

Gold Level

Model Answers 2

Level	IGCSE
Subject	Maths
Exam Board	Edexcel
Difficulty Level	Gold
Booklet	Model Answers 2

Time Allowed: 58 minutes

Score: / 48

Percentage: /100

- 1 Clare buys some shares for \$50x.
 Later, she sells the shares for \$(600 + 5x).
 She makes a profit of x%

(a) Show that $x^2 + 90x - 1200 = 0$

$$\therefore \text{Profit} = \frac{\text{Sell} - \text{buy}}{\text{buy}} = \frac{(600 + 5x) - 50x}{50x} \quad (3)$$

$$\frac{x}{100} = \frac{(600 + 5x) - 50x}{50x} \quad \rightarrow 50x^2 = 100(600 + 5x - 50x)$$

$\div 50$, collect terms

$$\rightarrow 2(600 - 45x) = x^2$$

$$\therefore \underline{x^2 = 1200 - 90x}$$

- (b) Solve $x^2 + 90x - 1200 = 0$
 Find the value of x correct to 3 significant figures.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

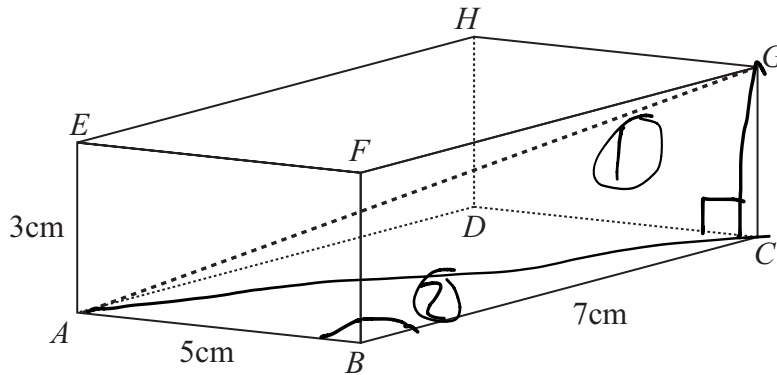
$$x = \frac{-90 \pm \sqrt{90^2 - (-1200)(1)(4)}}{2}$$

$$x = \frac{-45 \pm \sqrt{8100 + 4800}}{2}$$

positive root
 $= 11.789\dots$

$$x = \underline{\underline{11.8}} \quad (3)$$

Diagram NOT accurately drawn



The diagram shows a cuboid $ABCDEFGH$.

$AB = 5\text{cm}$

$BC = 7\text{cm}$

$AE = 3\text{cm}$

(a) Calculate the length of AG .

Give your answer correct to 3 significant figures.

$$AG^2 = AC^2 + GC^2$$

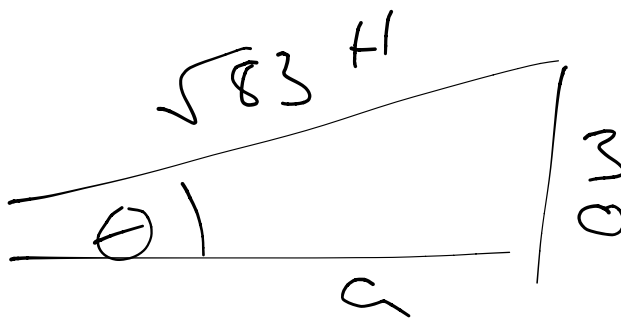
$$AC^2 = AB^2 + BC^2 \quad \therefore AG^2 = AB^2 + BC^2 + GC^2$$

$$AG = \sqrt{5^2 + 7^2 + 3^2} = \sqrt{83}$$

$$\approx \underline{\underline{9.1}} \text{ cm} \quad (3)$$

(b) Calculate the size of the angle between AG and the plane $ABCD$.

Give your answer correct to 1 decimal place.



$$\sin(\theta) = \frac{3}{\sqrt{83}}$$

$$\theta = \sin^{-1}\left(\frac{3}{\sqrt{83}}\right) \approx \underline{\underline{19.2^\circ}}$$

$$\underline{\underline{19.2}} \text{ }^\circ \quad (2)$$

(Total for Question is 5 marks)

3 Express $\sqrt{48} + \sqrt{108}$ in the form $k\sqrt{6}$ where k is a surd.

$$\begin{aligned}\sqrt{48} + \sqrt{108} &= \sqrt{6 \times 8} + \sqrt{6 \times 9 \times 2} \\ &= \sqrt{6} (\sqrt{8} + \sqrt{9 \times 2}) \\ &= (2\sqrt{2} + 3\sqrt{2})\sqrt{6} \\ &= (5\sqrt{2})\sqrt{6} \therefore \underline{\underline{k = 5\sqrt{7}}} \quad \underline{\underline{5\sqrt{2}}}\end{aligned}$$

(Total for Question is 3 marks)

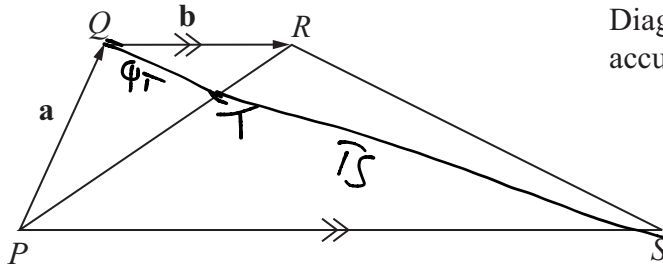


Diagram NOT accurately drawn

The diagram shows a trapezium $PQRS$.
 PS is parallel to QR .
 $PS = 4QR$.

$\vec{PQ} = \mathbf{a}$ $\vec{QR} = \mathbf{b}$

(a) Find, in terms of \mathbf{a} and/or \mathbf{b} ,

(i) \vec{PS} $PS = 4QR \therefore PS = 4b$ 4b

(ii) \vec{PR} a + b

(iii) \vec{RS} 3b - a
 (3)

The point T lies on the line PR such that $PT : TR = 4 : 1$

(b) Given that $\vec{TS} = k\vec{QT}$, find the value of k .

$$\vec{TS} = \frac{1}{5}(\vec{a} + \vec{b}) + \frac{3}{5}(\vec{b} - \vec{a})$$

$$\vec{QT} = \underbrace{-\vec{a}}_{\vec{QP}} + \frac{4}{5}(\vec{a} + \vec{b})$$

$$\rightarrow \vec{TS} = \frac{4}{5}(-\vec{a} + \vec{b}), \quad \vec{QT} = \frac{1}{5}(-\vec{a} + \vec{b})$$

→ 5 in denominator of \vec{PTR}
 route \vec{QTS}
 $\vec{TS} = 4\vec{QT}$
k = 4
k = 4 (3)

(Total for Question is 6 marks)

- 5 A bag contains 60 beads.
 x of the beads are red and the rest are green.
Altaaf takes at random a bead from the bag.

(a) State, in terms of x , the probability that Altaaf takes a red bead.

$$x/60$$

$$x/60$$

.....
(1)

Altaaf puts his bead back in the bag.
Another 20 **red** beads are added to those in the bag.
The probability that Altaaf takes a red bead is now doubled.

- (b) (i) Use this information to write down an equation in x
and show that your equation can be expressed as $8x = 3(x + 20)$

$$\text{new probability} = 2 (x/60) = x/30$$
$$\text{Which is equal too } (x+20)/(60+20)$$

$$x/30 = (x+20)/80$$
$$160x = 60(x+20)$$

$$8x = 3(x+20)$$

- (ii) Solve $8x = 3(x + 20)$
Show your working clearly.

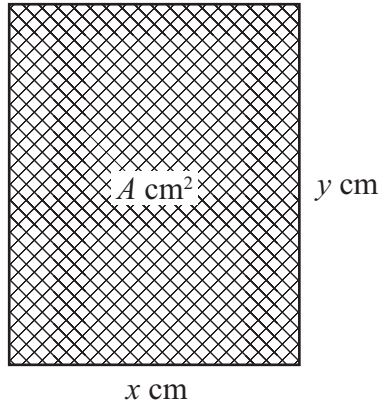
$$\text{Expand:}$$
$$8x = 3x + 60$$
$$5x = 60$$
$$x = 12$$

$$x = \frac{12}{\dots\dots\dots}$$

(5)

(Total for Question is 6 marks)

6



The diagram shows a rectangular photo frame of area A cm².
 The width of the photo frame is x cm.
 The height of the photo frame is y cm.
 The perimeter of the photo frame is 72 cm.

(a) Show that $A = 36x - x^2$

Sum of the sides = the perimeter

$$2x + 2y = 72$$

$$X + Y = 36$$

$$\text{Area} = X \times Y$$

$$\text{Area} = x(36-x)$$

$$A = 36x - x^2$$

(3)

(b) Find $\frac{dA}{dx}$

$$\frac{36 - 2x}{\dots\dots\dots}$$

(2)

(c) Find the maximum value of A .

Maximum occurs when differential = zero

$$36 - 2x$$

$$36 = 2x$$

$$18 = x$$

$$A = \frac{18=x}{\dots\dots\dots}$$

(3)

(Total for Question is 8 marks)

- 7 Two small magnets attract each other with a force, F newtons.
 F is inversely proportional to the square of the distance, d cm, between them.

When $d = 2$, $F = 12$

- (a) Express F in terms of d .

$$F \propto \frac{1}{d^2}$$

$$F = \frac{k}{d^2}$$

$$12 = \frac{k}{2^2} = \frac{k}{4}$$

$$48 = k$$

$$F = \frac{48}{d^2}$$

(3)

- (b) Calculate the value of F when $d = 5$

$$F = \frac{48}{d^2}$$

$$F = \frac{48}{5^2} = \frac{48}{25} = 1.92$$

$$F = 1.92$$

(1)

- (c) Calculate the value of d when $F = 3$

$$F = \frac{48}{d^2}$$

$$3 = \frac{48}{d^2}$$

$$d^2 = \frac{48}{3}$$

$$d = \sqrt{\frac{48}{3}} = \sqrt{16} = \pm 4 \quad \text{Distance so positive}$$

$$d = 4$$

(2)

(Total for Question is 6 marks)

8 The incomplete table shows information about the times, in minutes, that runners took to complete a race.

Time (t minutes)	$30 \leq t < 35$	$35 \leq t < 40$	$40 \leq t < 50$	$50 \leq t < 60$	$60 \leq t < 80$
Number of runners	12	20	30	12	16

(a) Use the histogram to calculate the number of runners who took between 40 and 50 minutes to complete the race.

12 large square = 6

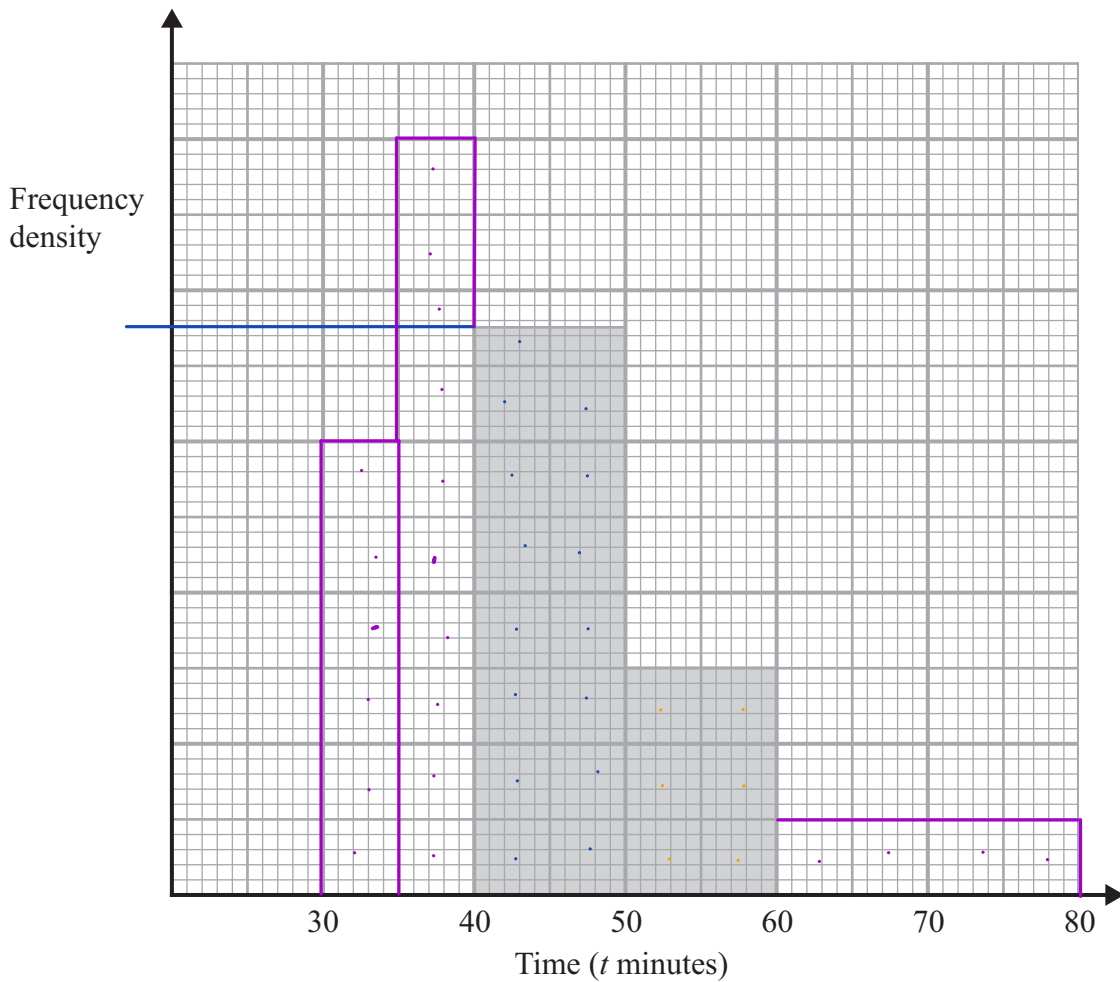
15 large squares

So $15 \times 2 = 30$

30

(2)

(b) Complete the histogram for the remaining results.



(2)

Runners who achieved a time between 37 and 48 minutes to complete the race were each awarded a silver medal.

(c) Calculate an estimate of the number of runners awarded silver medals.

3 minutes below 40, 8 minutes in 40-50

Frequency \times proportion of the class width

$$20 \times (3/5)$$

$$30 \times 8/10$$

summed they give an estimation of 36

36

(2)

(Total for Question is 6 marks)

9 Show that the recurring decimal $0.\dot{1}\dot{7} = \frac{8}{45}$

$$X = 0.17777777$$

$$10x = 0.177777$$

Subtract x from 10 x

$$9x = 1.7777 - 0.17777$$

$$9x = 1.6$$

$$X = 1.6/9 = 16/90 = 8/45$$

(Total for Question is 2 marks)