Edexcel IGCSE Higher Tier Mathematics Paper 3H – May 2014

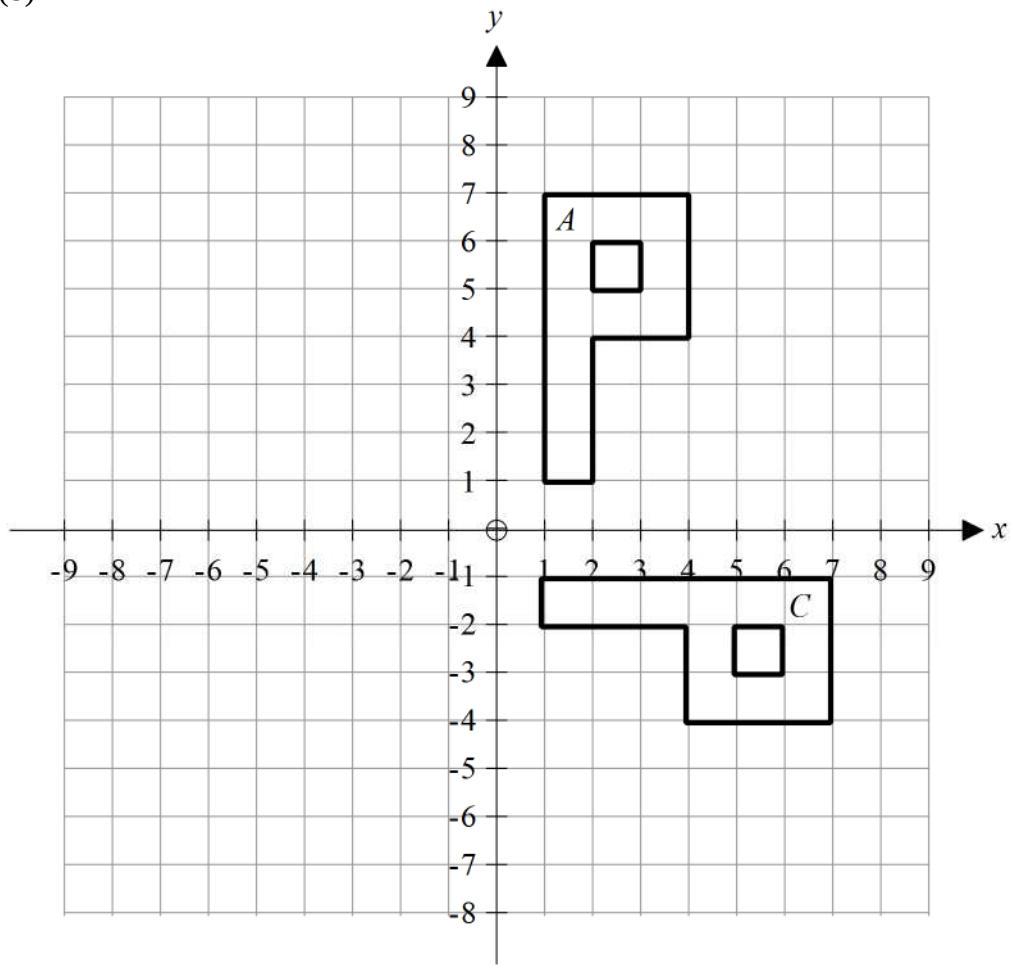
1. (a) $\dfrac{13.8\times 6.5}{7+\sqrt{2}} = 10.66053284$

(b) 10.7 (3 sf)

2. $\dfrac{4}{9}\div\dfrac{5}{6}=\dfrac{4}{9}\times\dfrac{6}{5}=\dfrac{24}{45}=\dfrac{8}{15}$

3. (a) Reflection in the line $x = -2$

(b)



4. (a) $8d \times 7d = 56d^2$

(b) $4(3e-5) = 12e-20$

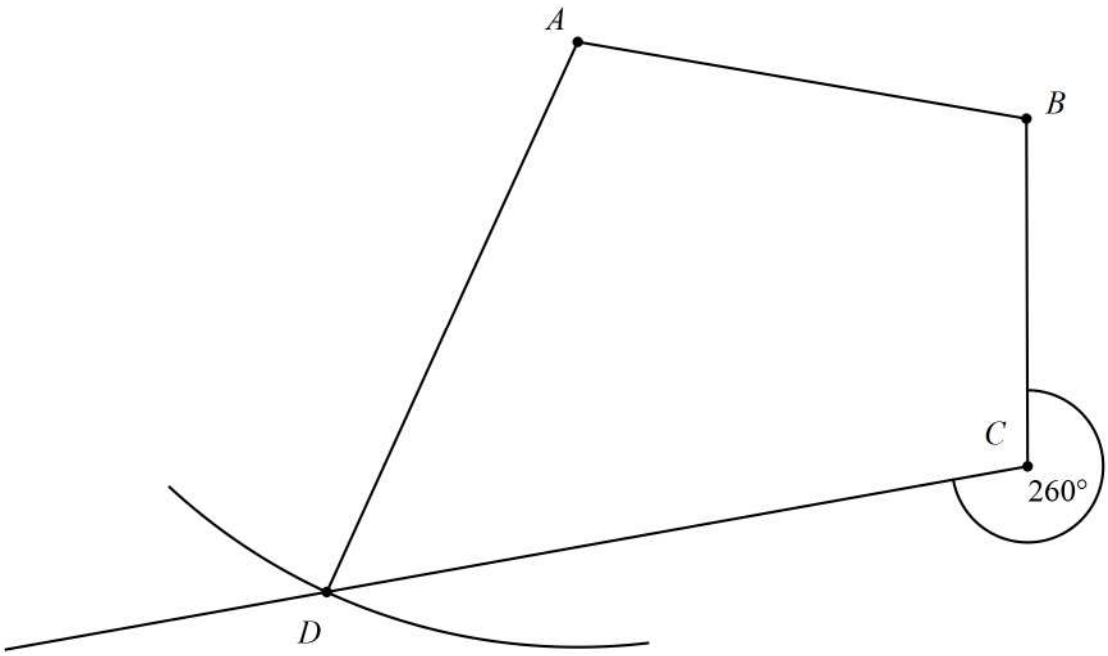
(c) $f^2 - 2f = f(f-2)$

(d) $H = 2^3 + 6\times 2 = 8+12 = 20$

5. $\dfrac{PQ}{12.2} = \sin 38°$

$PQ = 12.2 \sin 38° = 7.51 \text{ (3sf)}$

6.

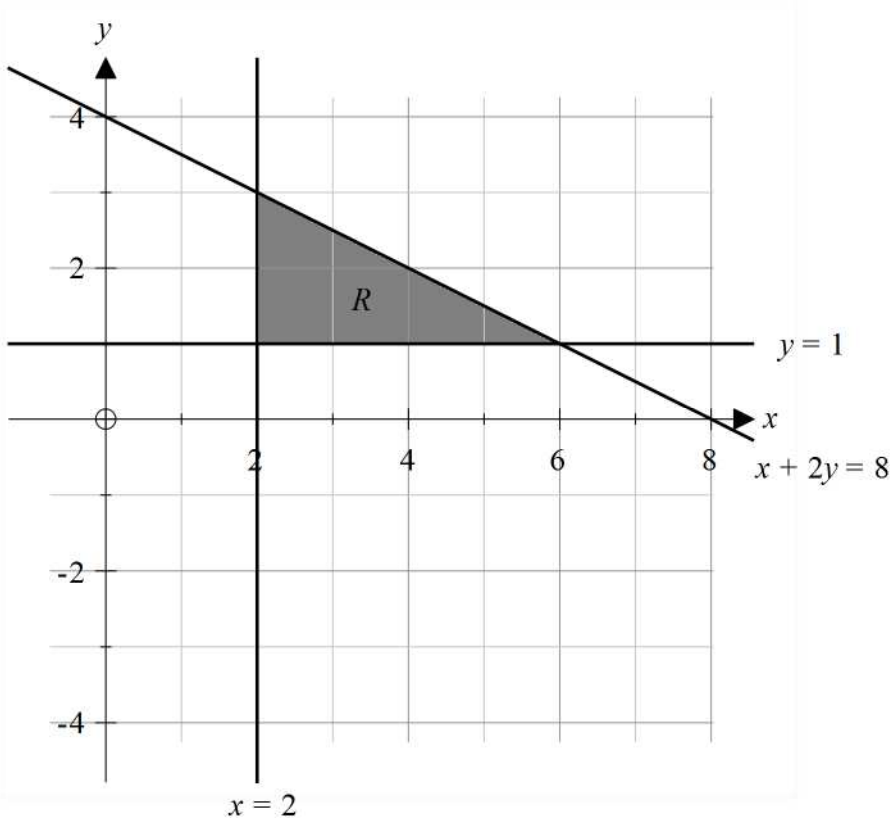


7. (a) (i) $A \cap B = \{\text{p, r, a}\}$

(ii) $B \cap C = \{\text{p,a,r,i,s,b,u,d,e,t}\}$

(b) $A \cap E = \phi$. There are no letters which are in both A and E.

8.



9. Surface area = Front & back + bottom + 2 × slanting sides

$$= 2 \times \frac{10 \times 12}{2} + 8 \times 10 + 2 \times 8 \times 13 = 408 \text{ cm}^2$$

10. Total of first four tests = $4 \times 64 = 256$

Let score required in fifth test = x

$$\frac{256 + x}{5} = 70$$

$$256 = 350$$

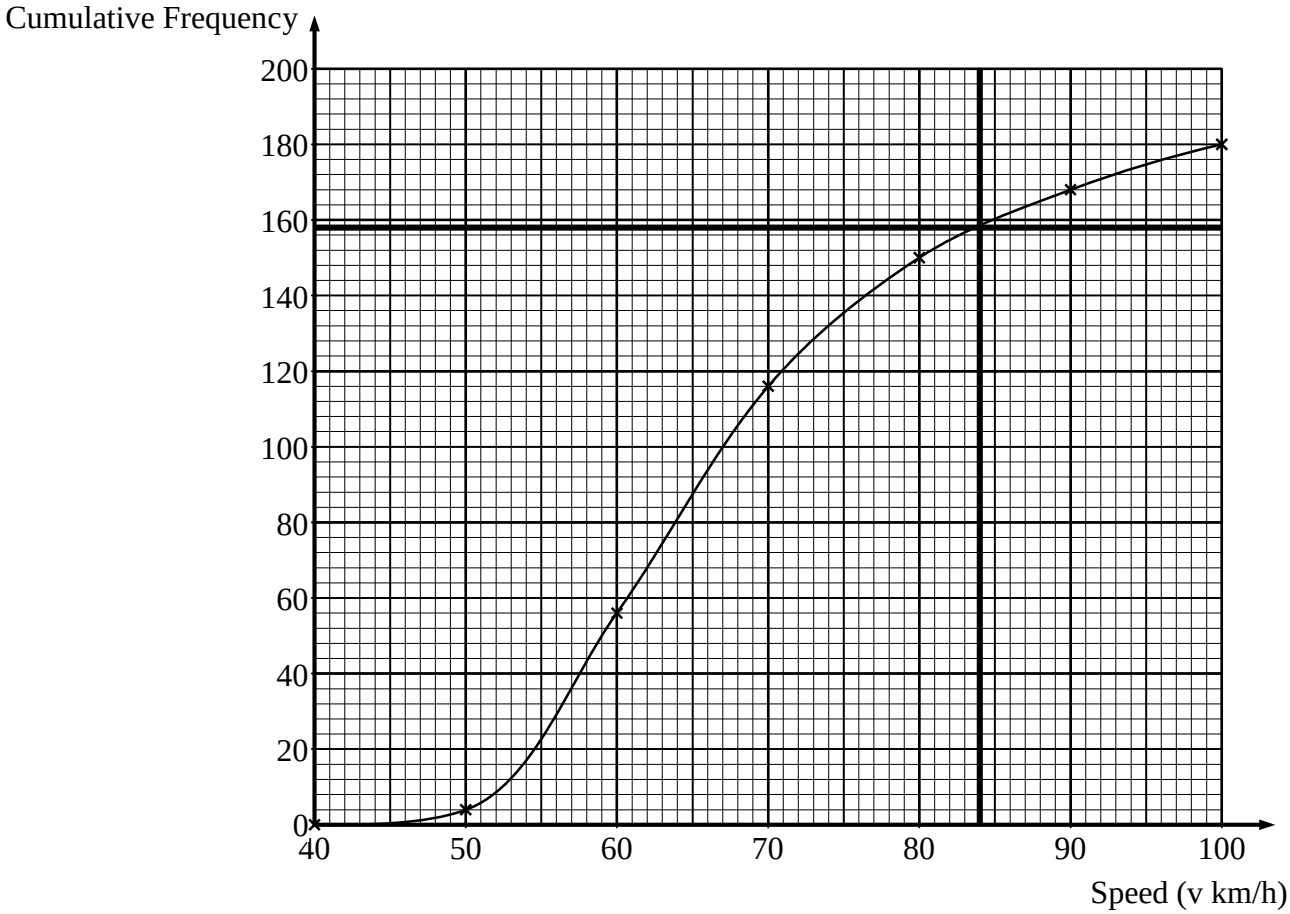
$$x = 94\%$$

11. (a) $60 < v \leq 70$

(b) $\frac{4+52}{180} = \frac{56}{180} = \frac{14}{45} = 0.311$ (3 sf)

(c) Cumulative frequencies are 4, 56, 116, 150, 168, 180

(d)



(e) $180 - 158 = 22$

12. (a) Percentage increase $= \dfrac{\text{Change}}{\text{Original}} \times 100$

$$= \frac{167.4 - 155}{155} \times 100$$
$$= 8\%$$

(b) Let original savings $= £x$

$$1.045x = 125.4$$
$$x = \frac{125.4}{1.045}$$
$$x = 120$$

Saving before increase $= £120$

13. $$d = \sqrt{10^2 + 10^2}$$
$$= \sqrt{200}$$

Circumference $= \pi d = \pi \times \sqrt{200}$

$$= 44.4 \text{ cm (3 sf)}$$

14. (a) (i) $12x + 10y = 180$

$$10y = 180 - 12x$$
$$y = \frac{180}{10} - \frac{12}{10}x$$
$$y = 18 - 1.2x$$

(ii) $A = 4x \times 2y$

$$= 8xy$$
$$= 8x(18 - 1.2x)$$
$$= 8x \times 18 - 8x \times 1.2x$$
$$= 144x - 9.6x^2$$

(b) $\dfrac{\mathrm{d}A}{\mathrm{d}x} = 144 - 2 \times 9.6x$

$$= 144 - 19.2x$$

(c) $$\frac{\mathrm{d}A}{\mathrm{d}x} = 0$$

$$144 - 19.2x = 0$$
$$x = \frac{144}{19.2} = 7.5$$
$$A_{\min} = 144 \times 7.5 - 9.6 \times 7.5^2$$
$$= 540 \text{ m}^2$$

15. Area of $OFGHIJ = 3^2 \times 4 = 36$

Shaded area $= 36 - 4 = 32\,\text{cm}^2$

16. $x^2 = 4 \times 9$

$x^2 = 36$

$x = 6$

17.

$$y = \sqrt{\frac{2x+1}{x-1}}$$

$$y^2 = \frac{2x+1}{x-1}$$

$$y^2(x-1) = 2x+1$$

$$y^2x - y^2 = 2x+1$$

$$y^2x - 2x = y^2 + 1$$

$$x(y^2 - 2) = y^2 + 1$$

$$x = \frac{y^2+1}{y^2-2}$$

18. $\frac{(k+4)}{2} \times \sqrt{3} = 5\sqrt{6}$

$$k + 4 = \frac{2 \times 5\sqrt{6}}{\sqrt{3}}$$

$$k + 4 = 10\sqrt{\frac{6}{3}}$$

$$k + 4 = 10\sqrt{2}$$

$$k = 10\sqrt{2} - 4$$

19. Upper bound in hours $= \frac{2.85}{4.5}$

Upper bound in minutes $= \frac{2.85}{4.5} \times 60 = 38$

20. (a) $\text{P}(5,5) = \frac{4}{9} \times \frac{3}{8} = \frac{1}{6}$

(b) $\text{P}(5,1) + \text{P}(1,5) + \text{P}(2,1) + \text{P}(1,2) = \frac{4}{9} \times \frac{2}{8} + \frac{2}{9} \times \frac{4}{8} + \frac{3}{9} \times \frac{2}{8} + \frac{2}{9} \times \frac{3}{8} +$

$$= \frac{28}{72} = \frac{7}{18} = 0.389 \text{ (3 sf)}$$

21. (a) $\mathrm{f}(1) = \dfrac{3}{4+1} = \dfrac{3}{5} = 0.6$

(b) $x = -4$

(c) $5 + a = 7$

$a = 2$

(d) $\mathrm{g}(1) = 5 + 1 = 6$

$\mathrm{fg}(1) = \mathrm{f}(\mathrm{g}(1))$

$= \mathrm{f}(6)$

$= \dfrac{3}{4+6} = \dfrac{3}{10} = 0.3$

(e) $\mathrm{fg}(x) = \dfrac{3}{4 + (5 + x)}$

$= \dfrac{3}{9 + x}$

22. (a)

$BO = 8 \text{ cm}$

$\angle BOC = 115°$

$\angle OBC = 180 - 115 - 35 = 30°$

$\dfrac{BC}{\sin 115°} = \dfrac{8}{\sin 35°}$

$BC = \dfrac{8}{\sin 35°} \times \sin 115°$

$= 12.64079526$

$= 12.6 \text{ cm (3 sf)}$

(b)

$\angle OBC = \angle AOB - \angle OCB$ (exterior angle in triangle = sum of interior opposite angles)

$= 65 - 35 = 30$

Total area = Area of sector + Area of triangle

$= \dfrac{65}{360} \times \pi \times 8^2 + \dfrac{1}{2} \times 8 \times 12.6407... \times \sin 30°$

$= 61.6 \text{ cm}^2 \text{ (3 sf)}$

23.

$$\frac{3}{x+2}+\frac{4}{x-3}=2$$

$$\frac{3(x-3)+4(x+2)}{(x+2)(x-3)}=2$$

$$\frac{3x-9+4x+8}{x^2-3x+2x-6}=2$$

$$\frac{7x-1}{x^2-x-6}=2$$

$$7x-1=2(x^2-x-6)$$

$$7x-1=2x^2-2x-12$$

$$2x^2-9x-11=0$$

$$(2x-11)(x+1)=0$$

$$x=\frac{11}{2}=5.5$$

$$\text{or } x=-1$$