

1.

- (a) A:  $y = 0, 3x = 24 \Rightarrow x = 8$   
A(8, 0) (A1)
- B:  $x = 0, 4y = 24 \Rightarrow y = 6$   
B(0, 6) (A1) 2
- (b) M:  $x_m = \frac{8+0}{2} = 4, y_m = \frac{0+6}{2} = 3$  (A1) 2
- M(4, 3) (A1)
- (c)  $L_2$ : gradient =  $\frac{3 - -2}{4 - 0} = \frac{5}{4}$  (A1)
- $y = \frac{5}{4}x - 2$  (or equivalent) (A1) 2
- (d) (i) M(4, 3), C(0, -2)
- $MC = \sqrt{(4-0)^2 + (3-(-2))^2}$  (M1)
- $= \sqrt{41}$
- $= 6.40$  (A1)
- (ii) A(8, 0), C(0, -2)
- $AC = \sqrt{8^2 + (-2)^2}$  (M1)
- $= \sqrt{68}$
- $= 8.25$  (A1) 4

2.

(a) Gradient of DC =  $-\frac{2}{11}$  (A2) 2

*Note: Award (A1) for sign, (A1) for  $\frac{2}{11}$ .*

(b) No. The gradients are not equal. (A1)(R1) 2

(c) Gradient =  $\frac{2}{12} = \frac{1}{6}$  (A1)

$y = \frac{1}{6}x + c$  (A1)

$3 = \frac{1}{6}(8) + c$

$18 = 8 + 6c$

$10 = 6c$

$c = \frac{10}{6} = \frac{5}{3}$

$6y = x + 10$  (M1)

$x - 6y = -10$  (A1) 5

(d)  $3x + 5y = 16$

$x - 6y = -10$  (M1)

$3x - 18y = -30$  (M1)

$23y = 46$

$y = 2$  (A1)

$x = 2 \Rightarrow T(2,2)$  (A1) 4

*Note: Award (A2) for the answers only.*

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3.

(a)  $E(8,0)$  (A1)(A1)

*Notes: Brackets required. If missing award (A1)(A0).*

*Accept  $x = 8, y = 0$*

*Award (A1) for  $x = 8$*

(b)  $y + \frac{1}{2}t = 4$  (M1)(M1)

*Notes: (M1) for the equation of the line seen.*

*(M1) for substituting  $t$ .*

$y = 4 - \frac{1}{2}t$  (AG)

*Notes: Final line must be seen or previous (M1) mark is lost.*

(c)  $\text{Area} = \frac{1}{2} \times \left(4 + 4 - \frac{1}{2}t\right) \times t$  (M1)(A1)

*Note: (M1) for substituting in correct formula,*

*(A1) for correct substitution.*

$= \frac{1}{2} \times \left(8 - \frac{1}{2}t\right) \times t = \frac{1}{2} \left(8t - \frac{1}{2}t^2\right)$  (A1)

$= 4t - \frac{1}{4}t^2$  (AG)

*Note: Final line must be seen or previous (A1) mark is lost*

(d)  $4t - \frac{1}{4}t^2 = 9.75$  or any equivalent form. (A1)

(e) (i)  $t = 3$  or  $t = 13$  (A1)(ft)(A1)(ft)(G2)

*Notes: Follow through from candidate's equation to part (d). Award (A0)(A1)(ft) for (3, 0) and (13, 0)*

(ii)  $t$  must be a value between 0 and 8 then  $t = 3$  (R1)(A1)

*Accept B is between O and E.*

*Do not award (R0)(A1).*

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4.

(a) Gradient of CD =  $\frac{1 - (-1)}{-2 - (-1)}$  (M1)

= -2 (A1)(G2)

*Note: Award (M1) for correct substitution in gradient formula.*

(b) Gradient of AD =  $\frac{1}{2}$  (A1)

$-2 \times \frac{1}{2} = -1$  or  $\frac{1}{2}$  is negative reciprocal of -2 (M1)

Hence AD is perpendicular for CD. (AG)

*Note: Last line must be seen for the (M1) to be awarded.*

(c)  $y = -2x - 3$  (A1)(ft)(A1)(ft)

*Note: Award (A1)(ft) for their (a), (A1)(ft) for -3.*

*If part (a) incorrect award (A1)(ft) for their y-intercept only if working is seen.*

**OR**

$y - 1 = -2(x + 2)$  (A1)(ft)(A1)

**OR**

$y + 1 = -2(x + 1)$  (A1)(ft)(A1)

*Note: Award (A1)(ft) for their (a), (A1) for correct substitution of point.*

$2x + y = -3$  (A1)(ft)

*Note: The final (A1)(ft) is for their equation in the stated form.*

(d) E(-3, 3) (Accept  $x = -3, y = 3$ ) (G2)

**OR**

Award (M1) for solving the pair of simultaneous equations by hand. (A1)(ft) for correct answer, (ft) from their (c). (M1)(A1)(ft)

**OR**

Award (M1) for having extended the lines in their own graph seen drawn on answer paper. (A1) for correct answer. (M1)(A1)

*Note: Missing coordinate brackets receive (G1)(G0) or (M1)(A0).*

(e) Distance between A and D =  $\sqrt{4^2 + 2^2}$  (M1)

=  $\sqrt{20}$  OR  $2\sqrt{5}$  OR 4.47 (3 s.f.) (A1)(G2)

*Note: Award (M1) for correct substitution into the distance formula, (A1) for correct answer.*

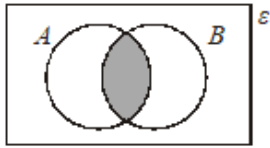
(f) Area of ADE =  $\frac{1}{2} \sqrt{20} \times \sqrt{20}$  (M1)

= 10 (A1)(ft)(G2)

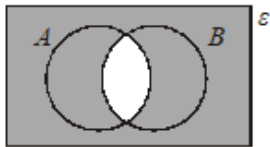
Follow through from (e).

5.

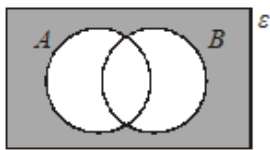
(a)  $A \cap B$  (A1)



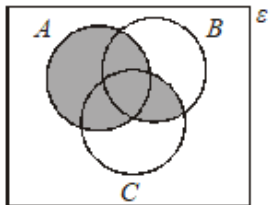
(b) The complement of  $(A \cap B)$  (A1)



(c) The complement of  $(A \cup B)$  (A1)



(d)  $A \cup (B \cap C)$  (A1)



[4]

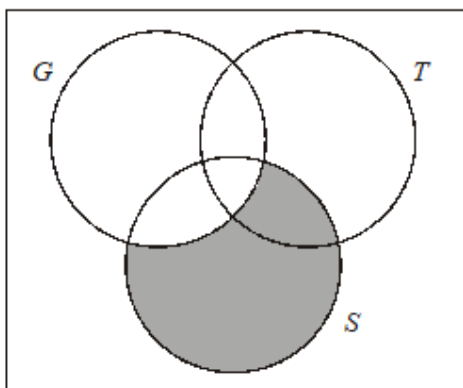
6.

(a) (i) 11 (A1) (C1)

(ii)  $2 + 3 = 5$  (A1) (C1)

(iii)  $8 + 4 + 6 + 4 = 22$  (A1) (C1)

(b)

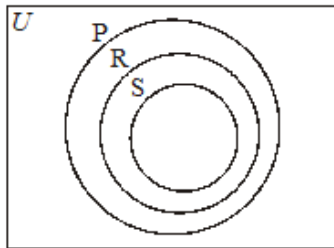


(A1) (C1)

[4]

7.

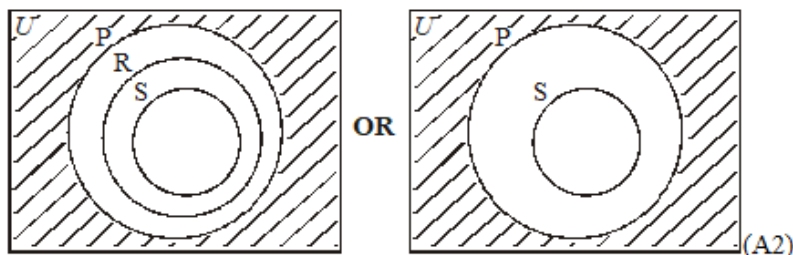
(a)



(A4) 4

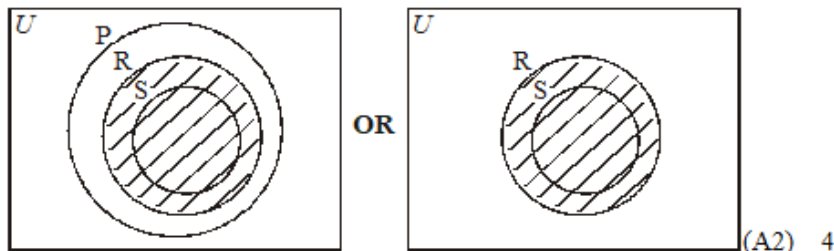
**Note:** Award (A1) for rectangle labelled with U, (A1) for R placed correctly with respect to S, (A1) for S placed correctly with respect to P, (A1) for R placed correctly with respect to P.

(b) (i)



(A2)

(ii)



(A2) 4

**Note:** Award (A2) for correct shading in each **ft** from circle placement in (a).

[8]

8.

(a) 3 (A1)

(b) For 5, 4, 7 (0) seen with no extra values (A1)  
16 (A1)(G2)

(c) They like (both) the *Salseros* (S) **and** they like the *Bluers* (B) (A1)(A1)  
**Note:** Award (A1) for "and", (A1) for the correct groups.

(d)  $R \cap B \cap S'$  (A1)(A1)  
**Note:** Award (A1) for  $R \cap B$ , (A1) for  $\cap S'$

(e) (i)  $21 + 3x = 33$  (M1)  
 $x = 4$  (A1)(G2)

(ii) 17 (A1)(ft)

[10]

9.

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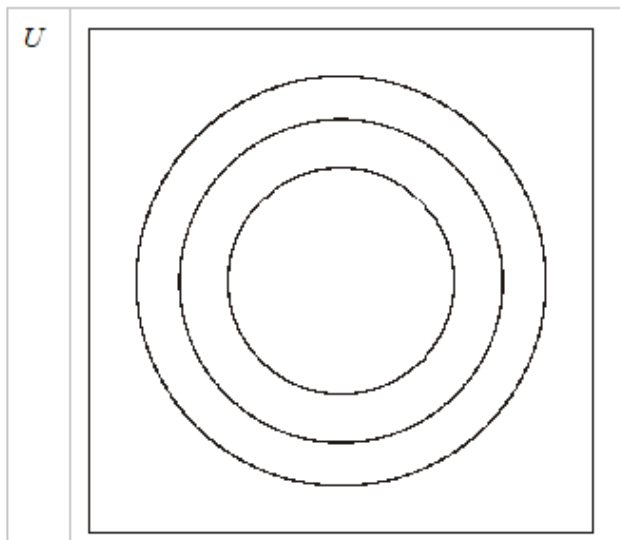
*Note: Award (A1) for each pair of correct entries in parts (a) and (c).  
A list of numbers with no set brackets is acceptable.*

- (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]

10.

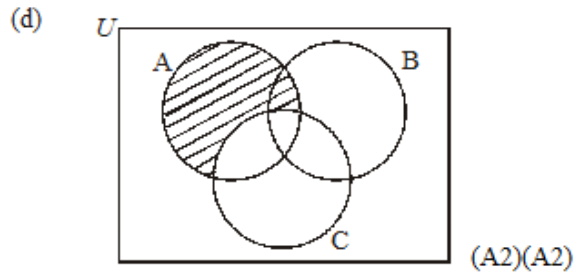
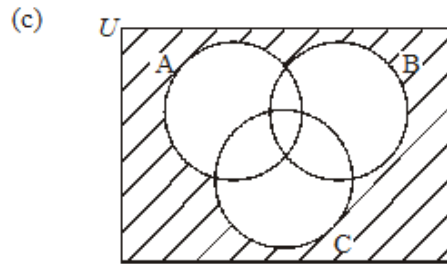
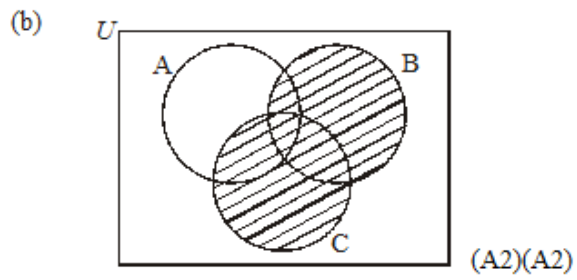
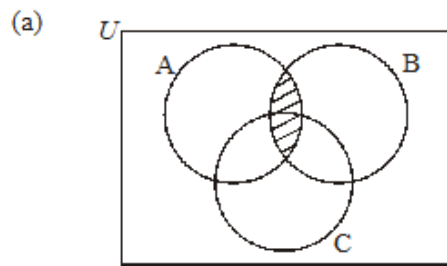
- (a) For example, 2, -3, etc (A1) (C1)  
(b) For example,  $\frac{3}{5}$  (not  $\frac{6}{1}$ ) (A1) (C1)  
(c) For example,  $\sqrt{2}$ ,  $\pi$  (A1) (C1)  
(d)



- For  $\mathbb{Z} \subset \mathbb{Q}$  (A1)  
For  $\mathbb{Z} \subset \mathbb{R}$  (A1)  
For  $\mathbb{Q} \subset \mathbb{R}$  (A1)  
Accept  $\mathbb{R}$  as  $U$ . (C3)

[6]

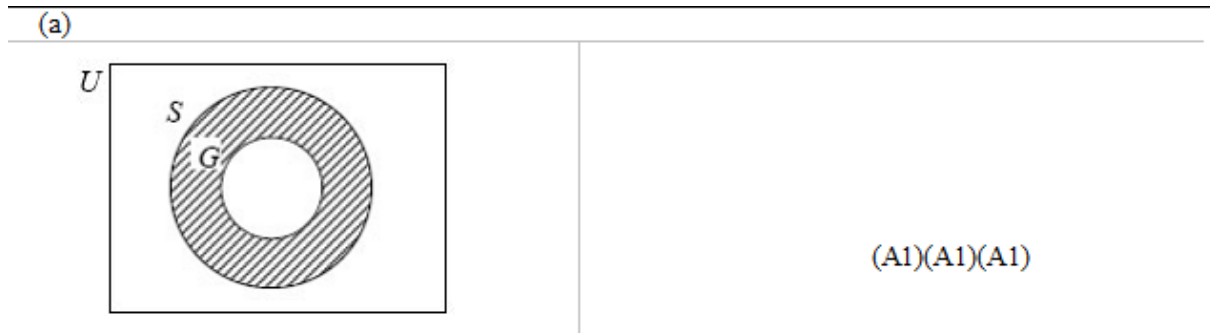
10.



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

[8]

12.



*Note: Award (A1) for rectangle, (A1) for S drawn and named, (A1) for G completely inside S.*

(b) shading on diagram (A1)(ft)

(c) sports cars that are not green (A2)

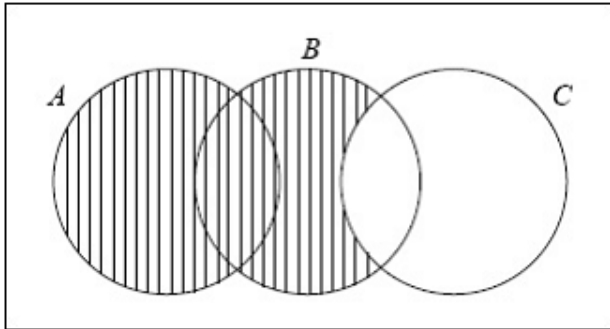
*Note: Award (A1) for sports cars intersecting with not green cars.*

[6]



13.

(a)



not shading  $C$  or shading  $A \cup B$   
correct shading

(A1)

(A1) (C2)

(b) Identifying the correct 5 numbers 3, 4, 5, 6, 9  
27

(A1)

(A1) (C2)

(c) (i)  $M = \{3, 6, 9, 12, 15, 18\}$  brackets not required.

(A1)

(ii)  $E' \cap M = \{3, 9, 15, 21, 27, 33\}$  (ft) from (i).

(A1)(ft) (C2)

[6]