Year 12 Standard Level Mathematical Studies

June 2013 Mark scheme

Question 1.

(a)

Time (minutes)	Number of telephone calls
$0 < t \le 5$	12
$5 < t \le 10$	4
$10 < t \le 15$	6
$15 < t \le 20$	8

(A2)   *(C2)*

Note: Award *(A2)* for four correct entries, *(A1)* for three correct entries, *(A0)* otherwise.

(b) $0 < t \le 5$ *(A1)*   *(C1)*

(c)   12.5   *(A1)*   *(C1)*

(d) $\dfrac{275}{30}$ *(M1)*

Note: Award *(M1)* for division with 275 seen.

$= 9.17 \ (9.16666\,)$ *(A1)(ft)*   *(C2)*

Note: Follow through from their parts (a) and (c), irrespective of whether working is shown.

[6 marks]

Question 2.

(a)	$d = -7$	*(A1)*	*(C1)*
(b)	$S_{50} = \dfrac{50}{2}\left(2(124) + 49(-7)\right)$	*(M1)*	
	(M1) for correct substitution.		
	$= -2375$	*(A1)(ft)*	*(C2)*
(c)	$124 - 7(k - 1) < 0$	*(M1)*	
	$k > 18.7$ *or 18.7 seen*	*(A1)(ft)*	
	$k = 19$	*(A1)(ft)*	*(C3)*
	(M1) for correct inequality or equation seen or for list of values seen or for use of trial and error.		

[6 marks]

Question 3.

a) $8.7 \times 5.6 \times 3.4 = 165.648$ *(M1) (A1)*

b) i) 165.6 *(A1)*

   ii) 166 *(A1)*

c) 1.66×10^2 *(A2)*

[6 marks]

Question 4.

(a)   17   *(A1)*   *(C1)*

(b) $35 - 17$ *(M1)*
          $= 18$ *(A1)*   *(C2)*

| Note: Award *(A1)* for correct answer only. |

(c) $60 - (35 - 17) - (28 - 17) - 17$ *(M1)*

         $= 14$ *(A1)(ft)*   *(C2)*

| Note: Follow through from (a) and (b). |

(d)

          (A1)   *(C1)*
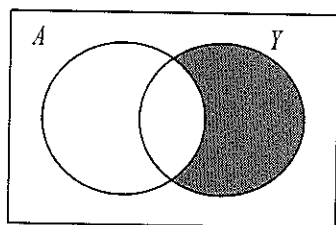
[6 marks]

Question 5.
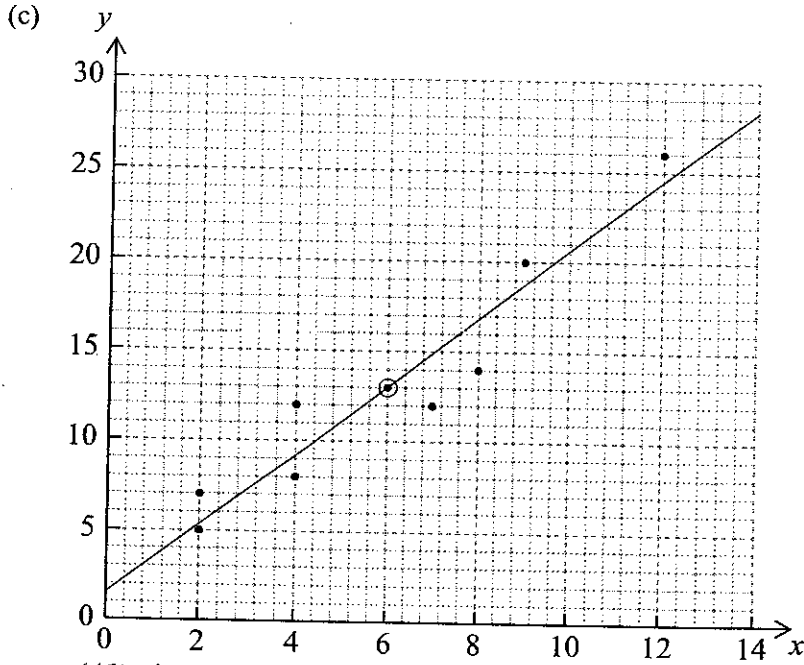
(a) (6,13)   *(A1)(A1)*   *(C2)*

(b) 0.952 (0.95202...)   *(A2)*   *(C2)*

Note: Award *(A0)* for 0.9.

(c)   *y*

(A1) *y* intercept at $y = 1.8$ *(accept between 1 and 2)*

(A1)(ft) line passes through their mean point   *(A1)(A1)*(ft)   *(C2)*

[6 marks]

Question 6.

a) i) $t = 8$ (A1)

    ii) $W = 48$ (A1)

b)

True	False	
	✓	(A1)
✓		(A1)
	✓	(A1)
✓		(A1)

[6 marks]

Question 7.

(a) $3 = 57 + (n-1) \times (-2)$

OR

$57 = 3 + (n-1) \times (2)$ *(A1)(M1)*

> **Note:** Award *(A1)* for 3 **or** 57 seen as u_n, *(M1)* for correctly substituted formula or list of values seen

   $n = 28$ *(A1)* *(C3)*

(b) $S_{28} = \dfrac{28}{2}(57 + 3)$

OR

$S_{28} = \dfrac{28}{2}(2(57) + (28-1) \times -2)$

OR

$S_{28} = \dfrac{28}{2}(2(3) + (28-1) \times 2)$ *(M1)(A1)(ft)*

> **Note:** *(A1)(ft)* for 28 seen.
> Award *(M1)* for correctly substituted formula or list of values seen.

   $S_{28} = 840$ *(A1)(ft)* *(C3)*

[6 marks]

Question 8.

	$\mathbb{N}$	$\mathbb{Q}$	$\mathbb{R}$
3	(✓)	(✓)	(✓)
−5		✓	✓
$(\sqrt{7}$			✓
2^{-3}		✓	✓
1.75		✓	✓

Question 9.

a) $P(R) = \dfrac{3}{12} = \dfrac{1}{4}$ *(A1)*

b) $P(G)$ and $P(B) = \dfrac{2}{12} \times \dfrac{7}{11} = \dfrac{14}{132} = \dfrac{7}{66}$ *(M1) (A1)*

c) $P(GG)$ or $P(RR)$ or $P(BB)$ *(M1)*

$= \dfrac{2}{132} + \dfrac{6}{132} + \dfrac{42}{132} = \dfrac{12}{132} = \dfrac{1}{11}$ *(A1) (A1).*

Question 10.

(a) $\dfrac{50}{120} \times \dfrac{35}{120} \times 120$ **OR** $\left(\dfrac{50 \times 35}{120}\right)$ *(M1)*

   $= 14.6 \ (14.5833...)$ *(A1)*   *(C2)*

(b)   0.0746   *(A2)*   *(C2)*

(c)   Since p-value > 5 %, the choice of the sport is independent of gender.   *(R1)(A1)(ft)*   *(C2)*

> **Note:** The *(R1)* is awarded for the explicit comparison, the *(A1)(ft)* is awarded for a consistent conclusion with their answer in part (c).
> It is therefore possible that *(R1)(A0)* may be awarded, but *(R0)(A1)* can never be awarded.

[6 marks]