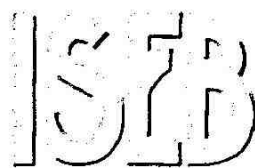


SURNAME FIRST NAME

JUNIOR SCHOOL SENIOR SCHOOL



Independent Schools
Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

MATHEMATICS

LEVEL 3: CALCULATOR PAPER

Practice Paper 2009–2010

Please read this information before the examination starts.

- This examination is 60 minutes long.
- All questions should be attempted.
- A row of dots denotes a space for your answer.
- Where answers are not exact, they should be given to three significant figures, unless specified otherwise.
- The π button on your calculator should be used for calculations involving π .



1. (a) (i) Writing down all the figures shown on your calculator, find the value of

$$\frac{12.9 \times 7.56}{2.96 + 6.75}$$

Answer: (2)

(ii) Write your answer to part (a) (i) correct to three decimal places.

Answer: (1) 0

(iii) Write your answer to part (a) (i) correct to three significant figures.

Answer: (1)

(b) Giving your answer correct to three significant figures, find the value of

(i) 5.5π

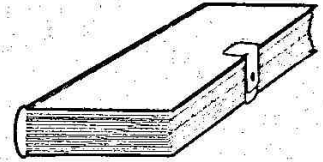
0

Answer: (1)

(ii) $\frac{\sqrt{3}}{2}$

Answer: (1)

2. (i) Mrs Collins sold a rare book on a website for £72
 She then paid a fee of 7.5% of the selling price.
 How much was the fee?



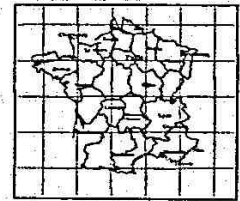
Answer: £ (2)

- (ii) Mrs Collins sold the book for £72 to Mr Hudson.
 He later sold the book for cash for £95
 Calculate his profit as a percentage of the price he paid for the book.

Answer: % (2)

3. A map has a scale of 1 centimetre to 2.5 kilometres.

- (i) What distance is shown by a length of 12.5 centimetres on the map?



Answer: km (1)

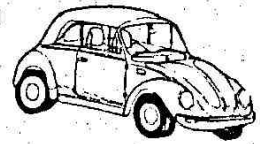
- (ii) What length on the map represents a distance of 22.5 kilometres?

Answer: cm (1)

- (iii) A square with sides of length 2 millimetres is drawn on the map.
 What is the perimeter, in kilometres, of the actual square that this represents?

Answer: km (2)

4. (a) When Mrs Ford drives her car, she travels 8 kilometres for each litre of petrol used.



(i) How many litres of petrol will Mrs Ford's car use for a journey of 252 kilometres?

Answer: litres (1)

When travelling the same journey of 252 kilometres, Mr Austin's car uses 36 litres of petrol.



(ii) How many kilometres per litre is this?

0

Answer: km/l (1)

Petrol costs 98p per litre.

(iii) How much less will Mrs Ford spend on petrol for the journey than Mr Austin?

Answer: £ (2)

0

(b) Mrs Cooper drives for 2 hours 45 minutes, travelling at an average speed of 72 km/h.

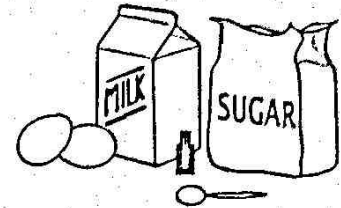
Then she drives for 40 minutes, travelling at an average speed of 96 km/h.



What total distance does Mrs Cooper travel?

Answer: km (3)

5. (a) To make custard for 4 people, Claire uses
- 300 millilitres of milk
 - 2 eggs
 - $\frac{1}{2}$ tablespoon of vanilla essence
 - 80 grams of caster sugar



- (i) How much milk does Claire need to make custard for 10 people?

Answer: ml (2)

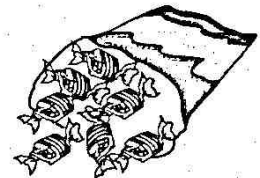
- (ii) Claire has plenty of milk, eggs and vanilla essence, but only 280 grams of caster sugar.

If she uses all the caster sugar, for how many people can she make custard?

Answer: (2)

- (b) Ian's packet of sweets contains toffees, mints and fruit centres in the ratio 3 : 5 : 4
There are 15 toffees in the packet.

- (i) How many sweets are there altogether in the packet?



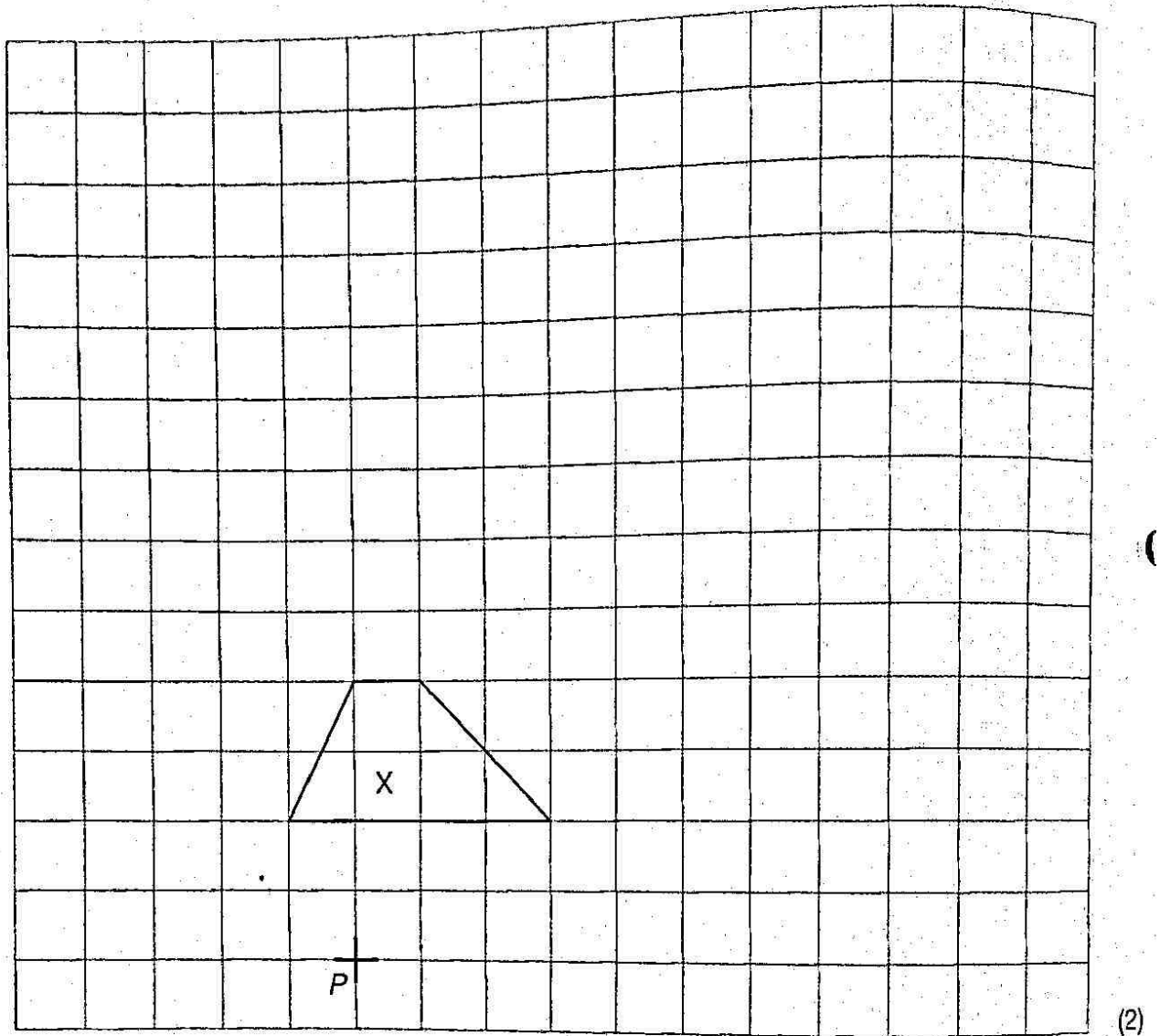
Answer: (2)

Ian eats 3 toffees and 1 mint from his packet of sweets.

- (ii) What is the ratio of toffees, mints and fruit centres remaining in the packet?
Give your answer in its simplest form.

Answer: : : (2)

6. (a) On the centimetre-square grid below, enlarge shape X with centre P and scale factor 3. Label the image Y.



- (b) Shape S is an enlargement of shape R.
Shape S has area 100 cm^2 .
Shape R has area 4 cm^2 .
What is the enlargement scale factor?

Answer:

7. (a) Simplify

(i) $5a^2 - 3a + 4a^2$

Answer: (1)

(ii) $4a^3 \times 3a^2$

Answer: (2)

(iii) $\frac{12a^2 + 8a}{4a}$

Answer: (2)

(b) (i) Multiply out the brackets and simplify

$4(c + 5) - 2(3c + 7)$

Answer: (3)

(ii) Factorise fully

$12g^2 + 18gh$

Answer: (2)

8. The eight swimmers in a 25 metres freestyle race recorded the following times in seconds:

16.5 21.2 17.5 15.9 17.7 18.3 17.5 17.8

(i) What was the range of the times?

Answer: sec (1)

(ii) What was the median time?

0

Answer: sec (2)

(iii) Work out the mean time to complete the race.

0

Answer: sec (2)

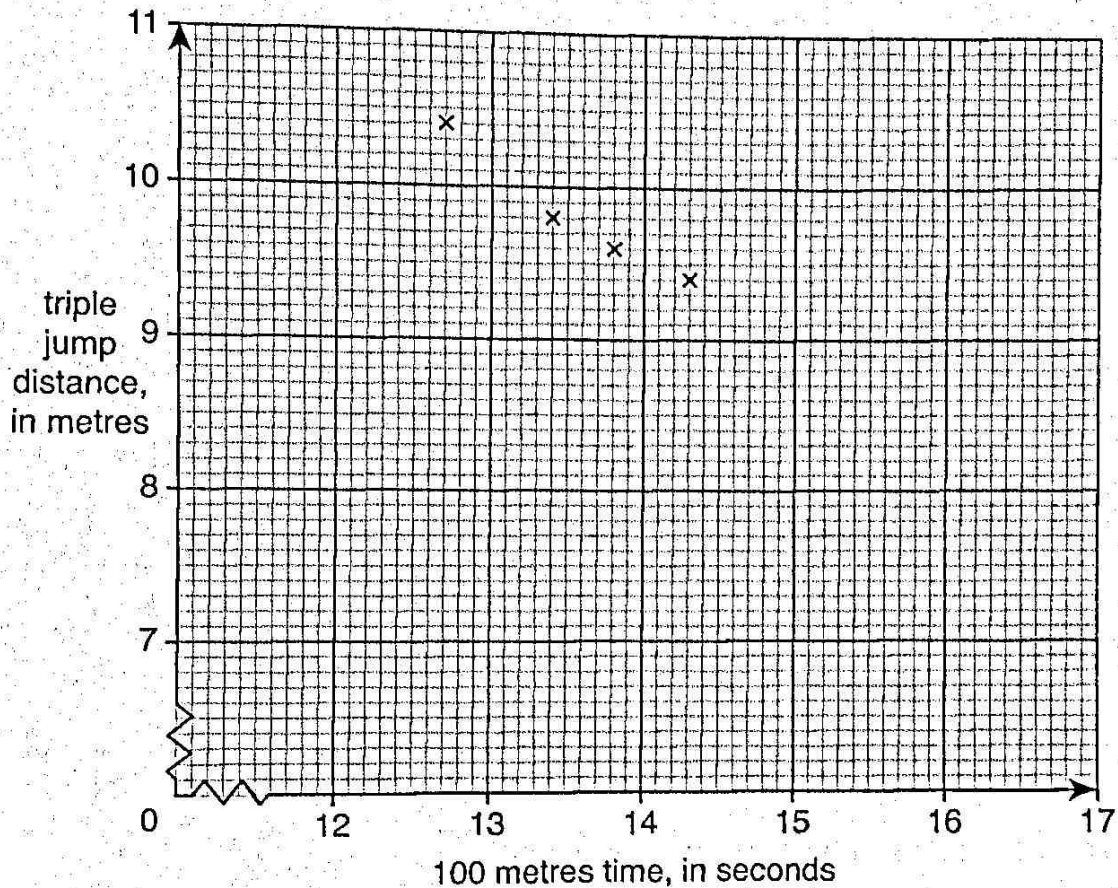
(iv) By how much time did the winner beat the second-placed swimmer?

Answer: sec (1)

9. The table below shows the times taken to run 100 metres and the distances achieved in the triple jump by a group of children on Sports Day.

100 metres time, in seconds	12.7	13.4	13.8	14.3	14.7	15.4	15.7	16.6
triple jump distance, in metres	10.4	9.8	9.6	9.4	9.1	8.2	8.3	7.6

- (i) The first four points are plotted on the scatter graph below.
Complete the scatter graph by plotting the remaining points.



- (ii) What type of correlation is shown by these results?

Answer: (1)

- (iii) Explain what this correlation tells you about the competitors' running and jumping.

..... (1)

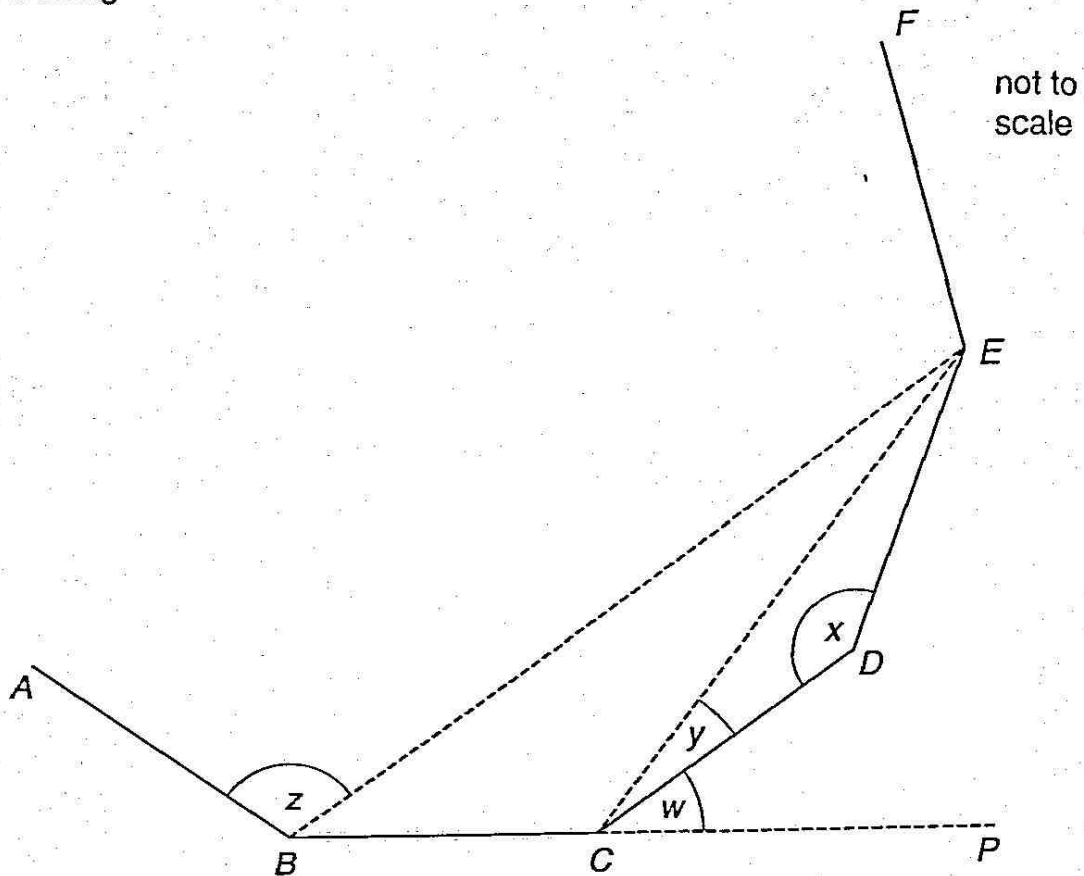
- (iv) Draw a line of best fit on the graph. (1)

- (v) Sally took 14.9 seconds to run 100 metres, but was injured before the triple jump.

Showing clearly where you take your reading, use your line of best fit to predict the distance she would have jumped, to the nearest 10 centimetres.

Answer: m (1)

10. $ABCDEF$ is part of a regular polygon with 10 sides.
 BCP is a straight line.



- (i) What is the name of this type of polygon?

Answer: (1)

- (ii) Calculate the size of each of the angles marked w , x , y and z .

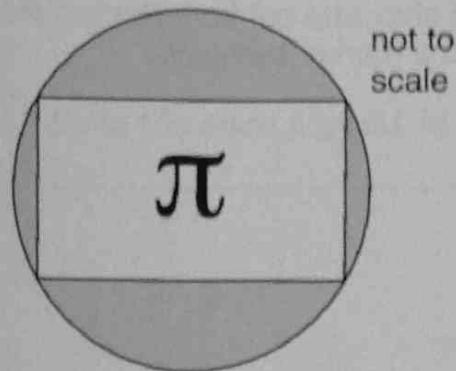
Answer: $w =$ (1)

Answer: $x =$ (1)

Answer: $y =$ (2)

Answer: $z =$ (2)

11. The school Mathematical Society has designed a badge.
The badge consists of a circle, in which is drawn a rectangle.



- (i) The area of the circle is 28.2 cm^2
(a) Calculate the radius of the circle.

Answer: cm (2)

- (b) Calculate the circumference of the circle.

Answer: cm (1)

- (ii) The length of the rectangle is 2 cm greater than its width.
The area of the rectangle is 16 cm^2 .

- (a) Taking the width of the rectangle to be $x \text{ cm}$, show that $x^2 + 2x = 16$

.....
..... (1)

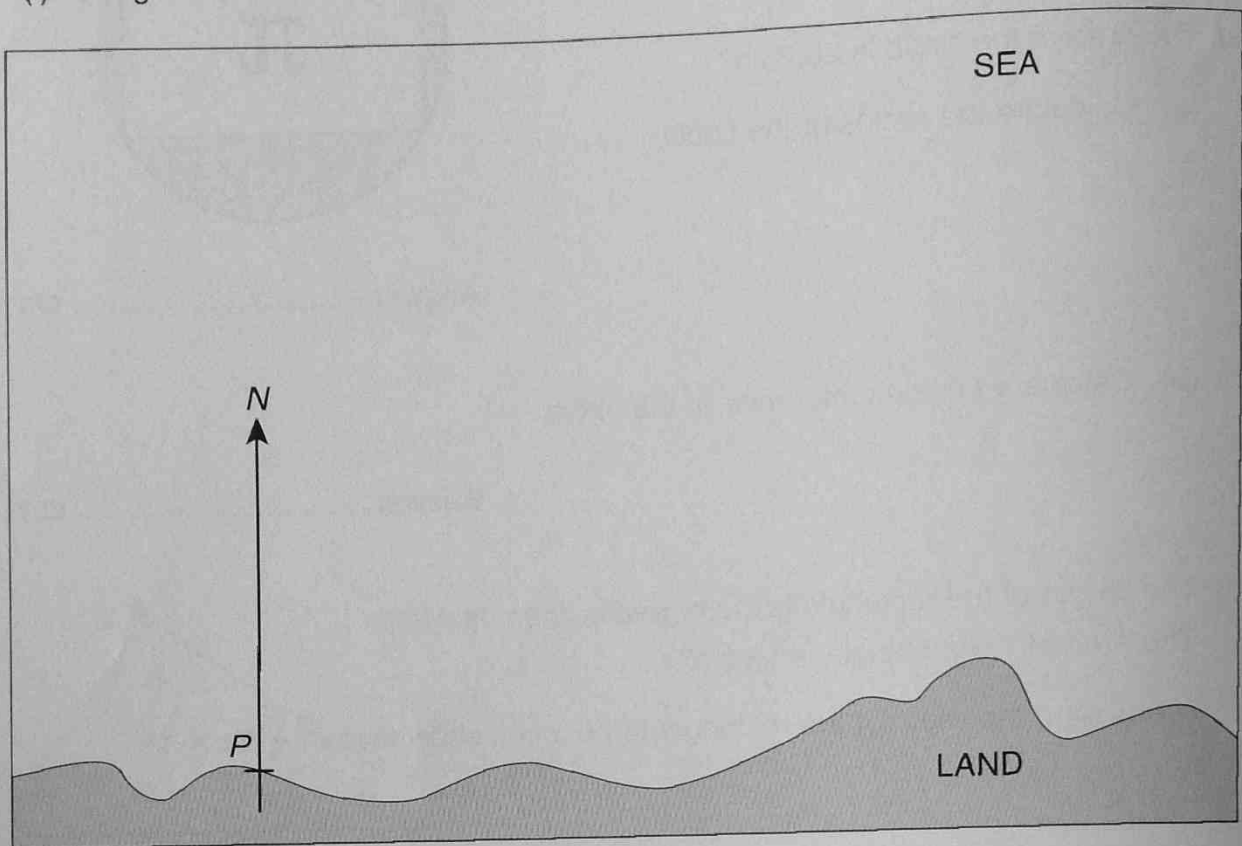
- (b) Use a trial and improvement method to find the value of x correct to one decimal place.

x	$x^2 + 2x$
4	24

Answer: $x =$ (3)

12. A ship sets out from Pirates' Point (P) and sails for 12 kilometres on a bearing of 075° to a marker buoy (B).

(i) Using a scale of 1 cm to 1 km, mark the position of the marker buoy and label it B .



(2)

At the marker buoy, the ship receives instructions to change course. It now sails for 6 kilometres on a bearing of north-west until it reaches a rock (R).

(ii) Mark the position of the rock on the diagram and label it R .

(2)

The ship then sails back to Pirates' Point.

(iii) How far does the ship sail from the rock back to Pirates' Point, and on what bearing?

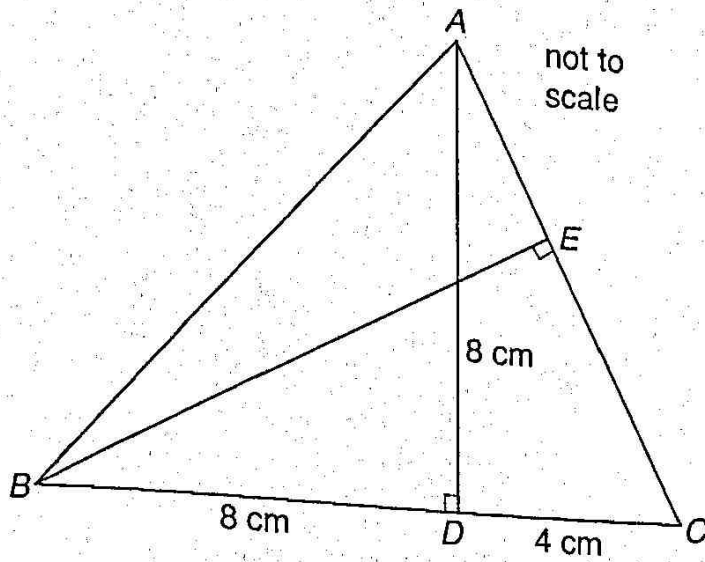
Answer: distance km (1)

bearing^o (1)

The average speed for the whole journey is 8 km/h.

(iv) How long does the ship take to complete the journey, from the time it sets out until the time it returns to Pirates' Point?

Answer: hours minutes (2)



In the triangle ABC , $AD = BD = 8\text{ cm}$ and $DC = 4\text{ cm}$.

- (i) Calculate the area of triangle ABC .

Answer: cm^2 (1)

- (ii) Calculate the length AC , giving your answer correct to three significant figures.

Answer: cm (2)

- (iii) Use your answers to parts (i) and (ii) to show that length $BE = 10.7\text{ cm}$ correct to three significant figures.

.....

 (2)

- (iv) Using $BE = 10.7\text{ cm}$, calculate the length CE .
 Give your answer correct to one decimal place.

Answer: cm (2)

14. (i) When $y = x^2 + 4x$ complete this table of values:

x	-5	-4	-3	-2	-1	0	1
y	5			-4		0	

(2)

(ii) On the grid opposite, draw and label the curve $y = x^2 + 4x$

(2)

(iii) When $y = 3 + \frac{1}{2}x$ complete this table of values:

x	-6	-2	2
y	0		

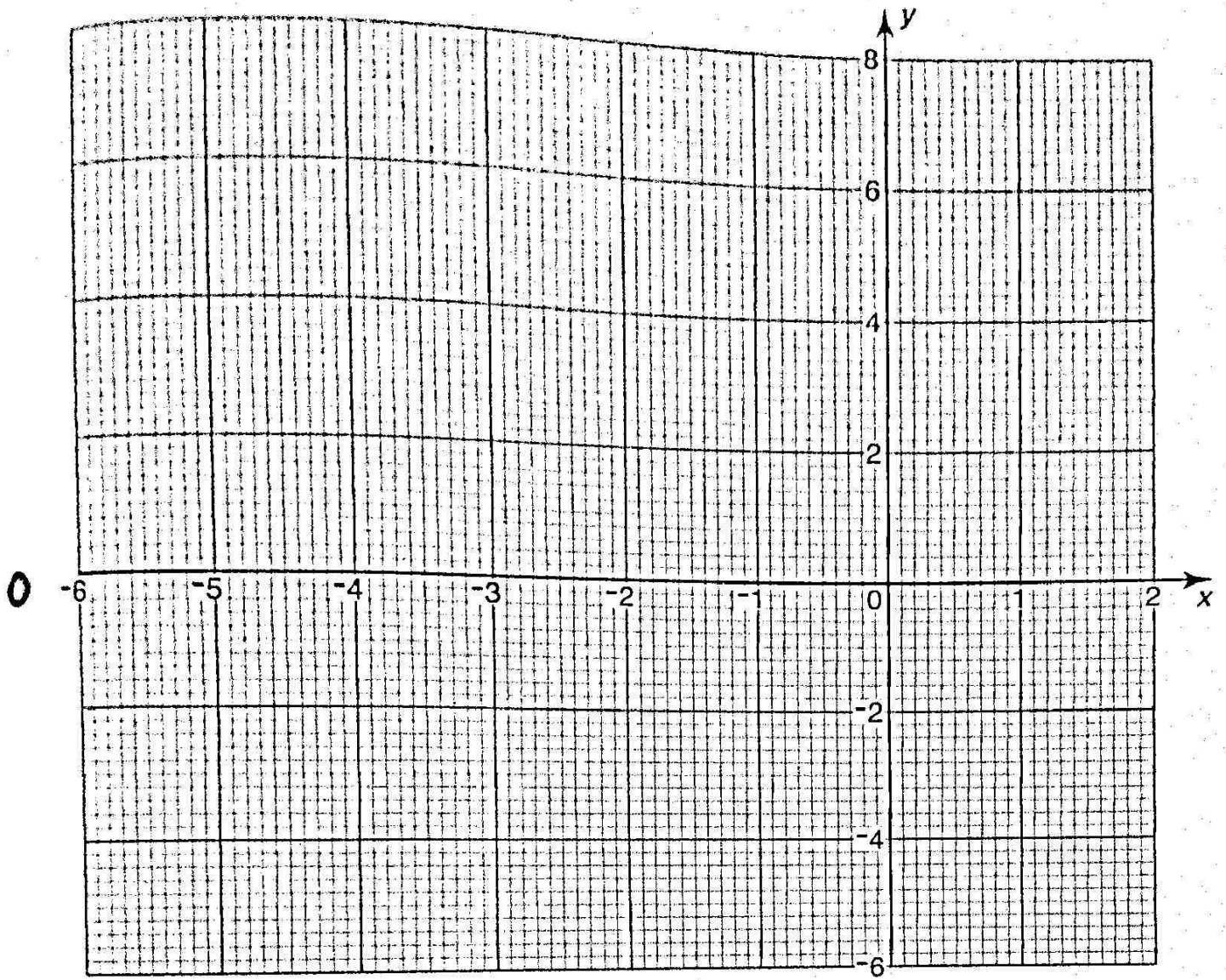
(1)

(iv) On the grid opposite, draw and label the line $y = 3 + \frac{1}{2}x$

(1)

(v) Write down the co-ordinates of the points of intersection of the curve $y = x^2 + 4x$ and the straight line $y = 3 + \frac{1}{2}x$

Answer: (.....,) and (.....,) (2)



TURN OVER FOR QUESTION 15

15. Jack collects model aeroplanes.

He buys 3 model aeroplanes in a shop for a cost of £ s each and 4 model aeroplanes from a website for a cost of £ w each.

The total cost of these aeroplanes is £45

(i) Write down an equation in terms of s and w to show this information.

Answer: (1)

Richard buys 1 model aeroplane in the shop and 3 model aeroplanes from the website.

The total cost of these aeroplanes is £25

(ii) Write down a second equation in terms of s and w to show this information.

Answer: (1)

(iii) Solve your two equations to find the values of s and w .

Answer: $s =$ (1)

$w =$ (4)

Fred buys 5 model aeroplanes in the shop and 3 model aeroplanes from the website.

(iv) How much more does Fred spend than Jack?

Answer: £ (2)

(Total marks: 100)