

## Section One: Calculator-free

(40 Marks)

This section has **seven (7)** questions. Answer **all** questions. Write your answers in the space provided.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

Suggested working time for this section is 50 minutes.

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**Question 1****(8 marks)**

Solve algebraically for each unknown.

(a)  $(+4d) + (-3d) - (-5d) = 15$

(2 marks)

$$\begin{aligned}4d - 3d + 5d &= 15 \\6d &= 15 \quad \checkmark \\d &= 2.5 \quad \checkmark\end{aligned}$$

(b)  $2(2x-1) + 3(x+5) = -1$

(2 marks)

$$\begin{aligned}4x - 2 + 3x + 15 &= -1 \\7x &= -1 - 13 \quad \checkmark \\x &= -2 \quad \checkmark\end{aligned}$$

(c)  $4p^2 = 36$

(2 marks)

$$\begin{aligned}p^2 &= 9 \\p &= 3 \text{ or } -3 \quad \checkmark \checkmark\end{aligned}$$

(d)  $3(t-1) < 15+t$

(2 marks)

$$\begin{aligned}3t - 3 &< 15 + t \quad \checkmark \\2t &< 18 \\t &< 9 \quad \checkmark\end{aligned}$$

Question 2

(8 marks)

- (a) Expand and simplify  $(2a + 4)(a - 7)$

(2 marks)

$$= 2a^2 - 14a + 4a - 28 \quad \checkmark$$

$$= 2a^2 - 10a - 28 \quad \checkmark$$

- (b) Factorise  $12 - 3y$

(1 mark)

$$= 3(4 - y) \quad \checkmark$$

- (c) Write in algebra using usual conventions:

(1 mark)

"A number has five added to it and the result is multiplied by eight".

$$8(x + 5) \quad \underline{\text{OR}} \quad (x + 5)8 \quad \checkmark$$

- (d) Lolita purchases a travel bag. The usual price is \$60. There is a discount of 20% in a sale. What amount does Lolita pay?

(1 mark)

$$\begin{aligned} \$60 \times 0.2 &= \$12 \\ 60 - 12 &= 48 \quad \$48 \quad \checkmark \end{aligned}$$

- (e) Evaluate  $\sqrt[3]{1000} + 15 \div (7 - 2)$

(2 marks)

$$\begin{aligned} &= 10 + 15 \div 5 \quad \checkmark \\ &= 10 + 3 \\ &= 13 \quad \checkmark \end{aligned}$$

- (f) Michael Douglas lost two-thirds of his fortune in the global financial crisis (GFC). He originally had assets worth \$120 000 000. What were his assets worth after the GFC?

(1 mark)

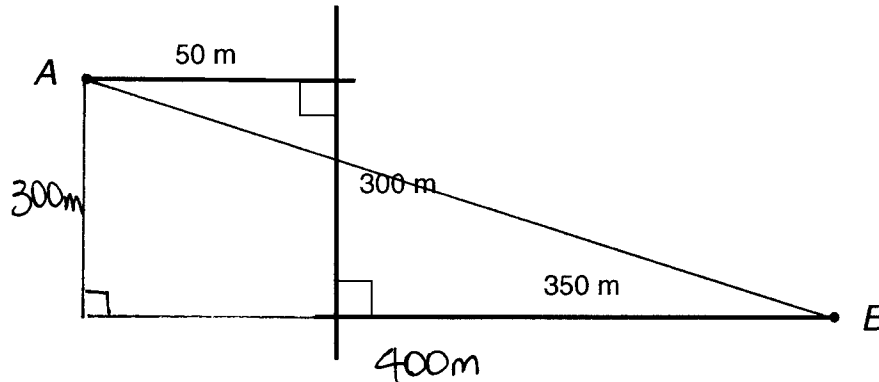
$$\begin{aligned} &\frac{1}{3} \times 120\,000\,000 \\ &= \$40\,000\,000 \quad \checkmark \end{aligned}$$

See next page

## Question 3

(5 marks)

- (a) A survey of a housing development site has been conducted and a field sketch (not to scale) of the roads made as shown. An underground power cable will run in a straight line from A to B. (2 marks)



What is the length of the power cable?

$$AB = \sqrt{300^2 + 400^2} \quad \checkmark$$

$$= 500 \text{ m} \quad \checkmark$$

- (b) Three friends combine to make a syndicate to buy one \$20 lottery ticket. Jake paid \$10, Millie paid \$4 and \$6 was paid by Ahmed. The tickets wins third prize of \$8 000 and is to be shared between the three friends in proportion to what they paid to be in the syndicate. How much of the prize money will each friend receive? (2 marks)

$$10 : 4 : 6 \quad 10 + 4 + 6 = 20$$

$$8000 \div 20 = 400 \quad \checkmark$$

$$10 \times 400 = \$4000 \text{ Jake} \quad 4 \times 400 = \$1600 \text{ Millie}$$

$$6 \times 400 = \$2400 \text{ Ahmed} \quad \checkmark \quad (\text{other methods possible})$$

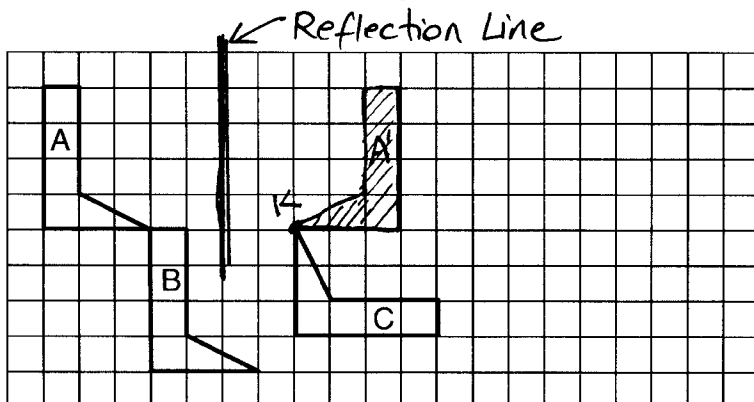
- (c) The mean weight of 10 people is 73.4 kg. What is the total weight of the ten people? (1 mark)

$$73.4 \times 10 = 734 \text{ kg} \quad \checkmark$$

Question 4

(7 marks)

(a) Consider the shape A and its images B and C shown below.



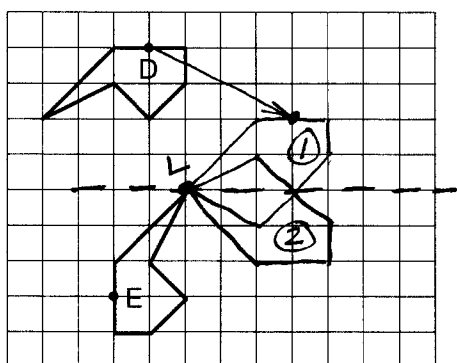
(i) Describe a single transformation of shape A that will create its image B. (1 mark)

Translate 3 units right and 4 units down ✓

(ii) Describe a series of two transformations of shape A that will create its image C. You may mark on the grid to assist your explanation. (2 marks)

Reflect A in the vertical line to get A' ✓  
 Rotate A' about point K 90° clockwise ✓

(b) For the shapes below, describe a series of transformations that would create image E from shape D. You may mark on the grid to show working. (2 marks)

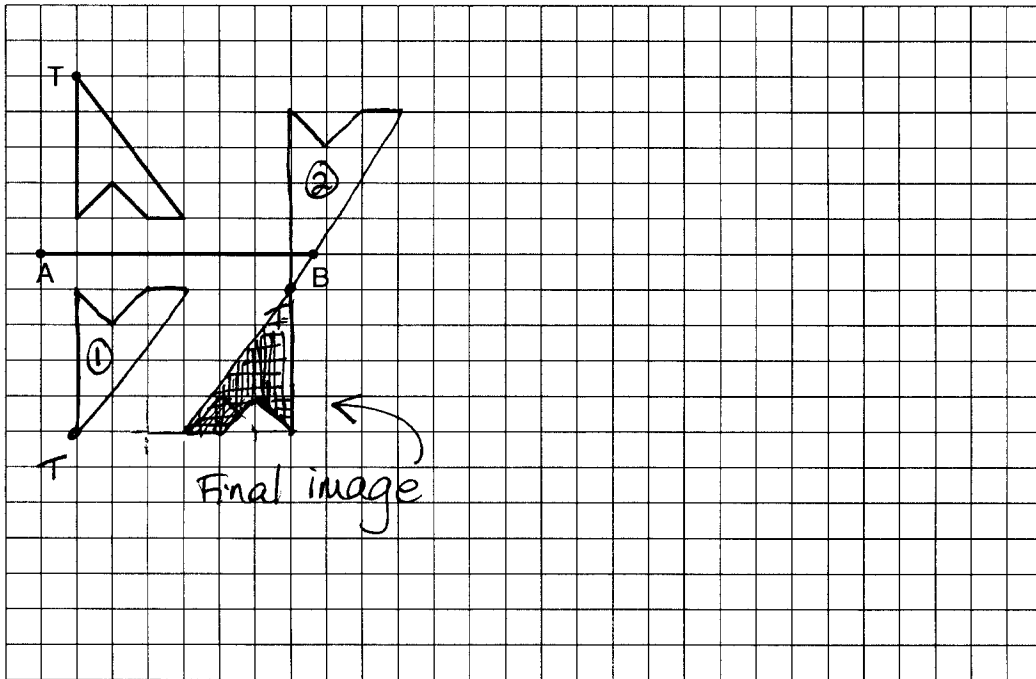


Translate 2 units down 4 right  
 Reflect in line ✓  
 Rotate 90° clockwise about L ✓  
 (Different order also correct)  
 (Other transformations correct)

Subtract one mark for each error up to 2 errors  
 Follow through.

- (c) On the diagram, draw the image of the shape at the end of this series of transformations. Sketch each step and clearly label the final image. (2 marks)

- step 1: reflect in the line AB
- step 2: translate 6 units to the right and 4 units up
- step 3: rotate 180° about point T in an anti-clockwise direction.



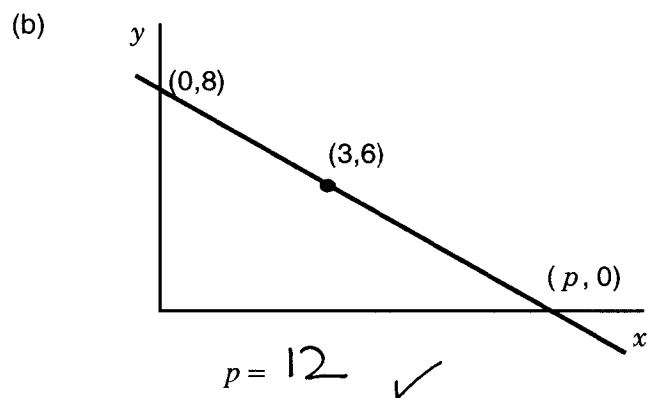
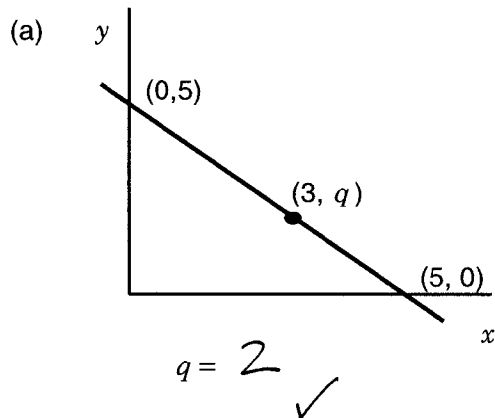
-1 for each error up to two errors.

Follow through if one error

Question 5

(2 marks)

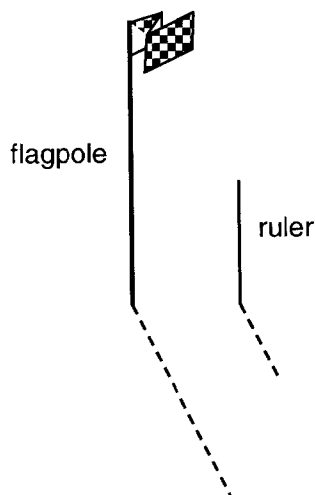
Determine the value of  $p$  and  $q$  in the following sketch graphs.



Question 6

(4 marks)

Petra needs to estimate the height of the flagpole to ensure the new rope for raising the flag is long enough. On a sunny day, she places a 1 metre ruler next to the flag pole while her friends measure the length of the shadow of both the ruler and the flagpole. See the sketch (not drawn to scale) below.



The shadow of the flagpole measured 320 cm at the same time that the shadow of the ruler measured 25 cm.

- (a) Estimate the height of the flagpole using the measurements that Petra obtained. (2 marks)

Shadow is  $\frac{1}{4}$  of actual length ✓  
 flagpole is  $320 \times 4$   
 $= 1280 \text{ cm high}$  ✓

- (b) The rope for the flag needs to be approximately twice as long as the height of the flagpole. How much rope, to the nearest metre, should Petra purchase. (2 mark)

$12.8 \text{ m} \times 2 = 25.6 \text{ m}$  ✓  
 Rope needs to be longer, not shorter  
 $26 \text{ m long}$  ✓

Question 7

(6 marks)

- (a) The level of water usage of 200 houses was rated in a survey as low, medium or high and the size of the houses as small, standard or large. The results of the survey are displayed in the table below.

		Size of house			Total
		Small	Standard	Large	
Level of water usage	Low	10	8	3	21
	Medium	23	64	8	95
	High	17	32	35	84
Total		50	104	46	200

-1 if any error.

- (i) Complete the table. (1 mark)
- (ii) How many houses in the survey were large? 46 ✓ (1 mark)
- (iii) What fraction, in simplest terms, of small houses in the survey had low water usage?  $\frac{10}{50} = \frac{1}{5}$  ✓ (1 mark)
- (iv) What is the percentage of standard size houses in the survey?  $\frac{104}{200} = 52\%$  ✓ (1 mark)

- (b) A souvenir shop sells four sizes of T-shirts. From years of sales, the owner knows that sales are made in the relative frequency shown in the table below.

Size	Small	Medium	Large	Extra large
Sales	0.1	0.45	0.3	0.15

- (i) Complete the table. (1 mark)
- (ii) The shop owner orders 400 T-shirts in the same proportions as shown in the table. How many Extra Large size T-Shirts should be delivered? (1 mark)

$$400 \times 0.15 = 60 \quad \checkmark$$

End of questions