Edexcel IGCSE Higher Tier Mathematics Paper 3H – May 2017

1. (a) $10a + 25 = 5(2a + 5)$

(b) $7w^2 - 4w = w(7w - 4)$

(c) $p^2(p - 5) = p^3 - 5p^2$

(d) $(x - 3)(x + 7) = x^2 + 7x - 3x - 21$

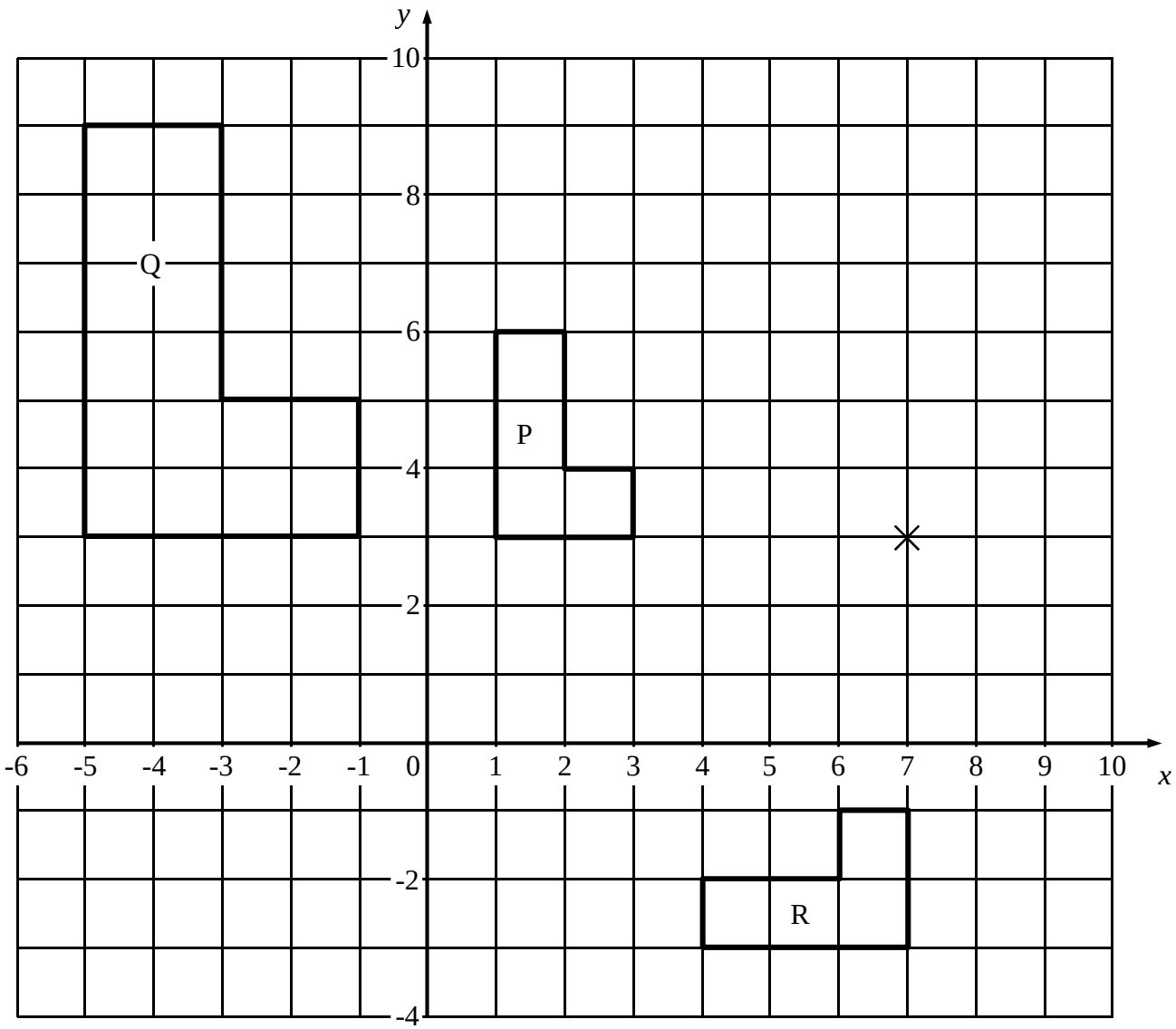
$= x^2 + 4x - 21$

(e) $G = f^3 - 7f$

$G = 2^3 - 7 \times 2$

$G = 8 - 14 = -6$

2. (a) (b)



3. (a) $\frac{10}{4} \times 300 = 750$ g

(b) $\frac{920}{115} \times 4 = 32$ people

4. (a) $3 < L \leq 4$

(b) $\text{Mean} = \frac{4 \times 0.5 + 5 \times 1.5 + 11 \times 2.5 + 14 \times 3.5 + 6 \times 4.5}{40}$

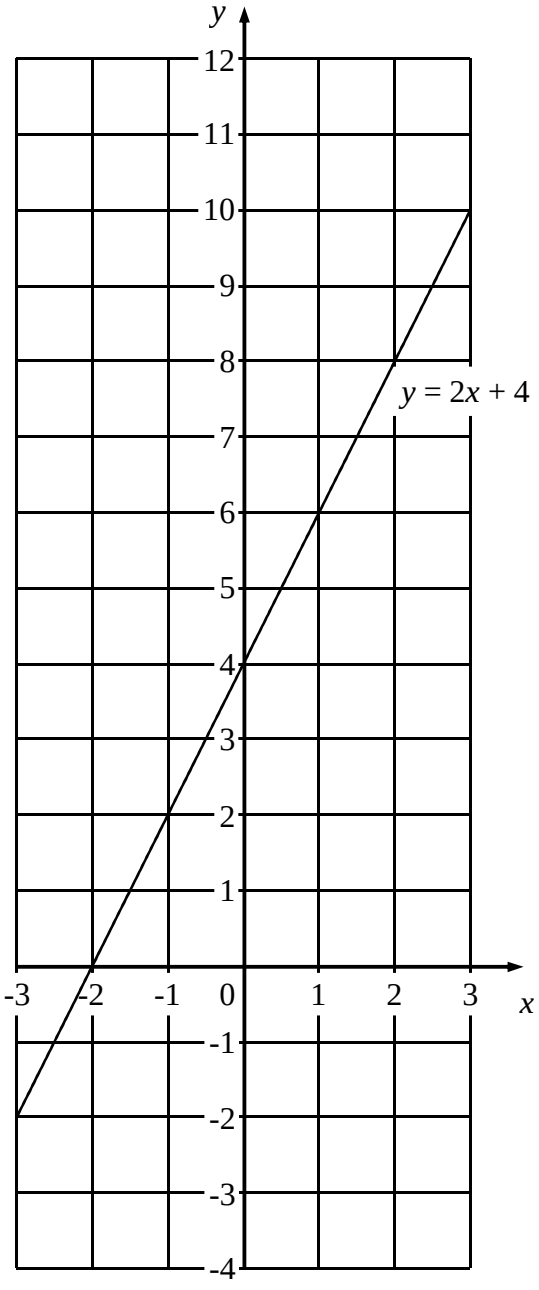
$= \frac{113}{40}$

$= 2.825\,\text{cm}$

5. (a) 6.30875

(b) 6.31 (3 sf)

6.



7. $\frac{14.9}{AC} = \cos 22°$

$AC = \frac{14.9}{\cos 22°}$

$AC = 16.1$ cm (3 sf)

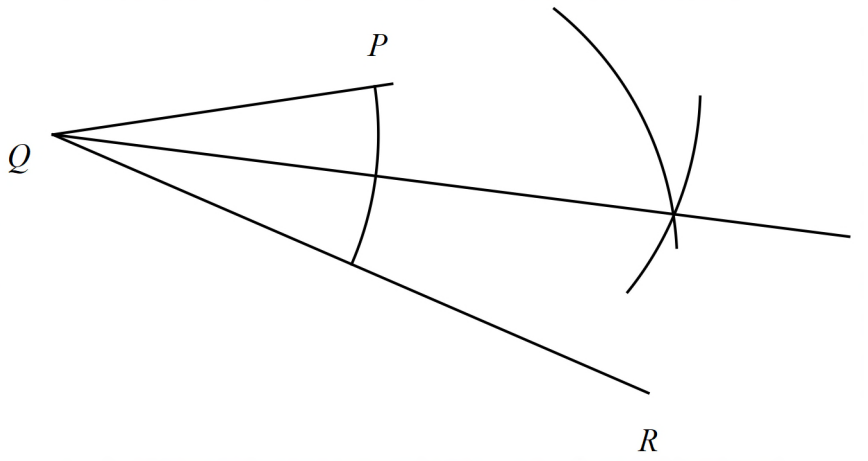
8. (a) Percentage increase $= \frac{668.8 - 640}{640} \times 100 = 4.5\%$

(b) Let x be weekly pay in 2016

$0.95x = 668.8$

$x = \frac{668.8}{0.95} = \$704$

9.



10. $2x + 7y = 31$ (1)

$5x - 3y = 16$ (2)

$41x = 205$ $3 \times (1) + 7 \times (2)$

$x = 5$

$10 + 7y = 31$ substitute into (1)

$7y = 21$

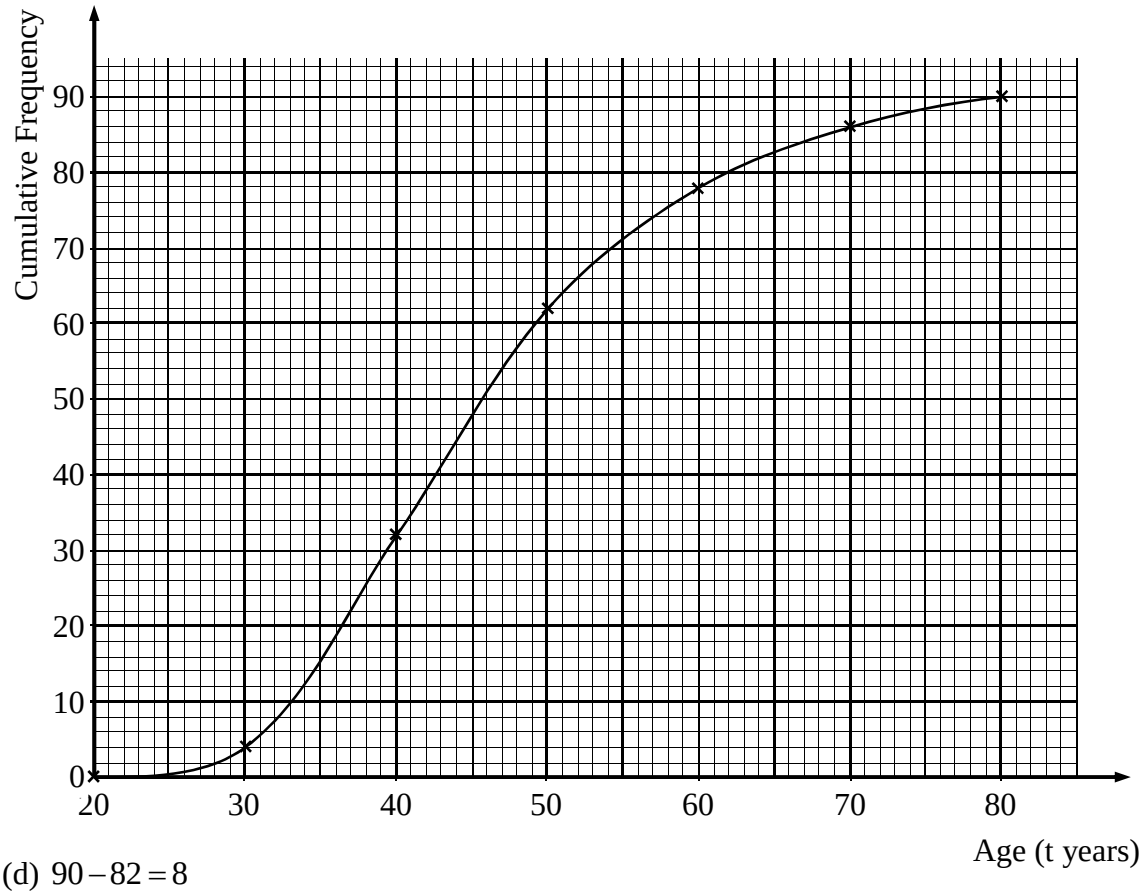
$y = 3$

11. (a) $\frac{16+8+4}{90}=\frac{28}{90}=\frac{14}{45}$

(b)

Age (t years)	**Cumulative Frequency**
$20 < t \le 30$	4
$20 < t \le 40$	32
$20 < t \le 50$	62
$20 < t \le 60$	78
$20 < t \le 70$	86
$20 < t \le 80$	90

(c)



(d) $90-82=8$

12. (a) $0.000451=4.51\times10^{-4}$

(b) $\frac{7.8\times10^{5}}{2.4\times10^{-4}}=3.25\times10^{9}$

13. (a) $\frac{d}{9} = \frac{8}{12}$

$d = \frac{8}{12} \times 9 = 6$

(b) $\text{Volume} = 160 \times \left(\frac{12}{8}\right)^3 = 540\,\text{ml}$

(c)

$$\text{Scale factor for areas} = \frac{q}{p}$$

$$\text{Scale factor for lengths} = \sqrt{\frac{q}{p}}$$

$$\text{Scale factor for volumes} = \left(\sqrt{\frac{q}{p}}\right)^3$$

$$\text{Weight of } Q = \left(\sqrt{\frac{q}{p}}\right)^3 w$$

14. (a) $(\sqrt{x})^8 = \sqrt{x^8} = x^4$

(b) $\frac{6+4y}{3} = 5-2y$

$6+4y = 3(5-2y)$

$6+4y = 15-6y$

$10y = 9$

$y = \frac{9}{10}$

(c) $g-1 = gh+3h$

$g - gh = 1+3h$

$g(1-h) = 1+3h$

$g = \frac{1+3h}{1-h}$

15. $P = kr^3$

$343 = k \times 3.5^3$

$k = \frac{343}{3.5^3} = 8$

$P = 8r^3$

16.

$$\left(5\sqrt{2}-e\right)\left(3\sqrt{2}+e\right)=f\sqrt{2}-6$$
$$30-3\sqrt{2}e+5\sqrt{2}e-e^2=f\sqrt{2}-6$$
$$30-e^2+2\sqrt{2}e=f\sqrt{2}-6$$
$$30-e^2=-6$$
$$e^2=36$$
$$e=6$$
$$f\sqrt{2}=12\sqrt{2}$$
$$f=12$$

17. (a) (i) $\overrightarrow{QS}=\overrightarrow{QP}+\overrightarrow{PS}=-\mathbf{a}+\mathbf{b}$

(ii) $\overrightarrow{QY}=\overrightarrow{QP}+\frac{1}{2}\overrightarrow{PS}=-\mathbf{a}+\frac{1}{2}\mathbf{b}$

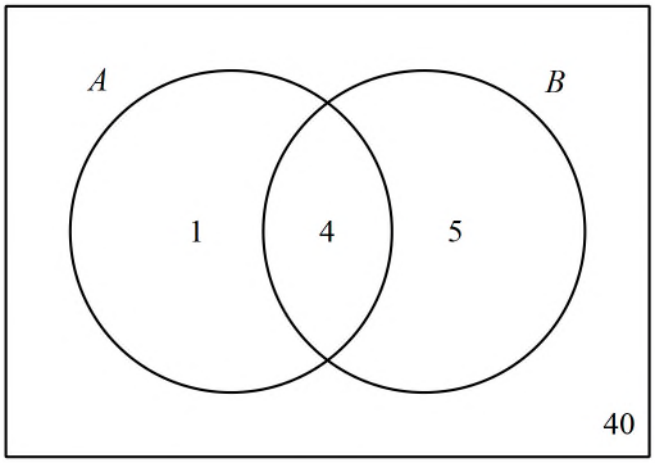
(iii) $\overrightarrow{PX}=\overrightarrow{PQ}+\frac{1}{2}\overrightarrow{QS}=\mathbf{a}+\frac{1}{2}(-\mathbf{a}+\mathbf{b})=\frac{1}{2}\mathbf{a}+\frac{1}{2}\mathbf{b}$

(b)
$$\overrightarrow{PR}=\frac{2}{3}\overrightarrow{PX}$$
$$\overrightarrow{PX}=\frac{3}{2}\overrightarrow{PR}=\begin{pmatrix}6\\3\end{pmatrix}$$

X has coordinates $(3+6,1+3)=(9,4)$

X has coordinates $(9-5,4+4)=(4,8)$

18. (a)



(b) (i) $n(A\cap B')=1$

(ii) $n(A\cup B')=45$

19. (a) $y = \dfrac{4}{x-3}$

$$x - 3 = \frac{4}{y}$$

$$x = \frac{4}{y} + 3$$

$$\mathrm{f}^{-1}(x) = \frac{4}{x} + 3$$

(b)

$$\mathrm{g}(a) = \frac{a-2}{a}$$

$$\mathrm{fg}(a) = \frac{4}{\frac{a-2}{a} - 3} = 1$$

$$4 = \frac{a-2}{a} - 3$$

$$4a = a - 2 - 3a$$

$$6a = -2$$

$$a = -\tfrac{1}{3}$$

20. $\mathrm{P}(BBB' \text{ or } BB'B \text{ or } B'BB) = 3 \times \dfrac{4}{12} \times \dfrac{3}{11} \times \dfrac{8}{10} = \dfrac{12}{55}$

21. $MC = \sqrt{5^2 + 18^2} = \sqrt{349}$

$$\tan VCM = \frac{7}{\sqrt{349}}$$

$$VCM = 20.5° \text{ (3 sf)}$$

22.

$$\frac{3}{2x+12} - \frac{x-15}{x^2-2x-48} = \frac{3}{2(x+6)} - \frac{x-15}{(x-8)(x+6)}$$

$$= \frac{3(x-8) - 2(x-15)}{2(x-8)(x+6)}$$

$$= \frac{3x - 24 - 2x + 30}{2(x-8)(x+6)}$$

$$= \frac{\cancel{x+6}^{1}}{2(x-8)\cancel{(x+6)}}$$

$$= \frac{1}{2(x-8)}$$