

1. (a) $x^2 = (3.1 \times 10^4)^2$ or 31000×31000 (M1)
 $= 9.61 \times 10^8$ (A1) (C2)
- (b) $\frac{x}{y} = \frac{3.1 \times 10^4}{2.4 \times 10^{-7}}$
 $= 1.29 \times 10^{11}$ (3 s.f.) (A2) (C2)
- Note: Award (A1) for 10^{11} , (A1) for 1.29*

[4]

2. (a) The sixth number is 22 (C1)
- (b) $u_{200} = 2 + 199 \times 4$ (M1)(A1)(A1)
 $= 798$ (A1) (C4)
- Note: Award (A1) for $a = 2$ stated or used, (A1) for $d = 4$ stated or used.*

- (c) $S_{90} = \frac{90}{2}(2 \times 2 + 89 \times 4)$ or $\frac{90}{2}(2 + 358)$ (M1)(A1)
 $= 16\,200$ (A1) (C3)

[8]

3. *Note: Award (A1) for each pair of correct entries in parts (a) and (c).
 A list of numbers with no set brackets is acceptable.*

- (a) $A \cup B = \{1, 3, 4, 7, 8, 9\}$ (A1)(A1)(A1) (C3)
- (b) $A \cap B \cap C = \{9\}$ (A1) (C1)
- (c) $A' = \{1, 3, 4, 7, 8, 9\}$ (A1)
 $A' \cap C = \{6, 7\}$ (A1)
 $(A' \cap C) \cup B = \{3, 6, 7, 9\}$ (A1)(A1) (C4)

[8]

4.

	\mathbb{N}	\mathbb{R}	\mathbb{Q}	
5	✓	✓	✓	(A1)(A1) (C2)
0.5	✗	✓	✓	(A1)(A1) (C2)
$\sqrt{5}$	✗	✓	✗	(A1)(A1) (C2)
-5	✗	✓	✓	(A1)(A1) (C2)

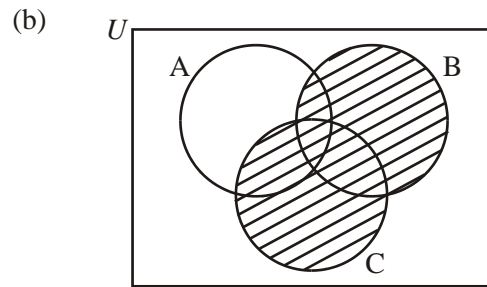
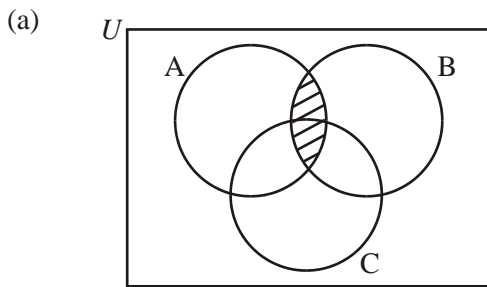
[8]

5. (a) $u_1 = 59$ $u_2 = 55$ (A1)(A1) 2
- (b) $63 - 4n = -13$ $-4n = -76$ $n = 19$ (M1)(A1) or (G2) 2
- (c) $63 - 4k + 63 - 4(k + 1) = 34$
 $-8k = -88$ $k = 11$ (M1)(M1)(A1) 3

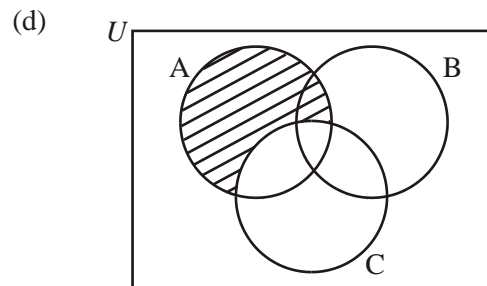
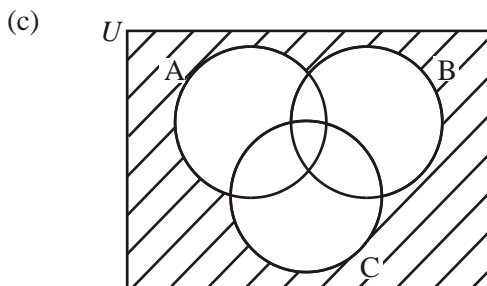
Note: Award (M1) for the terms 15 and 19.

[7]

6.



(A2)(A2)

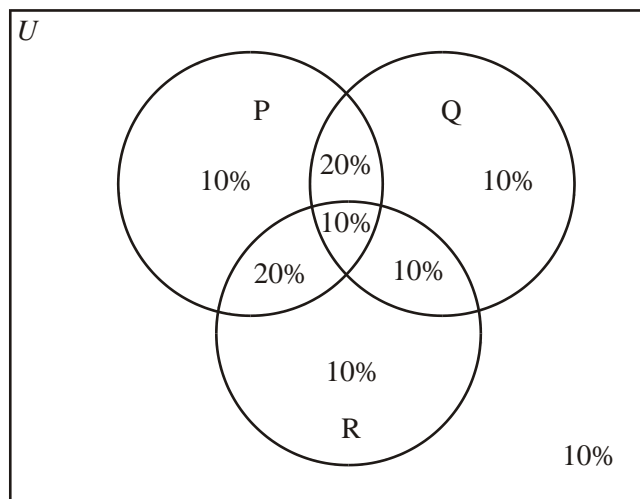


(A2)(A2)

Note: Award (A0), (A0), (A2)ft, (A2)ft if \cup and \cap are consistently reversed.

[8]

7. (a)



(A4) 4

Notes: Award (A1) for labelled sets P , Q , and R included inside a universal set.
(Label U is not essential.)

Award (A1) for central entry 10%, (A1) for 20%, 20%, 10% in the other intersecting regions,

Award (A1) for the remaining three 10% in P , Q and R .

ft at each stage for numerical errors, however, 10 followed by 30, 30, 20 then 60, 50, 50 receives only (A1) for the initial 10.

Allow fraction or decimal notation or missing % sign.

The 10% outside of P , Q , and R can be omitted.

Note: For (b) to (d) ft from the candidate's diagram, but not if the answer is negative or (strictly) greater than 100%

- (b) 50 % read exactly two magazines (A1) 1
- (c) 60 % read at least two magazines (A1) 1
- (d) 10 % do not read any magazines (A1) 1
8. (a) $0.001\ 673 \times 1\ 000 = 1.673\ \text{ml}$ (M1)(A1)
 $= 2\ \text{ml}$ (nearest whole number) or $2.0\ \text{ml}$ (A1) (C3)
*Note: Award (M0)(A0) if candidate divides by 1000. The final (A1) ft can be awarded for an answer of 0 ml but **not** for 2×10^{-6} .*
- (b) Energy = $\frac{1}{2} \times 351\ 223 \times 176.334^2$ (M1)
 $= 5\ 460\ 407\ 707$ (A1)
 $= 5\ 460\ 410\ 000$ ($= 5.46041 \times 10^9$) joules (A1) (C3)
- (c) Units are kg ms^{-1} or equivalent (A1)(A1) (C2)
Note: Award (A1) for any pair correctly presented, (A2) for all 3.

[8]