Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
18 – 19	
20 – 21	
22 – 23	
24 – 25	
26 – 27	
28 – 29	
TOTAL	

AQA

General Certificate of Secondary Education
Higher Tier
November 2014

Mathematics (Linear) 4365/2H

Paper 2

H

Friday 7 November 2014 9.00 am to 11.00 am

For this paper you must have:
- a calculator
- mathematical instruments.

Time allowed
- 2 hours

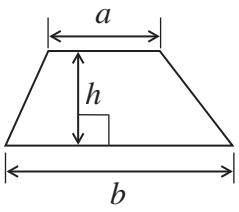
Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 105.
- The quality of your written communication is specifically assessed in Questions 3, 6 and 13. These questions are indicated with an asterisk (*).
- You may ask for more answer paper, tracing paper and graph paper. These must be tagged securely to this answer book.

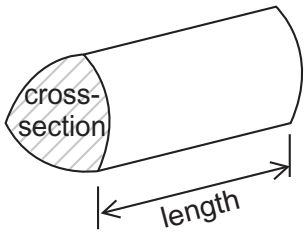
Advice
- In all calculations, show clearly how you work out your answer.

Formulae Sheet: Higher Tier

Area of trapezium = $\frac{1}{2}(a+b)h$

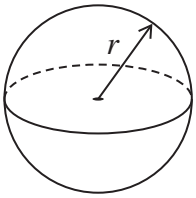


Volume of prism = area of cross section × length



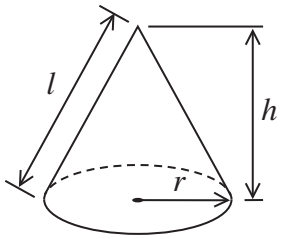
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

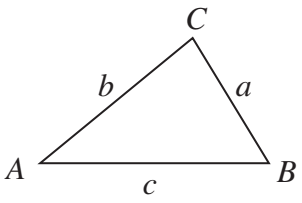
Curved surface area of cone = $\pi r l$



In any triangle ABC

Area of triangle = $\frac{1}{2}ab\sin C$

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$



Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

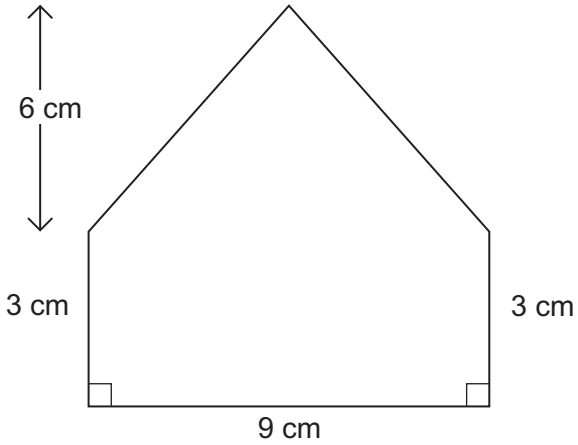
The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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

Answer **all** questions in the spaces provided.

1 Work out the area of this shape.



Not drawn accurately

[3 marks]

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Answer ..... cm^2

3

Turn over ▶

2 A box contains some cards.
Each card has a question.
Each question is about History, Languages, Movies or Sport.

The questions have three levels Easy, Medium or Difficult.

The table shows the probability for each type of question.

	Easy	**Medium**	**Difficult**
History	0.15	0.2	0.05
Languages	0.1	0.08	0.02
Movies	0.01	0.03	0.06
Sport	0.12	0.07	0.11

A card is picked at random.

2 (a) What is the probability that it is a **Sport** question?

[1 mark]

.....

Answer .....

2 (b) What is the probability that it is a **Medium** level question about **Languages** or **Movies**?

[1 mark]

.....

Answer .....

2 (c) There are 200 cards in the box altogether.

How many **Easy** questions are about **History**?

[2 marks]

.....

Answer .....

***3** Here is an advert.

Hair Salon

Trim and Colour	£65.50
Wash and Dry	£15.50
Perm	£68.00

Special Offer
15% off

Jen has a Trim and Colour.
She uses the special offer.

How much does she pay?

[3 marks]

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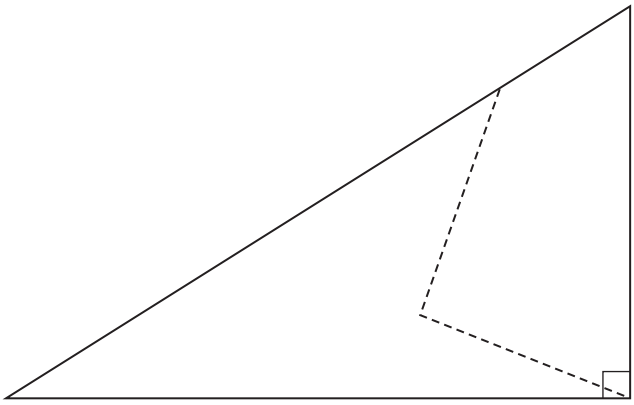
Answer £ .....

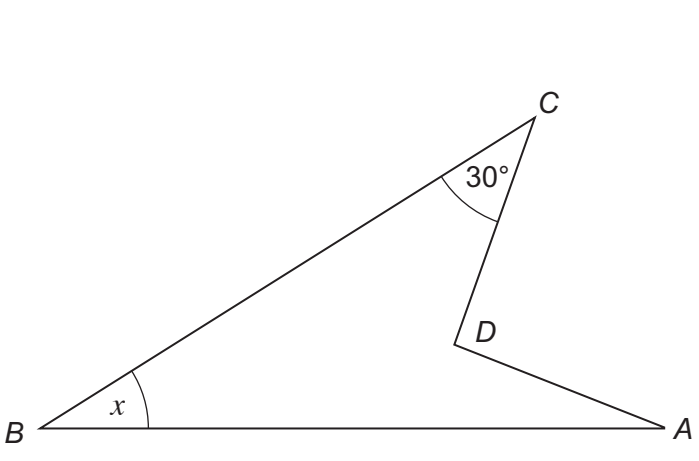
7

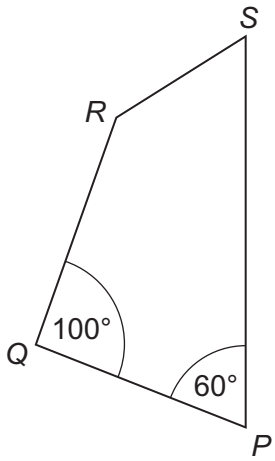
4 The diagram shows a right-angled triangle.



Not drawn accurately

The triangle is cut along the dotted lines to make two quadrilaterals, *ABCD* and *PQRS*.





Not drawn accurately

Work out the size of angle x.
You **must** show your working, which may be on the diagram.

[4 marks]

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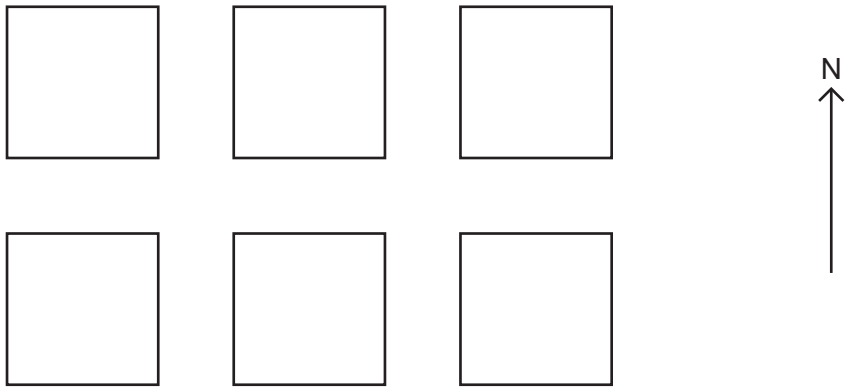
Answer ..... degrees

5 The diagram shows the positions of six chairs in a classroom.



Five students are sitting on the chairs so that

Ben is on a bearing of 045º from Adam

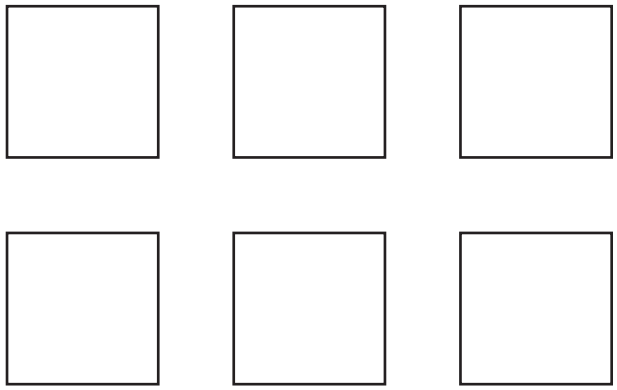
Cath is on a bearing of 090º from Ben

Darren is on a bearing of 135º from Emily.

On the plan below, show where each student is sitting.

[3 marks]

Answer



7

6 Here are the numbers of people in a restaurant on the first 15 days in December.

24	21	13	33	41
25	29	11	47	44
28	30	39	48	35

***6 (a)** Show the data on an ordered stem-and-leaf diagram.

Remember to complete the key.

[4 marks]

Key: ..... | ..... represents ..... people

.....	.....
.....	.....
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6 (b) Some people go to the restaurant on 16th December.
For the first 16 days in December the median number of people in the restaurant is 31

How many people went to the restaurant on 16th December?

[1 mark]

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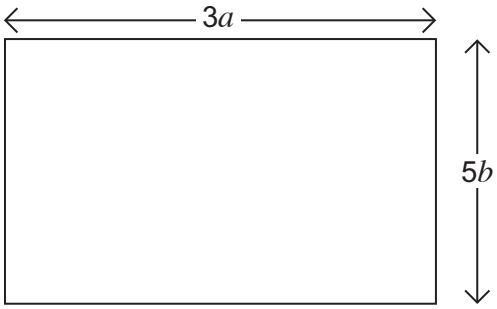
Answer .....

7 The diagram shows a rectangle.



7 (a) Write down an expression for the **area** of the rectangle.

Simplify your answer.

[2 marks]

.....

Answer .....

7 (b) You are given that a and b are prime numbers.
The **area** of the rectangle is 315 cm^2

Work out the values of a and b.

[2 marks]

Answer ..... cm and ..... cm

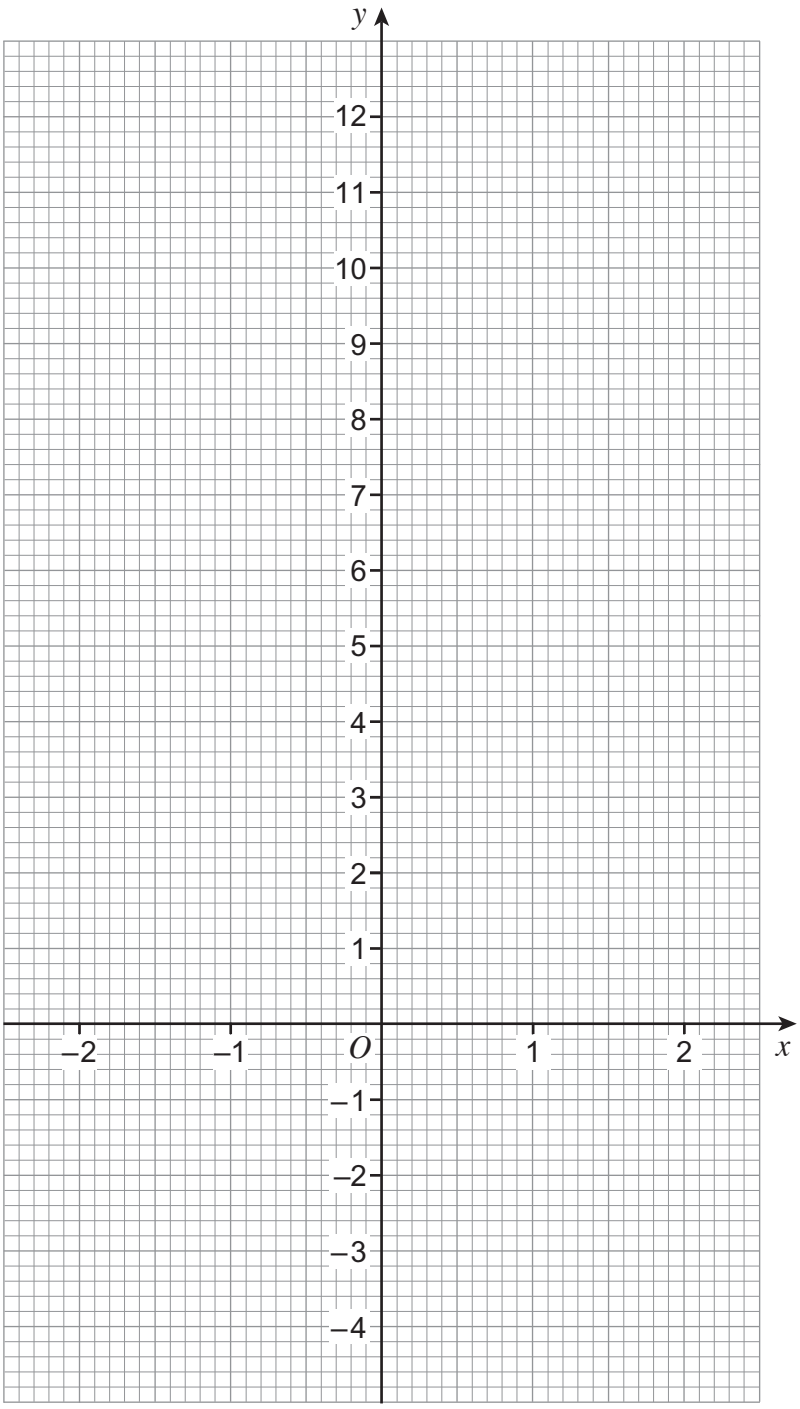
9

8 (a) Complete the table of values for $y = x^3 + 4$

x	– 2	– 1	0	1	2
y		3	4		12

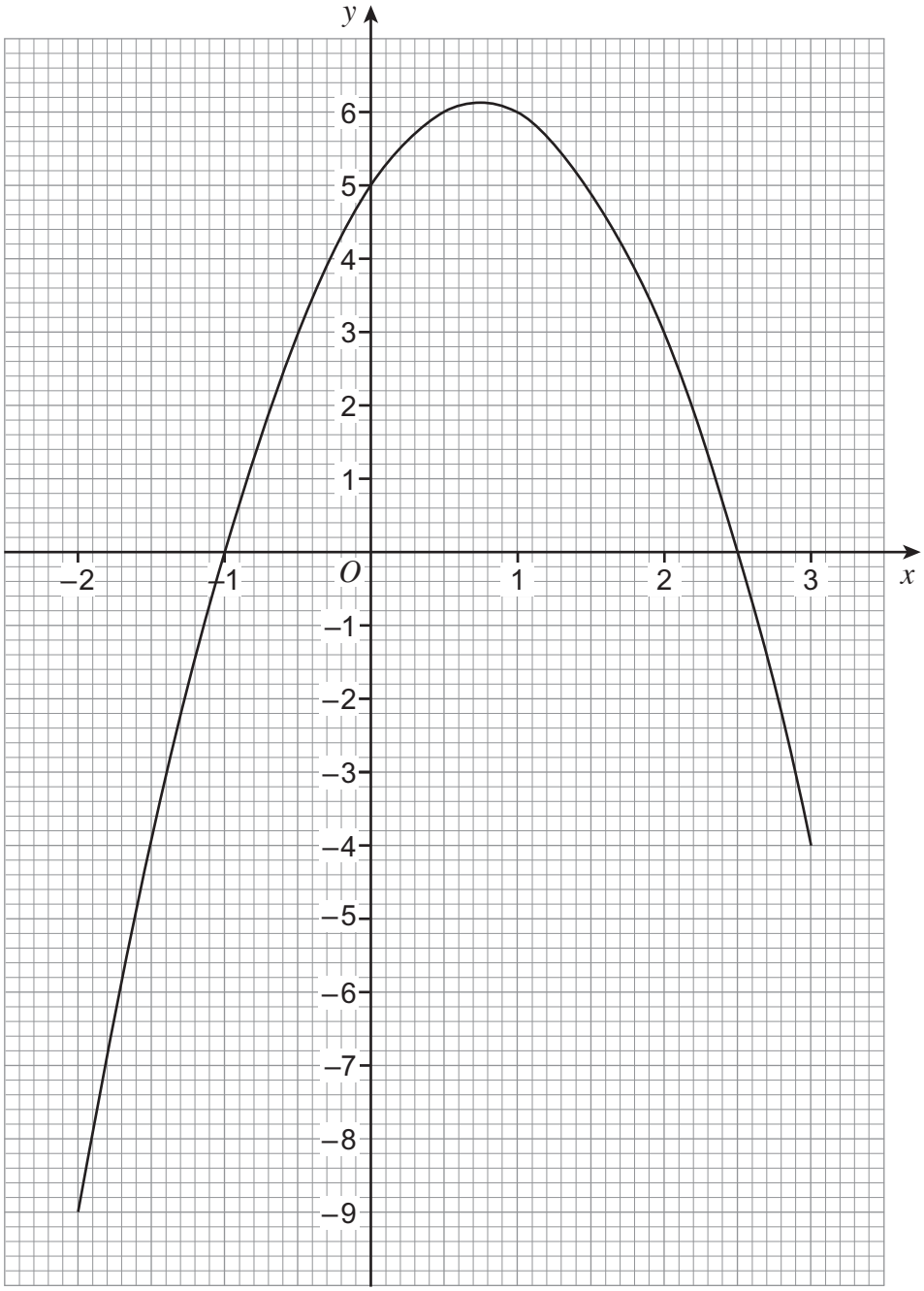
[2 marks]

8 (b) On the grid below, plot the graph of $y = x^3 + 4$ for values of x from –2 to 2



[2 marks]

8 (c) The graph of $y = 5 + 3x - 2x^2$ is shown for values of x from –2 to 3



Write down the solutions of $5 + 3x - 2x^2 = 0$

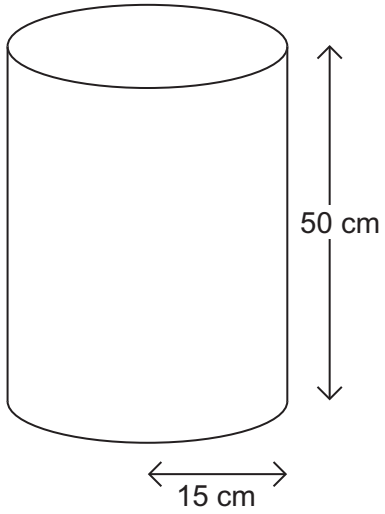
[2 marks]

Answer ..... and .....

6

Turn over ▶

9 A tank is in the shape of a cylinder of radius 15 cm and height 50 cm



9 (a) Work out the volume of the tank.

[3 marks]

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Answer ..... cm^3

9 (b) The volume of another tank is 33 000 cm^3

The tank is empty.
The tank is filled at the rate of 0.22 litres a second.

How many **minutes** will it take to fill the tank?

[4 marks]

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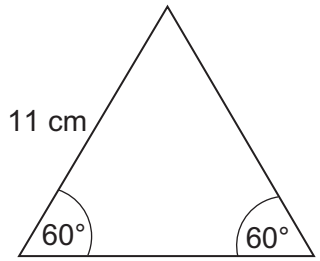
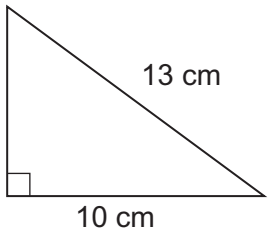
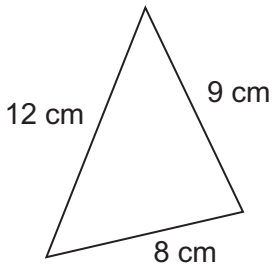
Answer ..... minutes

10 One of these triangles is picked at random.







Not drawn accurately

Work out the probability that its perimeter is less than 30 cm
You **must** show your working.

[5 marks]

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Answer .....

12

11 Andrew is paid £250 a week.
Each week, he

shares his pay with his sister in the ratio 3 : 2

saves 12% of his share.

How many weeks will it take Andrew to save £360?

[5 marks]

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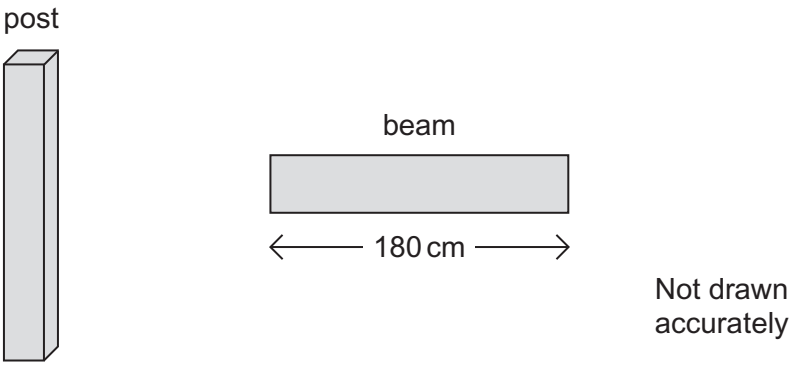
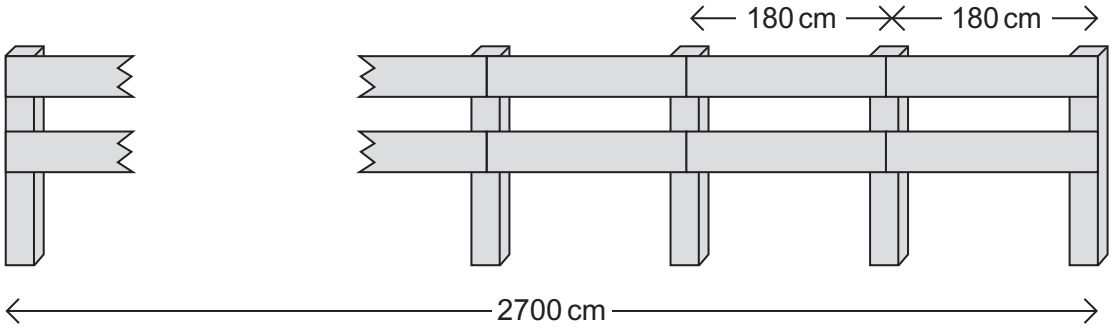
Answer .....

12 A farmer is building a fence using posts and beams.



The total length of the fence is 2700 cm



Use this formula to work out the cost, £ C, of the fence

$$C = 5(B + 2P)$$

B is the number of beams.
P is the number of posts.

[4 marks]

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Answer £ .....

9

Turn over ▶

***13** Use trial and improvement to find the solution to $2^x - 10 = 0$
Give your answer to 1 decimal place.

x	$2^x - 10$	**Comment**
3	– 2	too small

[4 marks]

Answer .....

14 The price of a pack of kitchen rolls is reduced by $\frac{1}{6}$

The new price is £1.20

Work out the original price.

[3 marks]

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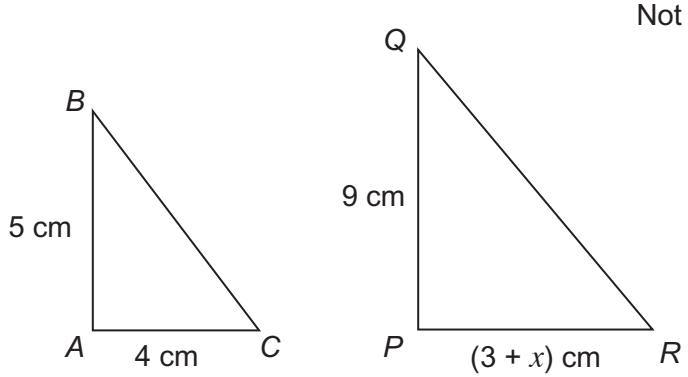
Answer £ .....

Turn over for the next question

7

15 *ABC* and *PQR* are similar triangles.

Not drawn accurately



15 (a) Which **one** of the following equations is correct for these triangles?
Circle your answer.

[1 mark]

$\frac{3+x}{4}=\frac{5}{9}$ $\frac{3+x}{9}=\frac{5}{4}$ $\frac{3+x}{5}=\frac{9}{4}$ $\frac{3+x}{4}=\frac{9}{5}$

15 (b) Solve the equation you circled to work out the value of x.

[4 marks]

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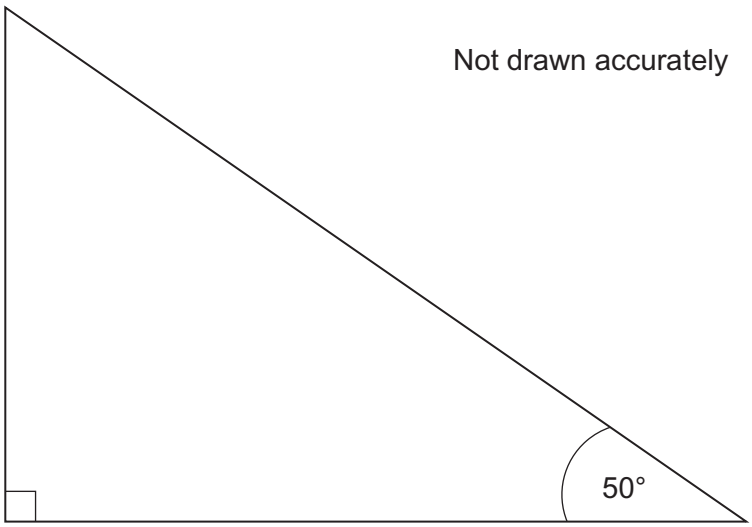
x = ...

16 Work out the area of this right-angled triangle.



Give your answer to 2 significant figures.

[5 marks]

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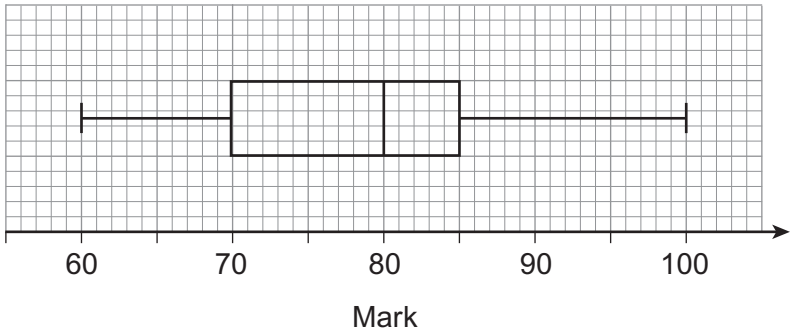
Answer ..... m^2

10

Turn over ▶

17 The box plot shows information about the marks of a Y11 class in a test.

Y11



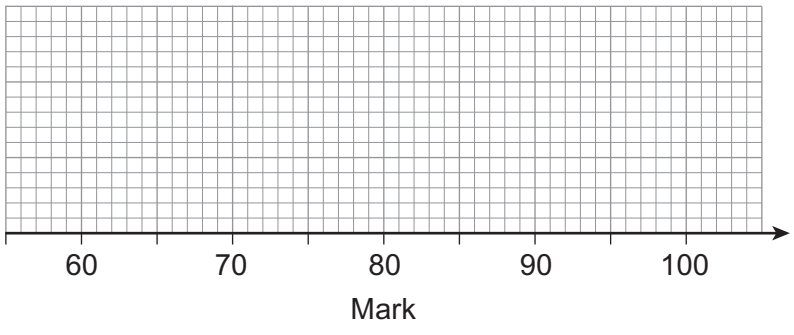
17 (a) The table shows information about the marks of the **boys** in the class.

Minimum	Lower quartile	Median	Upper quartile	Maximum
65	70	80	85	95

Draw a box plot for the marks of the **boys**.

[2 marks]

Boys

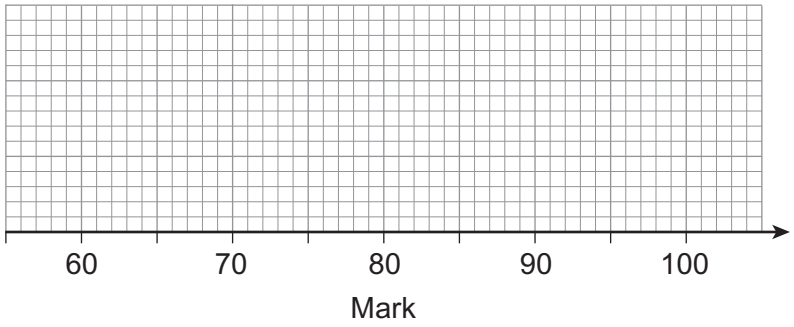


17 (b) One-quarter of the girls in the class scored 75 or less.
The inter-quartile range for the girls is the same as for the boys.

Draw a box plot for the marks of the girls.

[4 marks]

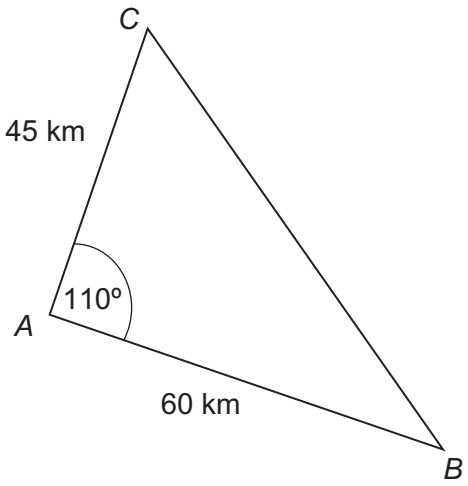
Girls



Turn over for the next question

6

18



Not drawn accurately

Work out the length *BC*.

[3 marks]

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Answer ..... km

19 Luke has a rectangular garden.
The length is 40 m
The width is 25 m
Both measurements are given to the nearest metre.

Mira also has a garden.
The area is 970 m^2 to the nearest 10 m^2

Mira thinks her garden has a bigger area.

Is she correct?

Tick a box.
You **must** show your working.

[3 marks]

Correct ☐ Incorrect ☐ Cannot tell ☐

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Turn over for the next question

6

20 y is directly proportional to R^2
When $R = 4$, $y = 24$

Work out the value of R when $y = 1350$

[5 marks]

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Answer .....

21 Solve the simultaneous equations

$$y - x = 2$$
$$y = 2x^2 + 5x + 1$$

Give your answers correct to 1 decimal place.

[6 marks]

Answer .....

11

22 Simplify $\dfrac{x^2 - 16}{2x^2 - 5x - 12}$

[3 marks]

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Answer .....

23 A bag contains 9 counters.
4 of the counters are blue.

Two counters are taken out of the bag at random.

Calculate the probability that **at least one** of the two counters is blue.

[4 marks]

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Answer .....

7

24 Prove that $\frac{3n + 5}{3n} - \frac{n}{n - 1} \equiv \frac{2n - 5}{3n(n - 1)}$

[3 marks]

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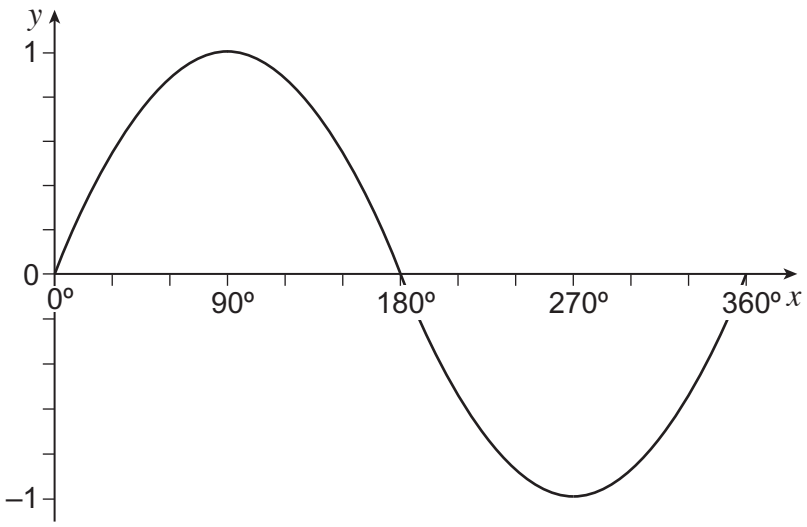
25 The graph shows $y = \sin x$ for $0^\circ \leqslant x \leqslant 360^\circ$



25 (a) $\sin x = \sin 60^\circ$ and $90^\circ < x < 360^\circ$

Work out the value of x.

[1 mark]

.....

Answer .....

25 (b) $\sin x = -\sin 60^\circ$ and $180^\circ < x < 360^\circ$

Work out **one** of the values of x.

[1 mark]

.....

Answer .....

END OF QUESTIONS

5

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