AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE MATHEMATICS (LINEAR)

H

Higher Tier Paper 2

Friday 4 November 2016 Morning Time allowed: 2 hours

Materials

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

Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- 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 2, 6 and 20. 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.

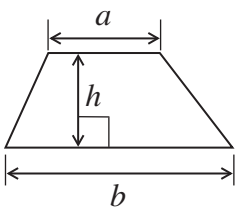
N 0 V 1 6 4 3 6 5 2 H 0 1

WMP/Nov16/E5

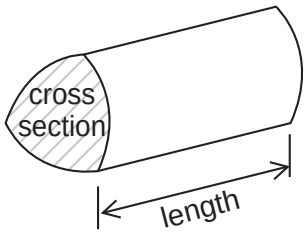
4365/2H

Formulae Sheet: Higher Tier

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

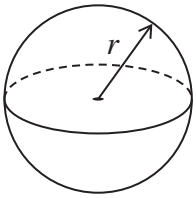


Volume of prism = area of cross section × length



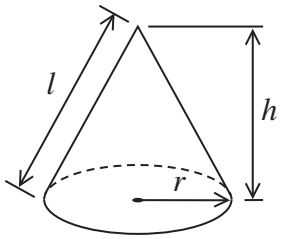
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

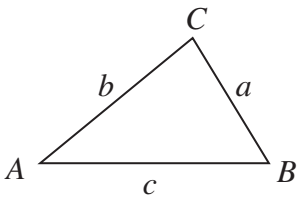


In any triangle ABC

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

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

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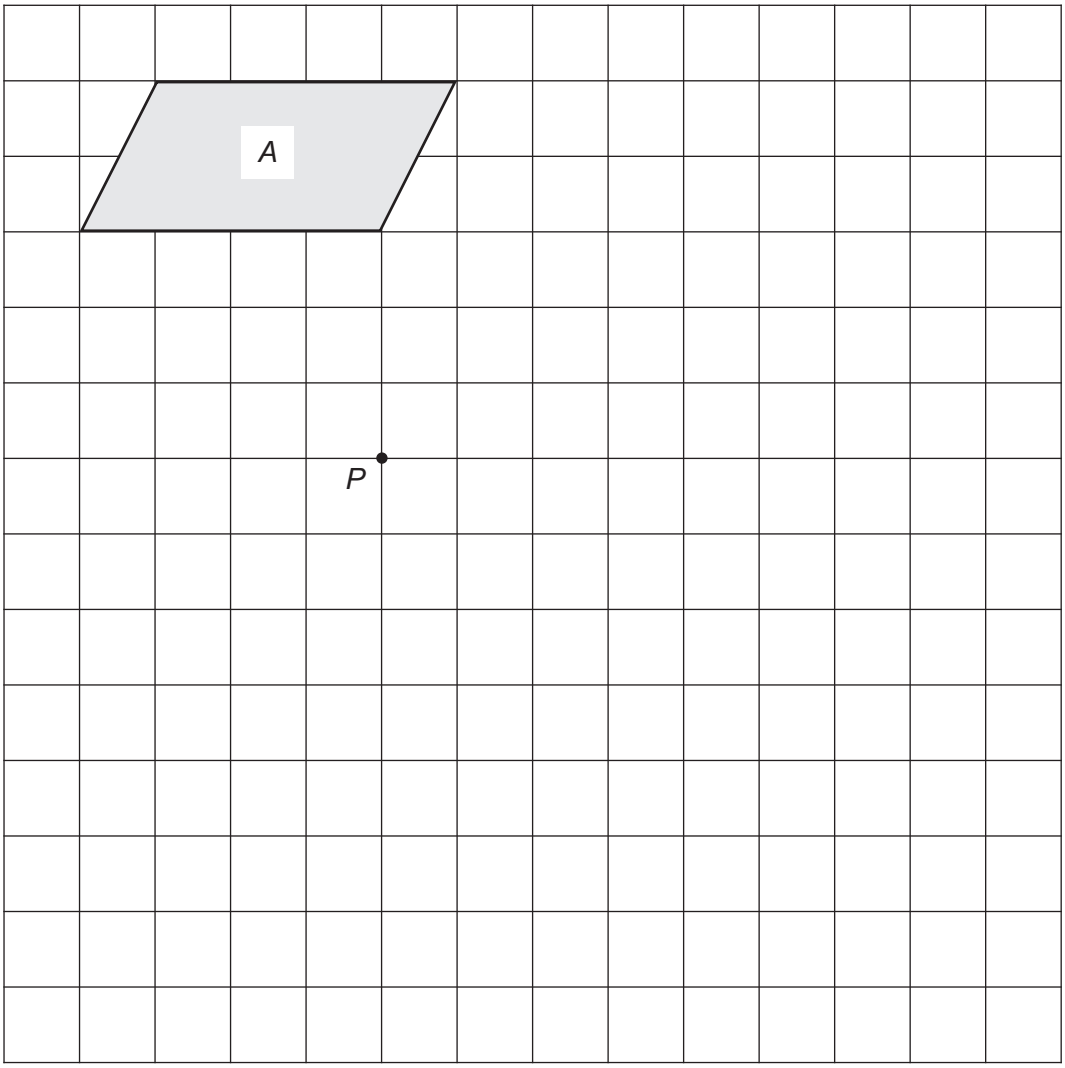
Answer **all** questions in the spaces provided.

1 On this grid, rotate shape *A* by 90° clockwise about point *P*.

[3 marks]



Turn over for the next question

3

Do not write outside the box

2 100 people are asked about their work.
Here are some of the results.

	Full time	Part time	Not working	Total
Men	24	9		60
Women	18			40
Total	42			100

2 (a) The total number working **part time** is the same as the total number of people **not working**.

Complete the table.

[4 marks]

Do not write outside the box

*2 (b) In this survey, there are 60 men and 40 women.

Which is greater

the percentage of the men who work full time

or

the percentage of the women who work full time?

You **must** show your working.

[3 marks]

Answer _____

Turn over for the next question

7

Do not write outside the box

3 This hexagon has two lines of symmetry.

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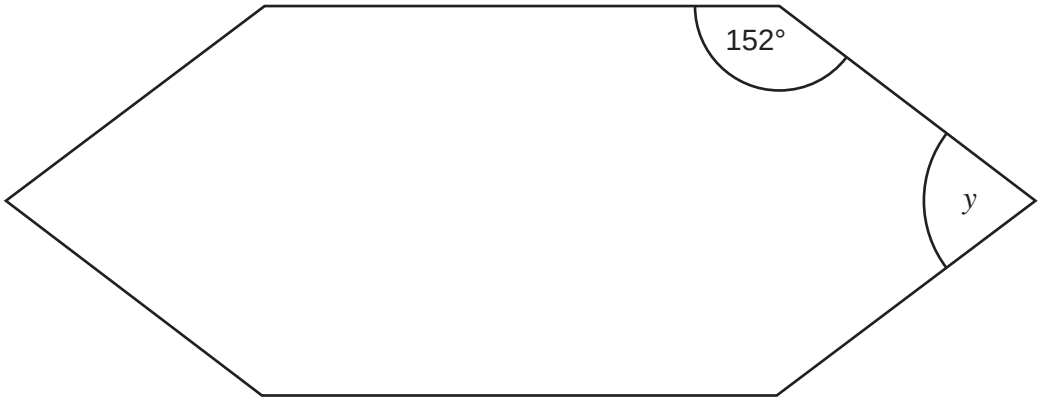


Work out the size of angle y.

[3 marks]

Answer _____ degrees

Do not write outside the box

4 A builder mixes sand and cement in the ratio 4 : 1

4 (a) Altogether he mixes 250 kg

How much sand and cement does he use?

[2 marks]

Sand _____ kg

Cement _____ kg

4 (b) Cement is sold in 25 kg bags.

Work out the **maximum** amount of mix that the builder can make with 3 bags of cement.

[3 marks]

Answer _____ kg

Turn over for the next question

8

Do not write outside the box

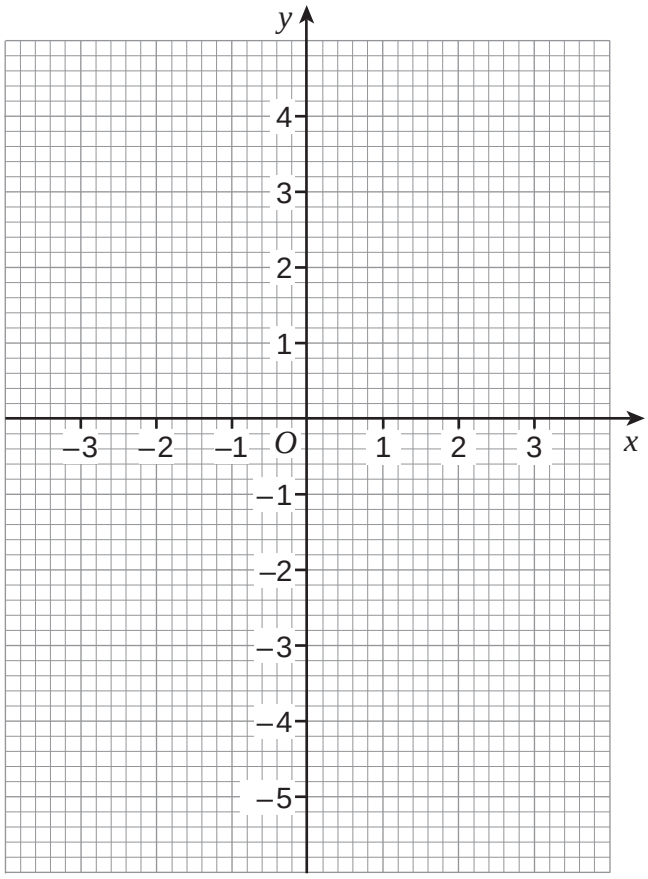
5 (a) Complete the table of values for $y = x^2 - 5$ for values of x from –3 to 3

[2 marks]

x	–3	–2	–1	0	1	2	3
y	4		–4			–1	4

5 (b) Draw the graph of $y = x^2 - 5$ for values of x from –3 to 3

[2 marks]



5 (c) Use the graph of $y = x^2 - 5$ to write down the values of x when $y = 0$

[1 mark]

Answer _____ and _____

Do not write outside the box

6 The table shows the proportions of left-handed and right-handed students in a school.

	Left-handed	**Right-handed**
Boys	15%	85%
Girls	12%	88%

***6 (a)** 20 boys and 10 girls are chosen at random from the school.

Estimate the number of left-handed students chosen.

[3 marks]

Answer _____

6 (b) There are an equal number of boys and girls in the school.
A student is chosen at random.

Work out the probability that the student is right-handed.

[2 marks]

Answer _____

10

Do not write outside the box

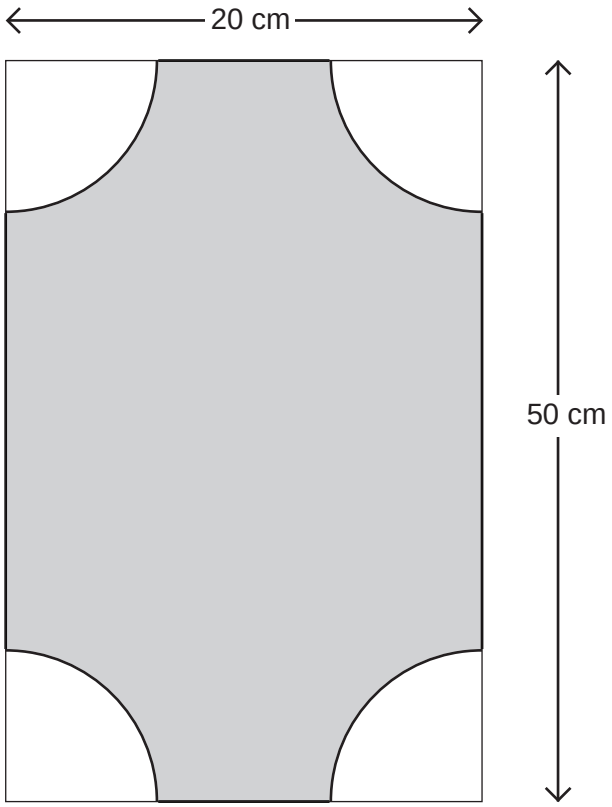
7 (a) Work out the area of a circle of radius 6 cm

[2 marks]

Answer _____ cm^2

7 (b) Quarter circles of radius 6 cm are cut from the corners of a rectangle as shown.

[3 marks]



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Work out the shaded area.

Answer _____ cm^2

Do not write outside the box

8 In 1981 the population of England was 46 million.
In 2011 the population of England was 53 million.

Work out the increase in population as a percentage of the 1981 figure.

[3 marks]

Answer _____ %

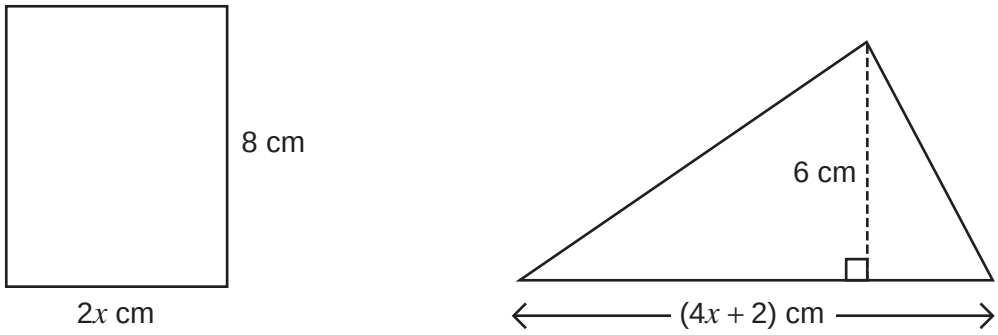
Turn over for the next question

8

Do not write outside the box

9 The area of the rectangle and the area of the triangle are equal.

Not drawn accurately



Work out the value of x.

[4 marks]

x = _____

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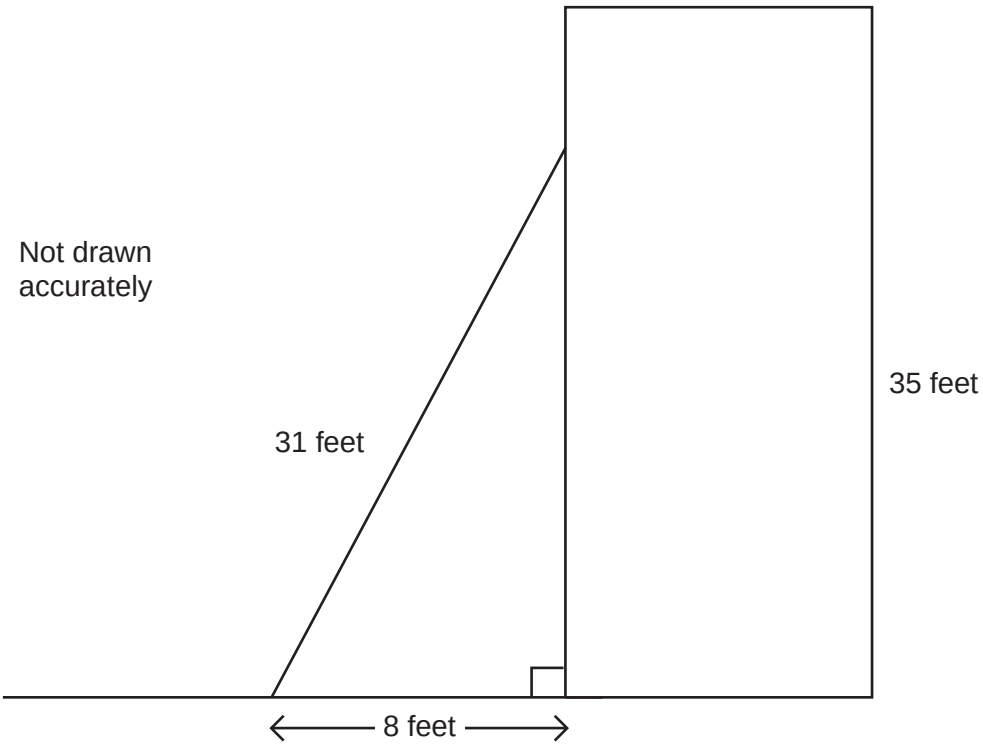
10 A ladder of length 31 feet is leaning against a wall as shown.
The foot of the ladder is 8 feet from the wall.
The wall is 35 feet tall.



Work out the distance from the top of the ladder to the top of the wall.

[4 marks]

Answer _____ feet

8

Turn over ▶

Do not write outside the box

11 Bag A contains 3 red balls and 7 blue balls.

Bag B contains 8 red balls and 2 blue balls.

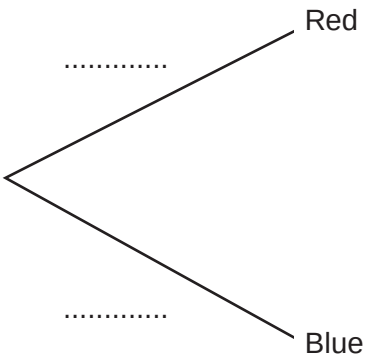
Bag A **Bag B**

A ball is picked at random from each bag.

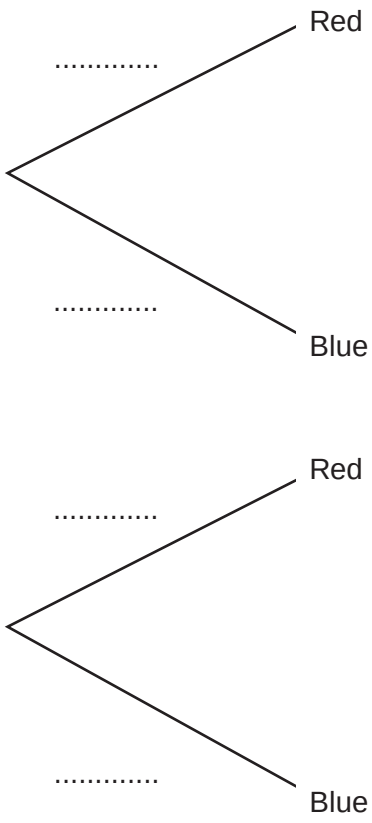
11 (a) Complete the tree diagram to show all the probabilities.

[3 marks]

Bag A



Bag B



Do not write outside the box

11 (b) Work out the probability of picking a **red** ball from Bag A and a **blue** ball from Bag B.

[2 marks]

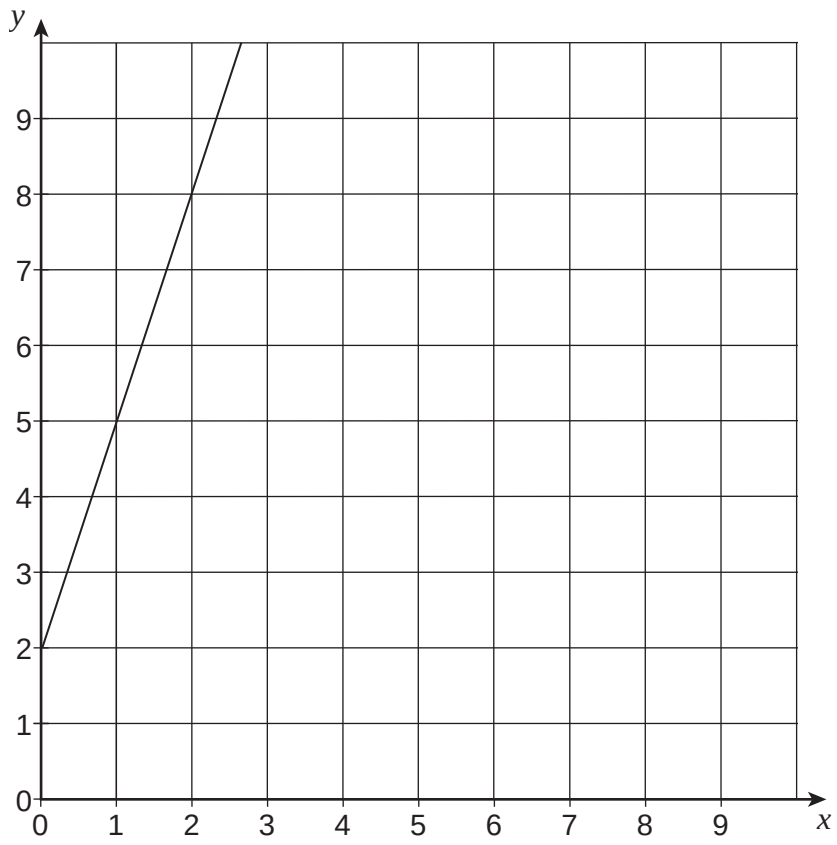
Answer _____

Turn over for the next question

5

Do not write outside the box

12 The straight line passes through points (0, 2) and (2, 8)



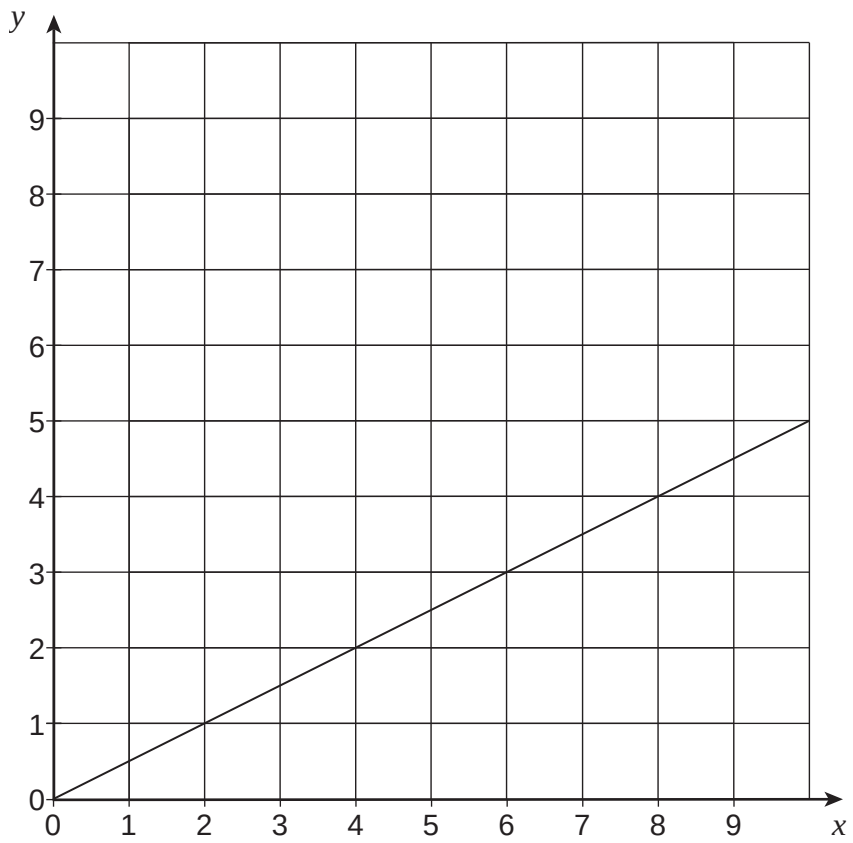
12 (a) Work out the equation of the straight line.

[3 marks]

Answer _____

Do not write outside the box

12 (b) On this grid the line $y = \frac{1}{2}x$ is shown.



On the same grid, draw the line $x + y = 9$ for values of x from 0 to 9

[2 marks]

12 (c) Solve the simultaneous equations

$$y = \frac{1}{2}x$$

and $x + y = 9$

[2 marks]

Answer _____

7

Turn over ▶

Do not write outside the box

13 (a) Simplify fully $5x^2 \times 3y^4 \times 2x \times y^3$

[2 marks]

Answer _____

13 (b) Expand and simplify $(x + 7)(x - 3)$

[2 marks]

Answer _____

13 (c) Solve $(x - 8)(x + 2) = 0$

[1 mark]

Answer _____

13 (d) Factorise $8x^2y + 6xy^2$

[2 mark]

Answer _____

Do not write outside the box

14 In a sale the normal price of a dress is reduced by 25%
The sale price is then reduced by £10

The dress is now priced at £80

The manager says,

"The price is now one-third less than the normal price."

Show that he is correct.

[5 marks]

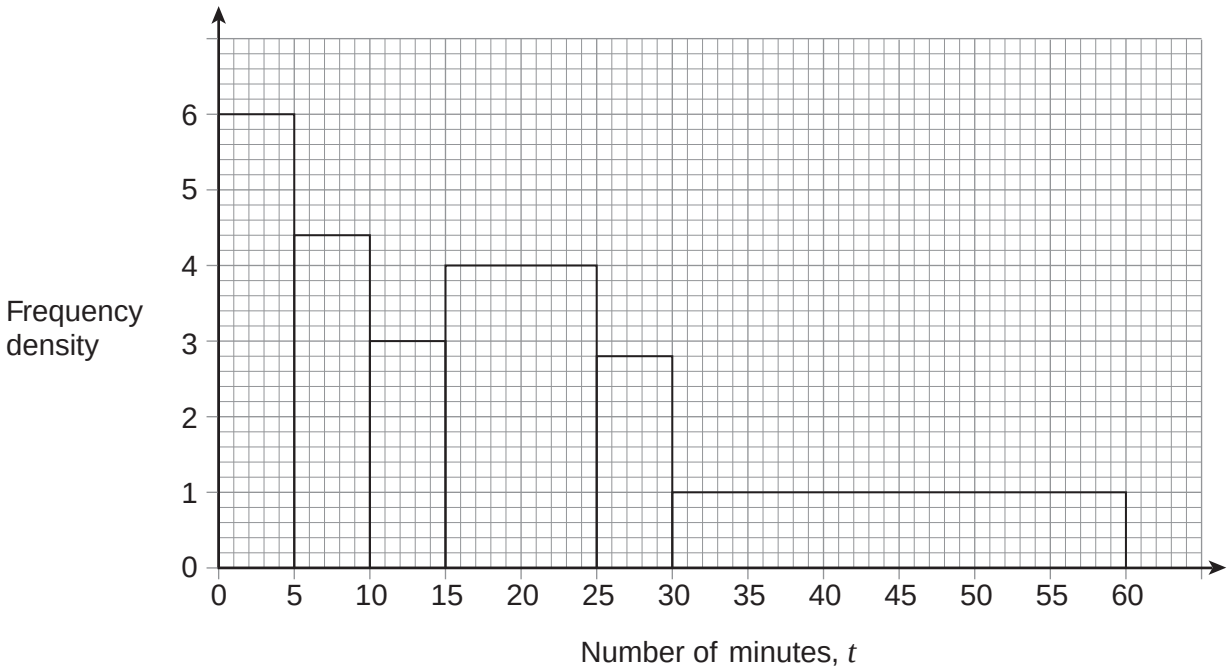
Turn over for the next question

12

Do not write outside the box

15 A train company records the number of minutes, t, some trains were late in one month.

The histogram summarises the results.



15 (a) How many trains were **more** than 15 minutes late?

[3 marks]

Answer _____

Do not write outside the box

15 (b) Which is the modal class?

Circle your answer.

[1 mark]

$0 < t \leqslant 5$ $15 < t \leqslant 25$ $25 < t \leqslant 30$ $30 < t \leqslant 60$

16 Which of these when converted to decimals are recurring decimals?
Circle your answers.

[2 marks]

$\frac{1}{3}$ π $\sqrt{3}$ $\frac{3}{16}$ $\frac{5}{7}$

Turn over for the next question

6

Do not write outside the box

17 The surface area of a solid cylinder is given by the formula

$$S = 2\pi rh + 2\pi r^2$$

17 (a) Rearrange the formula to make h the subject.

[2 marks]

Answer _____

17 (b) Work out the value of h when $S = 95\pi$ cm^2 and $r = 5.3$ cm
Give your answer to a suitable degree of accuracy.

[4 marks]

Answer _____ cm

Do not write outside the box

18 y is inversely proportional to x^2 where $x > 0$

When $x = 2$, $y = 20$

18 (a) Form an equation for y in terms of x.

[3 marks]

Answer _____

18 (b) Work out the value of x when $y = 5$

[2 marks]

Answer _____

11

Do not write outside the box

19 (a) Work out the length x.

[3 marks]

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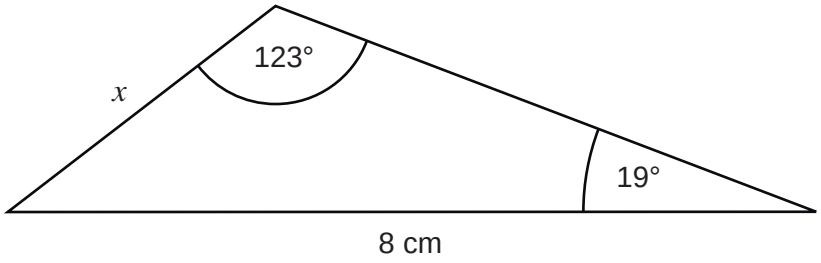


Answer _____ cm

19 (b) Circle the statements that are true.

[2 marks]

sin 123° = sin 57° sin 123° = cos 57°

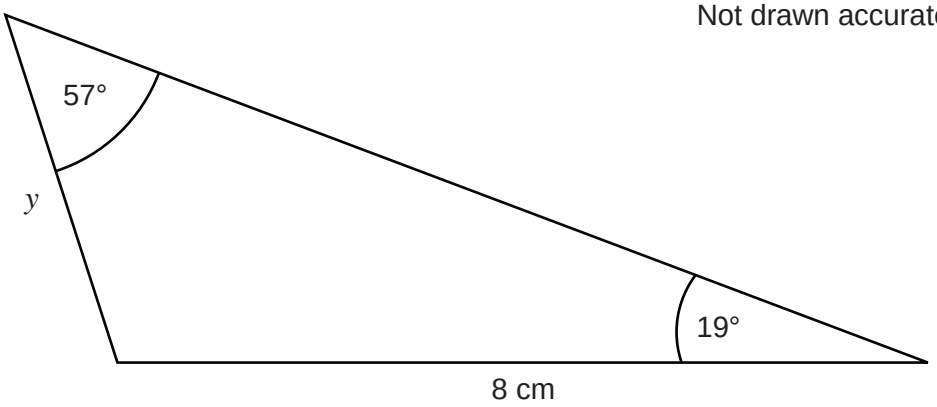
cos 123° = cos 57° cos 123° = –cos 57°

Do not write outside the box

19 (c) Work out the length y.

[1 mark]

Not drawn accurately



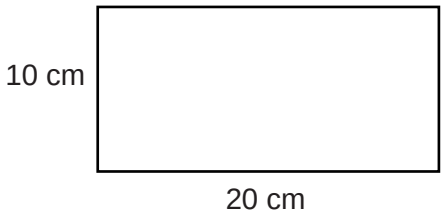
Answer _____ cm

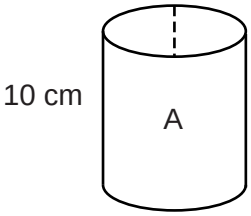
Turn over for the next question

6

Do not write outside the box

***20** A rectangle of card, 20 cm by 10 cm, is used to make a cylindrical tube A, as shown.
The card does **not** overlap.





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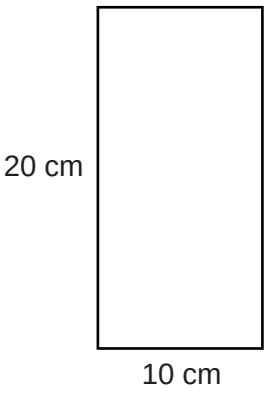
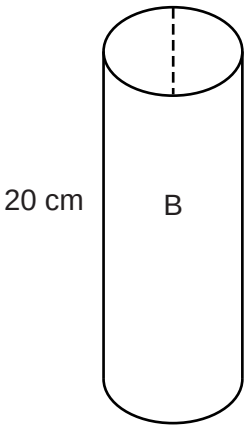
Another rectangle of card, 20 cm by 10 cm, is used to make a cylindrical tube B, as shown.
The card does **not** overlap.





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Do not write outside the box

The tubes are filled with clay.

Which tube uses more clay?
You **must** show your working.

[4 marks]

Answer _____

Turn over for the next question

4

Do not write outside the box

21 Use algebra to work out the x-coordinates of the points of intersection of

$$y = 3x^2$$

and $$y = 4x + 2$$

Give your answers to 1 decimal place.

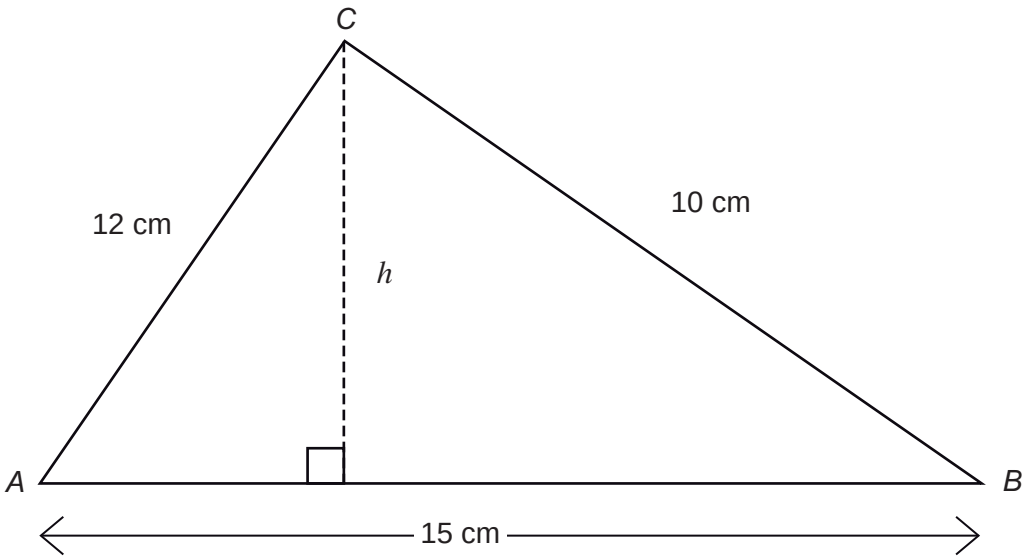
[5 marks]

Answer _____

Do not write outside the box

22 Work out the height h of the triangle ABC.

Not drawn accurately



[5 marks]

Answer _____ cm

END OF QUESTIONS

10

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