points consistently, from 6 to 8 interval onwards and intention to add. (dep on one at least M1) Accept 8 with working. 8 without working = M0A0
(ii)		Mid-points used as actual data is unknown	1	B1	Mention of mid-points <u>or</u> exact (actual) data is unknown.
					Total 6 marks

8. (a)		$x/60$ oe	1	B1	Must be a fraction or 0.016 rec x
(b) (i)	$2("x/60") = (x+20)/80$ $16(0)x = 6(0)(x + 20)$ or $80x = 30(x + 20)$ or $2x/3 = (x + 20)/4$		3	M2 A1 dep	(must be an equation) M1 for either $2("x/60")$ or $(x+20)/80$ Correct removal of denominators. Simplifying denominators.
(ii)	$8x = 3x + 60$ or $5x = 60$ or $60 \div 5$	12	2	M1 A1	Dependent on M1. Can be marked if seen in b(i)
					Total 6 marks

9. (a)	Use of sine or $\frac{\sin x}{3.4} = \frac{\sin 90}{5.8}$ sin "x" = 3.4 / 5.8 (=0.586..)	35.9	3	M1 Sine must be selected for use. M1 A1 (35.888...)Use isw on awrt 35.9
(b) (i)		5.85	1	B1 accept 5.849 rec
(ii)		5.75	1	B1
				Total 5 marks

10.	6/100 x 7500 (=450) {1st Year} or 1.06 x 7500 (=7950) "450" + "477" + "505.62"	1432.62	3	M1 M2 for $1.06^3 \times 7500$ (=8932.62) M1 Calculating 6% of previous capital for another 2 years. A1 M1A0 for 1350 or 8850
				Total 3 marks

11.	$3y + 6x - 3 = x + 5y$ $5x - 3 = 2y$ oe	$(5x - 3)/2$	3	M1 Multiplying out brackets. M1 dep Correctly collecting like terms, (3 terms needed here). A1 oe
				Total 3 marks

12. (a)	6/9 x 12 oe	8	2	M1 e.g $12 \div 1.5$ A1
(b)	9/6 (or $12/8$) x 5	7.5	2	M1 A1 cao
(c)	$1.5^2 \times 32$ (=72) oe "72" - 32	40	3	M1 M1 for 1.5^2 or $(2/3)^2$ M1 dep A1
				Total 7 marks

13. (a) (i)		41°	2	B1
(ii)		Angles in same segment (are equal)	2	B1 Accept "from same chord", "on same arc".
(b) (i)		75°	2	B1
(ii)		Angle at centre/middle is not 2 x angle at circumference / edge / perimeter / arc or Angle PQT \neq QPT or PRS \neq RSQ (oe) or $34 \neq 41$	2	B1 Accept $75 \neq 2 \times 41$ or $75 \neq 2 \times 34$ or using idea of isosceles triangles but must mention angles.
				Total 4 marks

14. (a)	$y = 36 - x$	(Area =) $x(36 - x)$	3	M2 M1 for $x + y = 36$ oe or $2y = 72 - 2x$ A1 Must see x times $(36 - x)$ dep on M2
(b)		$(dA/dx) = 36 - 2x$	2	B1 B1 B1 for 36 B1 for $-2x$
(c)	“ $36 - 2x$ ” = 0 $x = 18$	(Area =) 324	3	M1 allow ft only on $a + bx$ ($a, b \neq 0$) A1ft A1ft
Total 8 marks				

15. (a)	$F = “k”/d^2$ $12 = k/2^2$ $k = 48$	$F = 48/d^2$	3	M1 $k =$ letter not number. M1 A1 Award 3 marks for $F = “k”/d^2$ and $k = 48$ stated anywhere, unless contradicted by later work.
(b)	$(F =) “48”/5^2$	1.92 oe	1	B1 ft $k \neq 1$ accept 48/25 as an answer.
(c)	$3 = “48”/d^2$ $d^2 = “48”/3$	4	2	$k \neq 1$ M1 Rearrangement to make d^2 or d the subject A1 ignore \pm
Total 6 marks				

16. (a)	10×3 or 15×2 or $12 \times 7.5/3$	30	2	M1 or any correct fd in correct position and no errors, or $1 \text{ sq} = 2$ (runners) indicated. A1
(b)	Missing blocks = 6cm, 10cm, 2cm		2	B2 3 correct blocks B1 1 or 2 correct blocks
(c)	$0.6 \times 20 + 0.8 \times “30”$ or $3 \times “4” + 8 \times “3”$ or 450×0.08	36	2	M1 (partitioning blocks) (time \times fd’s) {must see clear evidence that fd values used}. 450 small squares. A1 cao
Total 6 marks				

17.	$x = 0.1777\dots$ and $10x = 1.777\dots$ $9x = 1.6$	16/90 oe		See at least 3 sevens or recurring symbol. Condone omission of x. M1 Accept $10x = 1.777\dots$ and $100x = 17.77\dots$ A1 Must be integers in numerator and denominator but not 8 & 45 N.B for $0.1777 = 1/10 + 0.0777\dots$ (0.777 needs to be shown to be 7/90 to gain first M1)
Total 2 marks				

18.	$AOC = 70^\circ$ $"70"/360 \times \pi \times 9^2 (=49.48..)$ $0.5 \times 9^2 \times \sin "70" = (38.057..)$ 49.48.. or 38.057... $"49.48.." - "38.057.."$	11.4	6	B1 Could be marked on diagram. M1ft Area of sector. M1ft Area of triangle. Follow through angles must be the same. A1 Either area correct to 3 sf M1 dep on both previous M1's A1 (11.42253...) awrt 11.4
Total 6 marks				
19.	$(\sqrt{3} + 3\sqrt{3})/\sqrt{2}$ $4\sqrt{3}/\sqrt{2}$ $2\sqrt{6}$ or $(\sqrt{48}/\sqrt{2})$	24	3	M1 Must see $\sqrt{27}$ reduce to $3\sqrt{3}$ alternative $\frac{\sqrt{6} + \sqrt{54}}{2}$ (or better) M1 dep on 1st M1 A1cao dep on M2 Accept $\sqrt{24}$ if M2 awarded.
Total 3 marks				
20.	$\frac{4(2-x)+3x}{x(2-x)}$ oe $\frac{8-4x+3x}{x(2-x)}$	$\frac{8-x}{x(2-x)}$	3	M1 M1 A1 Accept $\frac{8-x}{2x-x^2}$ Single fraction needed as final answer.
Total 3 marks				

21. (a)	$0.5x[(x+5)+(x+8)] = 42$ (trapezium formula) or $x(x+5) + 0.5x \times 3 = 42$ (partitioning) $x(2x+13) = 84$ or $x^2 + 5x + 1.5x = 42$		2	M1 M1 dep on 1 st M1 then needs to develop on to quadratic given.
(b)	$(2x+21)(x-4) = 0$ oe $x = 4$ (P=) “4” +”9” +”12” + $\sqrt{3^2 + “4”^2}$	30	5	B2 B1 for either factor correct or $(2x \pm 21)(x \pm 4)$ or M1 for $x = \frac{-13 \pm \sqrt{13^2 - 4 \times 21 \times -84}}{4}$ (condone 1 sign error) then M1 for $x = \frac{-13 \pm \sqrt{169 + 672}}{4}$ A1 dep on M1 or B2 M1 i.e $x + (x+5) + (x+8) + \sqrt{3^2 + x^2}$ in numeric form. A1cao (Last two marks independent) N.B. Working for solving quadratic could be seen in (a) if not contradicted in (b).
				Total 7 marks

Write your name here

Surname

Other names

Edexcel

International GCSE

Centre Number

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Candidate Number

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Mathematics A

Paper 4H



Higher Tier

Monday 16 January 2012 – Morning

Time: 2 hours

Paper Reference

4MA0/4H

You must have:

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
Anything you write on the formulae page will gain **NO** credit.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ►

P40613A

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6/6/6/3



P 4 0 6 1 3 A 0 1 2 4

PEARSON

Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Work out the value of $\frac{6.7 - 2.5}{2.8 \times 0.4}$

Give your answer as a decimal.

.....

(Total for Question 1 is 2 marks)

- 2 An aeroplane flew from Qatar to Bahrain.
The distance flown was 135 km.
The average speed was 180 km/h.

Work out the time taken.
Give your answer in minutes.

..... minutes

(Total for Question 2 is 3 marks)

Do NOT write in this space.



- 3 Solve $7x - 5 = 3x + 2$
Show your working clearly.

$x = \dots\dots\dots$

(Total for Question 3 is 3 marks)

- 4 Three positive whole numbers have a median of 7 and a mean of 5
Find the range of these three numbers.

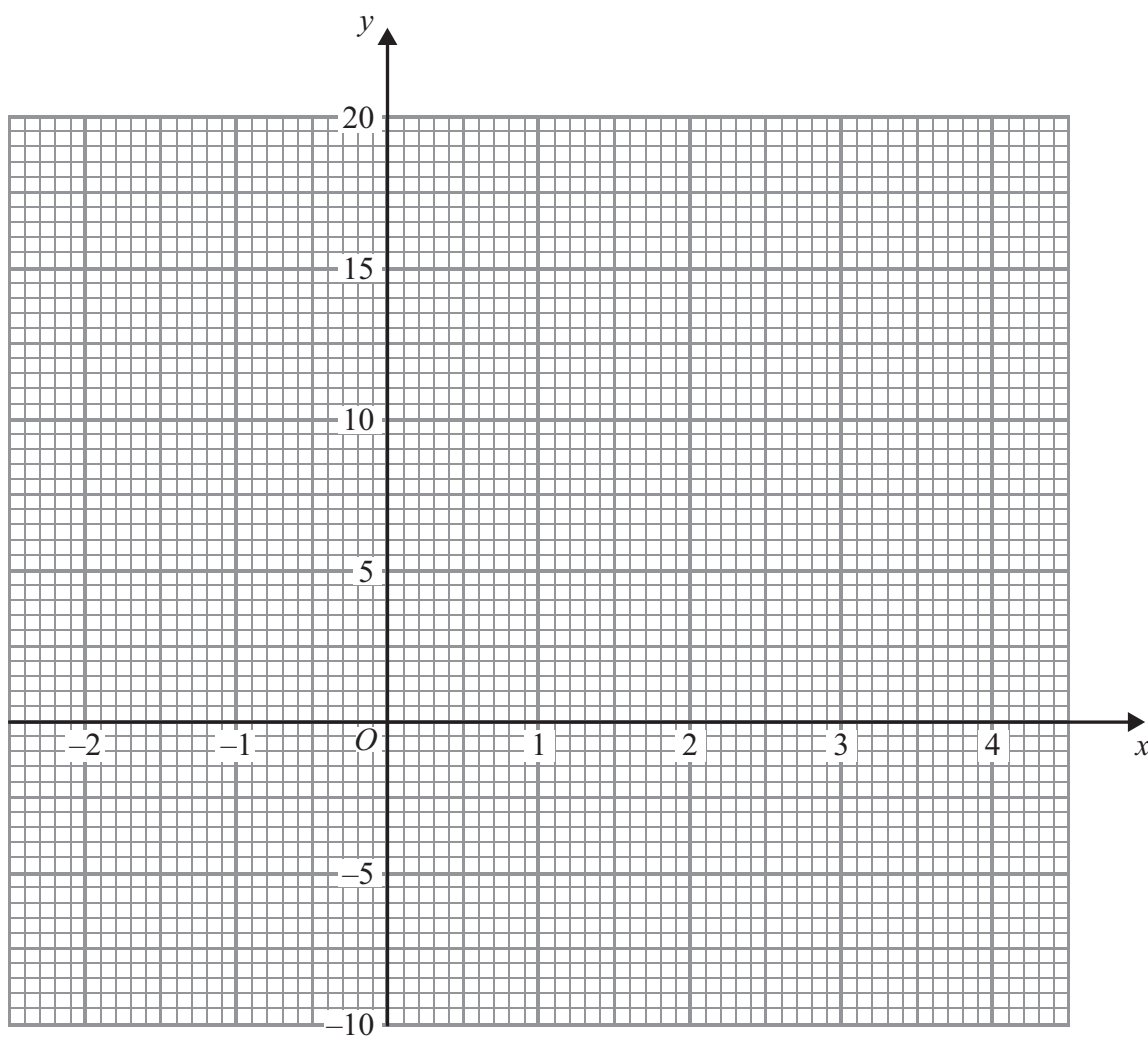
$\dots\dots\dots$

(Total for Question 4 is 3 marks)

Do NOT write in this space.



5 On the grid, draw the graph of $y = 4x - 1$ from $x = -2$ to $x = 4$



(Total for Question 5 is 4 marks)

Do NOT write in this space.



- 6 (a) There are 32 students in a class.
All the students are either left-handed or right-handed.
The ratio of the number of left-handed students to the number of right-handed students is 1 : 7

Work out the number of right-handed students.

.....
(2)

- (b) Sajid makes a scale model of a lorry.
He uses a scale of 1 : 32
The length of Sajid's model lorry is 45 cm.
Chitra makes a scale model of the same lorry.
She uses a scale of 1 : 72

Work out the length of Chitra's model lorry.

..... cm
(3)

(Total for Question 6 is 5 marks)

Do NOT write in this space.



7 Express 200 as a product of powers of its prime factors.

.....
(Total for Question 7 is 3 marks)

8 $\frac{y^3 \times y^n}{y} = y^6$

Find the value of n .

$n =$

(Total for Question 8 is 2 marks)

Do NOT write in this space.



9

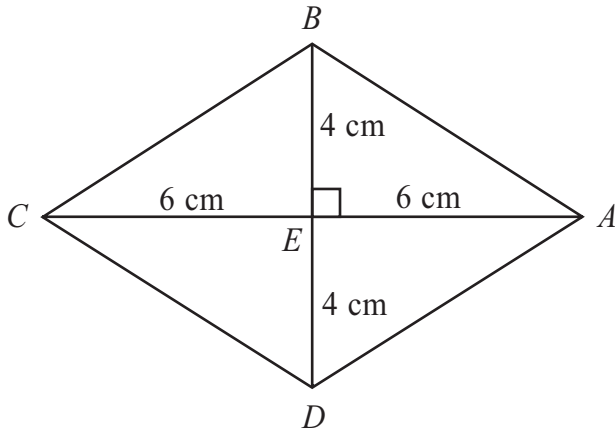


Diagram **NOT** accurately drawn

$ABCD$ is a rhombus.
The diagonals AC and BD cross at the point E .
 $AE = CE = 6$ cm.
 $BE = DE = 4$ cm.
Angle $AEB = 90^\circ$

(a) Work out the area of the rhombus.

..... cm²
(3)

(b) Work out the length of AB .
Give your answer correct to 3 significant figures.

..... cm
(3)

(Total for Question 9 is 6 marks)



10 (i) Solve the inequalities $-6 < 4x \leq 8$

.....

(ii) n is an integer.

Write down all the values of n which satisfy $-6 < 4n \leq 8$

.....

(Total for Question 10 is 4 marks)

11 (a) Find the Highest Common Factor (HCF) of 75 and 90

.....

(2)

(b) Find the Lowest Common Multiple (LCM) of 75 and 90

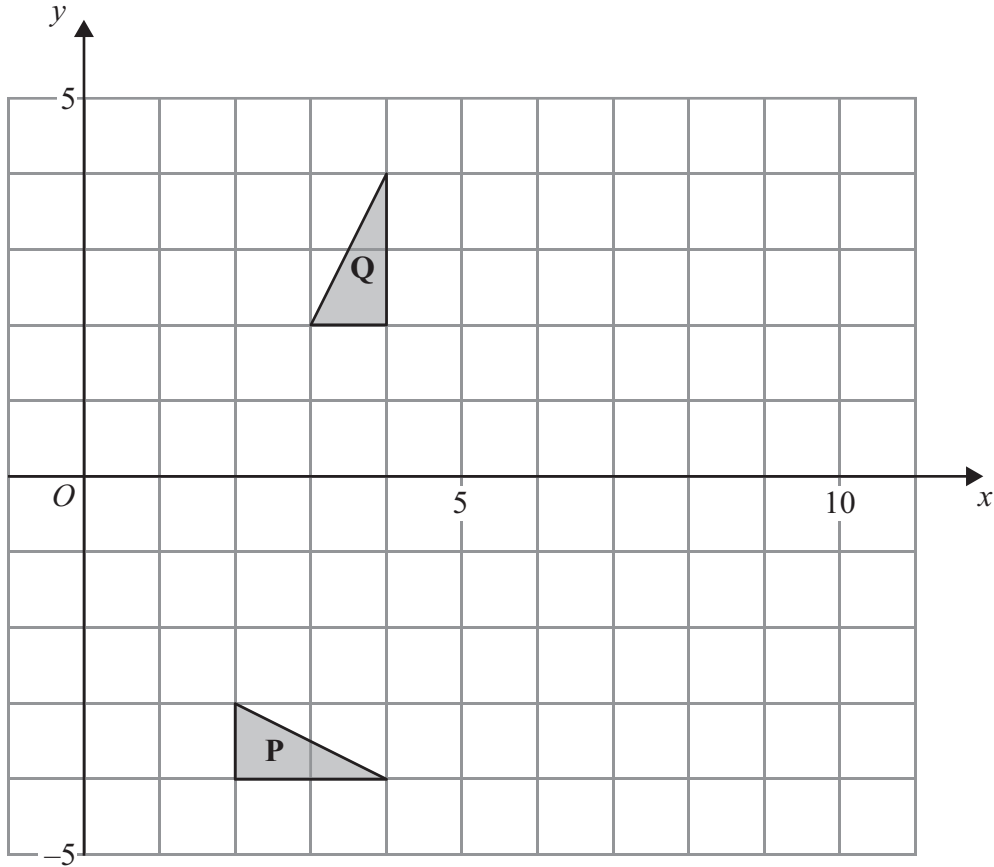
.....

(2)

(Total for Question 11 is 4 marks)

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(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

.....

.....

(3)

(b) On the grid, translate triangle **Q** by the vector $\begin{pmatrix} 4 \\ -2 \end{pmatrix}$

Label the new triangle **R**.

(1)

(c) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

.....

.....

(2)

(Total for Question 12 is 6 marks)

Do NOT write in this space.



13 (a) Find the gradient of the line with equation $3x + 4y = 10$

.....
(3)

(b) Find the coordinates of the point of intersection of the line with equation $3x + 4y = 10$ and the line with equation $5x - 6y = 23$
Show your working clearly.

(.....,)
(5)

(Total for Question 13 is 8 marks)



14 The grouped frequency table gives information about the ages of 200 elephants.

Age (t years)	Frequency
$0 < t \leq 10$	55
$10 < t \leq 20$	60
$20 < t \leq 30$	40
$30 < t \leq 40$	22
$40 < t \leq 50$	13
$50 < t \leq 60$	10

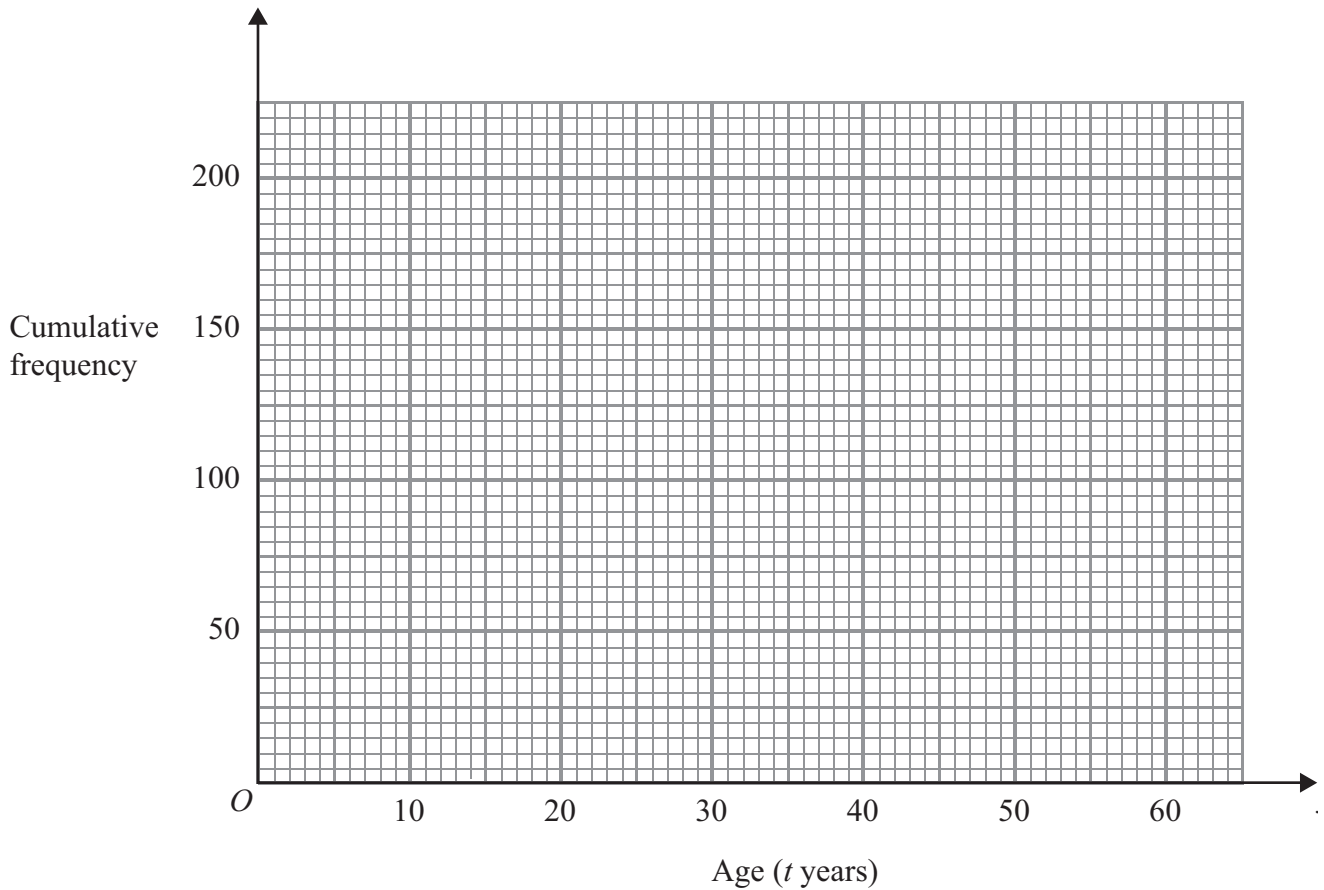
(a) Complete the cumulative frequency table.

Age (t years)	Cumulative frequency
$0 < t \leq 10$	
$0 < t \leq 20$	
$0 < t \leq 30$	
$0 < t \leq 40$	
$0 < t \leq 50$	
$0 < t \leq 60$	

(1)



(b) On the grid, draw a cumulative frequency graph for your table.



(2)

(c) Use the graph to find an estimate for the number of elephants with ages of more than 26 years.

.....
(2)

(Total for Question 14 is 5 marks)

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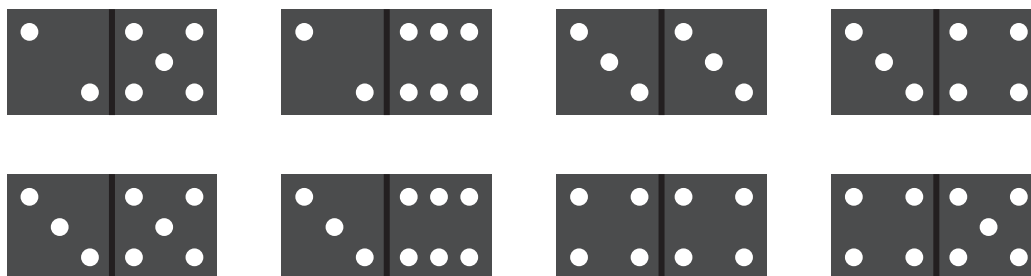


15 Solve the inequality $x^2 < 16$

.....

(Total for Question 15 is 2 marks)

16 Here are 8 dominoes.



The 8 dominoes are put in a bag.

Riaz takes at random a domino from the bag.

(a) Find the probability that he takes a domino with a total of 8 spots or a domino with a total of 9 spots.

.....

(2)



Helima takes at random 2 dominoes from the bag of 8 dominoes without replacement.

(b) Work out the probability that

(i) the total number of spots on the two dominoes is 18

(ii) the total number of spots on the two dominoes is 17

.....
(5)

(Total for Question 16 is 7 marks)

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17

$$f(x) = \sqrt{x-6}$$

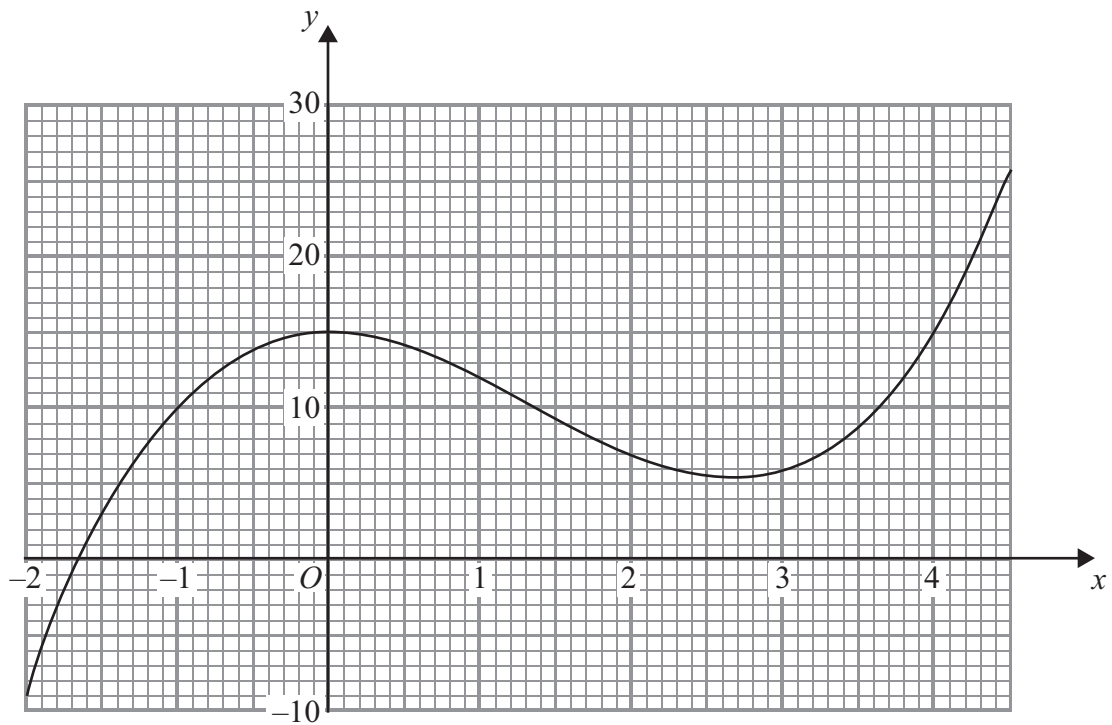
(a) Find $f(10)$

.....
(1)

(b) State which values of x must be excluded from a domain of f

.....
(2)

The diagram shows part of the graph of $y = g(x)$



(c) Find $g(2)$

.....
(1)



(d) Find $fg(0)$

.....
(2)

(e) One of the solutions of $g(x) = k$, where k is a number, is $x = 1$

Find the other solutions.

Give your answers correct to 1 decimal place.

.....
(3)

(f) Find an estimate for the gradient of the curve at the point where $x = 3.5$

Show your working clearly.

.....
(3)

(Total for Question 17 is 12 marks)

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18

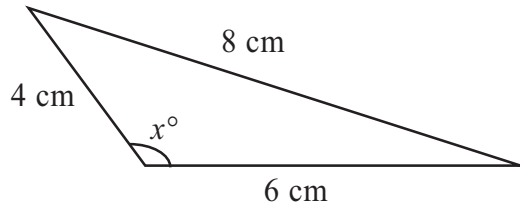


Diagram **NOT**
accurately drawn

Calculate the value of x .
Give your answer correct to 1 decimal place.

$x = \dots\dots\dots$

(Total for Question 18 is 3 marks)

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19 A and B are two sets.

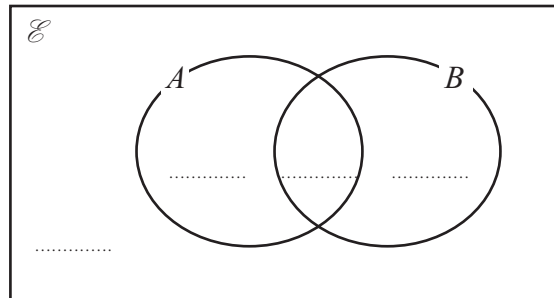
$$n(\mathcal{E}) = 37$$

$$n(A) = 22$$

$$n(A \cap B) = 12$$

$$n(A \cup B) = 30$$

(a) Complete the Venn Diagram to show the **numbers** of elements.



(2)

(b) Find (i) $n(A \cap B')$

.....

(ii) $n(A' \cup B')$

.....

(2)

(Total for Question 19 is 4 marks)

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20

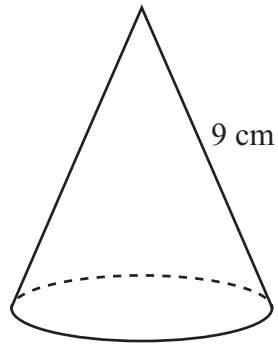


Diagram **NOT**
accurately drawn

A solid cone has a slant height of 9 cm.
The **curved** surface area of the cone is 100 cm^2 .

Calculate the volume of the cone.
Give your answer correct to 3 significant figures.

..... cm^3

(Total for Question 20 is 5 marks)



21 (a) Simplify $(16y^8)^{\frac{3}{4}}$

.....
(2)

(b) Given that $2^p \times 8^q = 2^n$
express n in terms of p and q .

$n =$
(2)

(Total for Question 21 is 4 marks)

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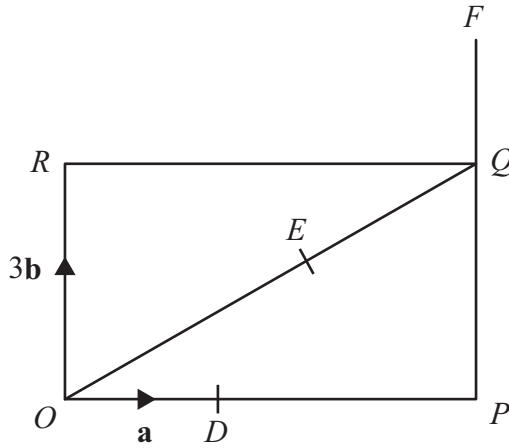


Diagram **NOT** accurately drawn

$OPQR$ is a rectangle.

D is the point on OP such that $OD = \frac{1}{3} OP$.

E is the point on OQ such that $OE = \frac{2}{3} OQ$.

PQF is the straight line such that $QF = \frac{1}{3} PQ$.

$\vec{OD} = \mathbf{a} \quad \vec{OR} = 3\mathbf{b}$

(a) Find, in terms of \mathbf{a} and \mathbf{b} ,

(i) \vec{OQ}

(ii) \vec{OE}

(iii) \vec{DE}

.....

.....

.....

(3)



(b) Use a vector method to prove that DEF is a straight line.

(2)

(Total for Question 22 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

Do NOT write in this space.



January 2012 International GCSE Mathematics (4MA0) Paper 4H Mark Scheme

Apart from Questions 3, 13(b) and 17(f) (where the mark scheme states otherwise), the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
1.	$\frac{4.2}{1.12}$		2	M1 for 4.2 or 1.12 or 0.6 or $\frac{15}{4}$
		3.75		A1
				Total 2 marks

2.	$\frac{135}{180}$		3	M1
	0.75 oe			A1
		45		A1 cao
				Total 3 marks

3.	$4x = 7$ or $4x = 2 + 5$ or $7x - 3x = 7$ oe or $4x - 7 = 0$ oe		3	M2 for correct rearrangement with x terms on one side and numbers on the other AND collection of terms on at least one side or for $4x - 7 = 0$ oe M1 for $7x - 3x = 2 + 5$ oe ie correct rearrangement with x terms on one side and numbers on the other
		$1\frac{3}{4}$ oe		A1 Award full marks for a correct answer if at least 1 method mark scored
				Total 3 marks

4.	1 7 7		3	B2 for 1 7 7 in any order B1 for three positive whole numbers with either a median of 7 or a sum of 15 SC Award B1 for 0 7 8
		6		B1 cao
				Total 3 marks

5.	One correct point plotted or stated		4	B1 May appear in table
	2nd correct point plotted or stated			B1 May appear in table
	Correct line between $x = -2$ and $x = 4$			B2 B1 for a line joining two correct, plotted points
				Total 4 marks

6.	(a)	$1 + 7$ or 8		2	M1 8 may be denominator of fraction or coefficient in an equation such as $8x = 32$	SC If M0 A0, award B1 for 4 : 28
			28		A1 cao	
	(b)	32×45 or 1440 or 14.4(0)m		3	M1	
		$\frac{"1440"}{72}$			M1 dep	
			20		A1 cao	
						Total 5 marks

7.	Fully correct factor tree or repeated division or 2, 2, 2, 5, 5 or $2 \times 2 \times 2 \times 5 \times 5$		3	M2 M1 for factor tree or repeated division with 2 and 5 as factors
		$2^3 \times 5^2$		A1 Also accept $2^3 \cdot 5^2$
				Total 3 marks

8.	$y^{3+n-1} = y^6$ oe or $y^{3+n} = y^7$ oe or $3 + n - 1 = 6$ oe or $y^n = \frac{y^7}{y^3}$ or $y^n = \frac{y^6}{y^2}$ or $y^n = y^4$		2	M1	SC if M0, award B1 for an answer of y^4
		4		A1 cao	
					Total 2 marks

9.	(a)	Complete, correct expression which, if correctly evaluated, gives 48 eg $4 \times \frac{1}{2} \times 6 \times 4$, $2 \times \frac{1}{2} \times 12 \times 4$, $\frac{1}{2} \times 12 \times 8$		3	M2 M1 for correct expression for area of one relevant triangle eg $\frac{1}{2} \times 6 \times 4$, $\frac{1}{2} \times 6 \times 4 \sin 90^\circ$, $\frac{1}{2} \times 8 \times 6$, $\frac{1}{2} \times 12 \times 4$
			48		A1 cao
	(b)	$4^2 + 6^2 = 16 + 36 = 52$		3	M1 for squaring and adding
		$\sqrt{4^2 + 6^2}$			M1 (dep) for square root
			7.21		A1 for answer which rounds to 7.21 (7.211102...)
					Total 6 marks

10.	(i)		$-1\frac{1}{2} < x \leq 2$	4	B2 Also accept $-\frac{3}{2} < x \leq 2$ or answer expressed as two separate inequalities B1 for $-1\frac{1}{2} < x$ or $-\frac{3}{2} < x$ or $x \leq 2$ (these may be as part of a double-ended inequality) or $-\frac{6}{4} < x \leq \frac{8}{4}$
	(ii)		-1 0 1 2		B2 B1 for 4 correct and 1 wrong or for 3 correct and 0 wrong
					Total 4 marks

11.	(a)	$75 = 3 \times 5^2$ and $90 = 2 \times 3^2 \times 5$ or 1,3,5,15,25,75 and 1,2,3,5,6,9,10,15,18,30,45,90 or 3×5		2	M1 Need not be products of powers; accept products or lists ie 3,5,5 and 2,3,3,5 Prime factors may be shown as factor trees or repeated division
				15	A1
	(b)	$2 \times 3^2 \times 5^2$ oe eg $6 \times 3 \times 5^2$ or 75,150,225,300,375,450 and 90,180,270,360,450		2	M1 Also award for $\frac{75 \times 90}{15}$
				450	A1
Total 4 marks					

12.	(a)		Rotation	3	B1	These marks are independent but award no marks if the answer is not a single transformation
			90°		B1 Also accept quarter turn or -270° (B0 for 90° clockwise)	
			(0, 0)		B1 Also accept origin, <i>O</i>	
	(b)		R correct	1	B1	
	(c)		Rotation 90°	2	B1 Accept quarter turn or -270° instead of 90°	As for (a)
			(3, 1)		B1 fit from their R if it is a translation of the correct R	
Total 6 marks						

13. (a)	$4y = 10 - 3x$ or $-4y = 3x - 10$		3	M1 May be implied by second M1 or by $y = -\frac{3}{4}x + c$ even if value of c is incorrect. or finds coordinates of 2 points on the line eg (0, 2.5), $x = 2, y = 1$, table, diagram.
	$y = \frac{5}{2} - \frac{3}{4}x$ oe or $y = \frac{10}{4} - \frac{3}{4}x$ oe or $y = \frac{10 - 3x}{4}$ oe			M1 or for clear attempt to evaluate $\frac{\text{vert diff}}{\text{horiz diff}}$ for their pts
		$-\frac{3}{4}$		A1 Award 3 marks for correct answer if either first M1 scored or no working shown. SC If M0, award B1 for $-\frac{3}{4}x$

13	(b)	eg $9x + 12y = 30$ $10x - 12y = 46$	eg $15x + 20y = 50$ $15x - 18y = 69$		5	M1 for coefficients of x or y the same or for correct rearrangement of one equation followed by correct substitution in the other eg $5x - 6\left(\frac{10 - 3x}{4}\right) = 23$
		$x = 4$	$y = -\frac{1}{2}$			A1 cao dep on M1
						M1 (dep on 1st M1) for substituting for other variable
				$x = 4, y = -\frac{1}{2}$		A1 Award 4 marks for correct values if at least first M1 scored
				$(4, -\frac{1}{2})$		B1 Award 5 marks for correct answer if at least first M1 scored ft from their values of x and y
						Total 8 marks

14.	(a)	55 115 155 177 190 200	1	B1	cao
	(b)		2	B1	$\pm \frac{1}{2}$ sq ft from sensible table ie clear attempt to add frequencies
		Curve or line segments		B1	ft from points if 4 or 5 correct or ft correctly from sensible table or if points are plotted consistently within each interval at the correct heights Accept curve which is not joined to the origin
	(c)	26 indicated on cf graph	2	M1	for 26 indicated on cf graph – accept 26-27 inc
		approx 60 from correct graph		A1	If M1 scored, ft from cf graph If M1 not scored, ft only from correct curve & if answer is correct ($\pm \frac{1}{2}$ sq tolerance) award M1 A1
					Total 5 marks
15.		$-4 < x < 4$	2	B2	B1 for $x < 4$ or $x > -4$ or $x < \pm 4$ or $x < \sqrt{16}$ SC B1 for $-4 \leq x \leq 4$
					Total 2 marks

16.	(a)	$\frac{3}{8} + \frac{2}{8}$ oe		2	M1	
					A1	$\frac{5}{8}$
	(b)(i)	$\frac{2}{8} \times \frac{1}{7}$ appearing once only		5	M1	
					A1	for $\frac{2}{56}$ or $\frac{1}{28}$ or for 0.036 or for answer rounding to 0.036
			$\frac{2}{56}$ or $\frac{1}{28}$			Sample space method – award 2 marks for correct answer; otherwise no marks
	(ii)	$\frac{2}{8} \times \frac{3}{7} + \frac{3}{8} \times \frac{2}{7}$ or $2 \times \frac{2}{8} \times \frac{3}{7}$ oe			M1	for one correct product
					M1	for completely correct expression
					A1	for $\frac{12}{56}$ oe inc $\frac{3}{14}$ or for 0.21 or for answer rounding to 0.21
						Note for (b)(ii): sample space method – award 3 marks for correct answer; otherwise no marks SC M1 for $\frac{2}{8} \times \frac{3}{8}$ or $\frac{3}{8} \times \frac{2}{8}$ M1 (dep) for $\frac{2}{8} \times \frac{3}{8} + \frac{3}{8} \times \frac{2}{8}$ oe SC Sample space method – award 2 marks for $\frac{12}{64}$ oe; otherwise no marks
						Total 7 marks

17.	(a)		2	1	B1	cao
	(b)		$x < 6$	2	B2	cao B1 for eg $x \leq 6$ or ... -2, -1, 0, 1, 2, 3, 4, 5 SC B1 for $x \geq 6$
	(c)		7	1	B1	cao
	(d)	$g(0) = 15$		2	M1	for 15 seen
			3		A1	cao If M0, award B1 for ± 3 oe
	(e)	$k = 12$		3	M1	May be stated or indicated on diagram. May be implied by one correct solution.
			-0.7 or -0.8 3.8		A2	A1 for solution rounding to -0.7 or -0.8 A1 for solution rounding to 3.8
	(f)	tan drawn at $x = 3.5$		3	M1	tan or tan produced passes between points $(3, 3 \leq y \leq 6)$ and $(4, 11 \leq y \leq 14)$
		$\frac{\text{vertical difference}}{\text{horizontal difference}}$			M1	finds their $\frac{\text{vertical difference}}{\text{horizontal difference}}$ for two points on tan or finds their $\frac{\text{vertical difference}}{\text{horizontal difference}}$ for two points on curve, where one of the points has an x -coordinate between 3 and 3.5 inc and the other point has an x -coordinate between 3.5 and 4 inc
			6.5 – 11 inc		A1	dep on both M marks
						Total 12 marks

18.	$(\cos x^\circ =) \frac{4^2 + 6^2 - 8^2}{2 \times 4 \times 6}$ or $8^2 = 4^2 + 6^2 - 2 \times 4 \times 6 \cos x^\circ$		3	M1 for correct substitution in Cosine Rule
	$(\cos x^\circ =) -0.25$ oe			A1
		104.5		A1 for value rounding to 104.5 (104.4775...)
				Total 3 marks

19. (a)			2	B2 for all correct B1 for 2 or 3 correct
(b)(i)		10	2	B1 cao
(ii)		25		B1 cao
				Total 4 marks

20.	$\pi \times r \times 9 = 100$ oe		5	M1
	($r =$) 3.53677...			A1 for 3.53 or for value rounding to 3.54 (3.14 \rightarrow 3.53857...)
	$\sqrt{9^2 - "3.53..."^2}$			M1
	($h =$) 8.2759...			A1 for 8.27 or for value rounding to 8.28
		108		A1 for answer rounding to 108 ($\pi \rightarrow 108.40...$ 3.14 \rightarrow 108.45...) If both M1s scored, award 5 marks for an answer which rounds to 108
Total 5 marks				

21.	(a)		$8y^6$	2	B2 B1 for 8 B1 for y^6
	(b)	$2^p \times (2^3)^q = 2^p \times 2^{3q} = 2^{p+3q}$	$p + 3q$	2	B2 B1 for 2^{3q} seen
Total 4 marks					

22.	(a)(i)		$3\mathbf{a} + 3\mathbf{b}$ oe	3	B1
	(ii)		$2\mathbf{a} + 2\mathbf{b}$ oe		B1 Accept eg $\frac{2}{3}(3\mathbf{a} + 3\mathbf{b})$
	(iii)		$\mathbf{a} + 2\mathbf{b}$ oe		B1 Accept eg $2\mathbf{a} + 2\mathbf{b} - \mathbf{a}$
	(b)	$\vec{DF} = 2\mathbf{a} + 4\mathbf{b}$ oe		2	M1 Also award for $\vec{EF} = \mathbf{a} + 2\mathbf{b}$ oe
			$\vec{DF} = 2\vec{DE}$ oe eg $\vec{DE} = \vec{EF}$		A1 Also award A1 for an acceptable explanation in words.
Total 5 marks					