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 6 November 2015 Morning Time allowed: 2 hours

Materials

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

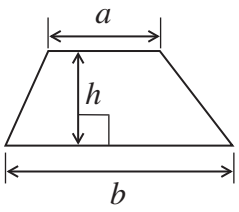
Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book.

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 4 and 15. 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.

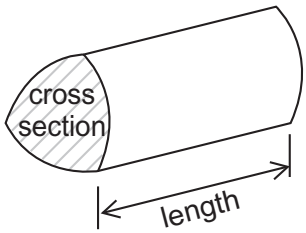
Advice
- In all calculations, show clearly how you work out your answer.

Formulae Sheet: Higher Tier

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

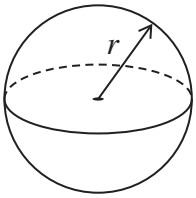


Volume of prism = area of cross section × length



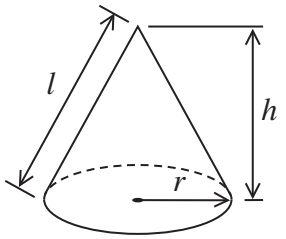
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

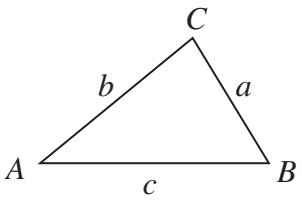
Curved surface area of cone = $\pi r l$



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

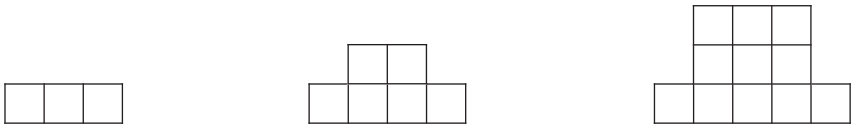
The Quadratic Equation

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 Here is a sequence of patterns made with squares.



Pattern 1 Pattern 2 Pattern 3

The rule for working out the number of squares in each pattern is

Square the pattern number and then add 2

1 (a) How many squares are in pattern 7?

[1 mark]

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Answer .....

1 (b) Which pattern has 123 squares?

[2 marks]

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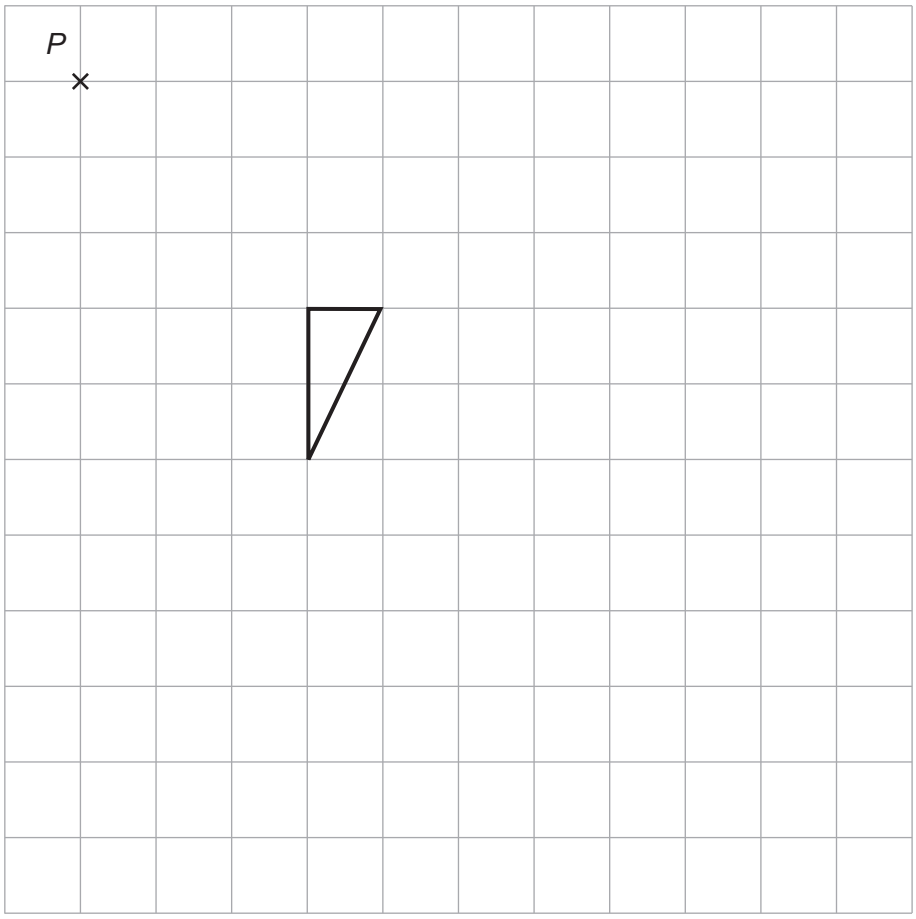
Answer .....

3

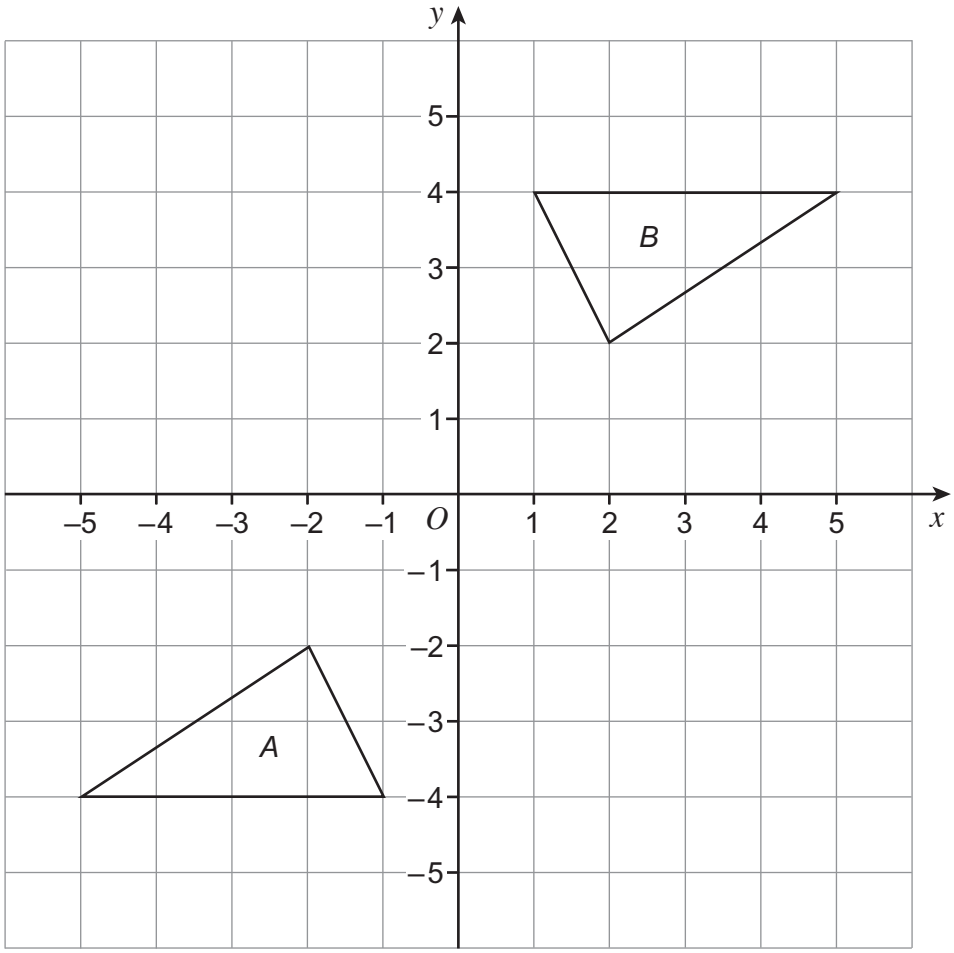
2 (a) Enlarge the triangle by scale factor 2, using point *P* as the centre of enlargement.

[3 marks]



2 (b) Describe fully the **single** transformation that maps shape *A* onto shape *B*.

[3 marks]



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3 A family uses 300 units of gas.

Each unit of gas costs 19p without VAT.
VAT of 5% is added to the bill.

Work out the total gas bill.

[4 marks]

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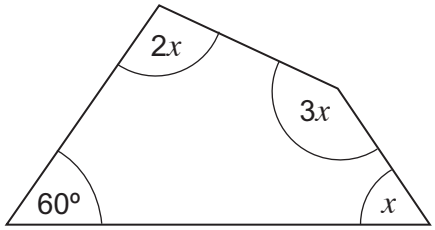
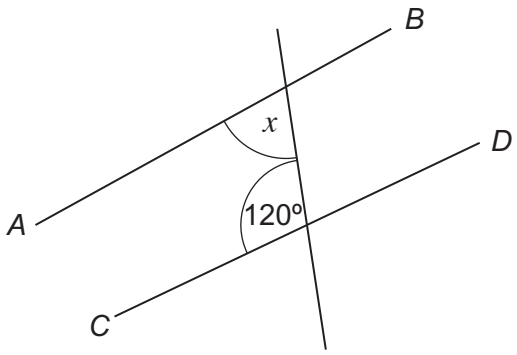
Answer £ .....

***4**





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Show that *AB* is **not** parallel to *CD*.

[4 marks]

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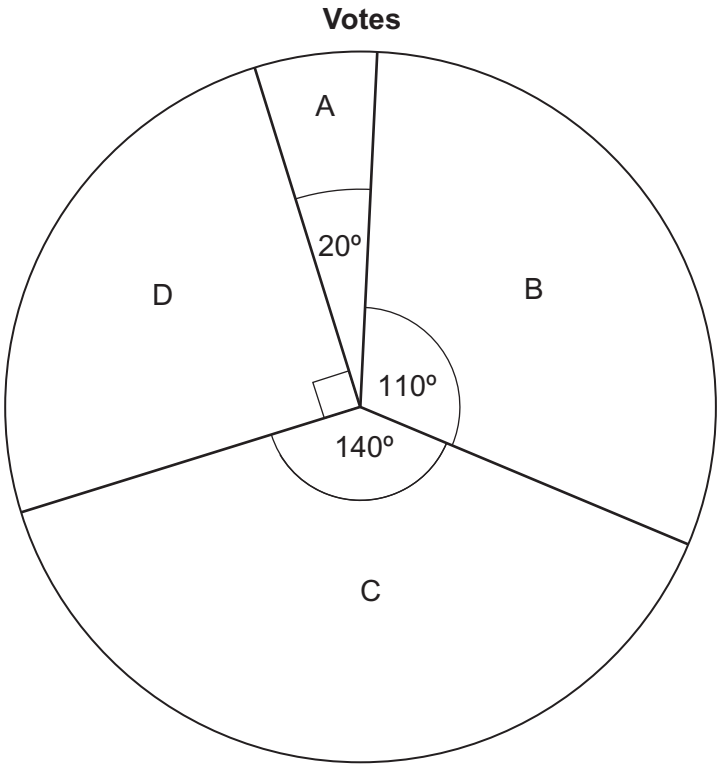
Turn over for the next question

8

5 The pie chart shows information about how people voted in an election.



1800 people voted for D.

How many **more** people voted for C than B?

[3 marks]

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Answer .....

6 (a) Solve $6x + 4 = 2(2x - 5)$

[3 marks]

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$x =$ .....

6 (b) Multiply out $y(2 - y^3)$

[2 marks]

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Answer .....

7 Abby and Judy share some money.
Abby gets 25%

7 (a) Write Abby's share : Judy's share as a ratio.
Give your answer in its simplest form.

[2 marks]

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Answer ..... : .....

7 (b) Judy gets £19.50

How much does Abby get?

[2 marks]

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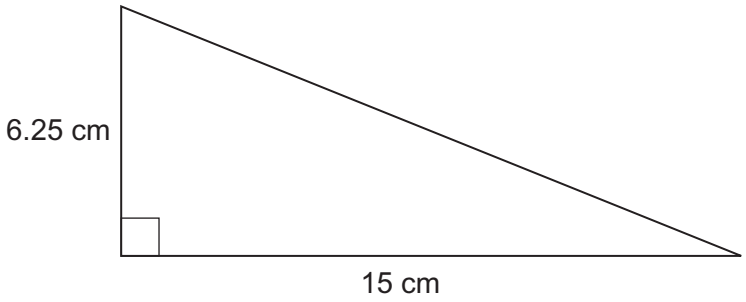
Answer £ .....

12

8 Work out the length of the hypotenuse.



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[3 marks]

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Answer ..... cm

9 Here is information about the scores, t, of class A in a test.

Score	Frequency		
$0 < t \leqslant 10$	4		
$10 < t \leqslant 20$	8		
$20 < t \leqslant 30$	9		
$30 < t \leqslant 40$	3		
$40 < t \leqslant 50$	1		

The mean score for class B in the same test is 22

Dan says,

"On average, class A did better than class B."

Is he correct?
You **must** show your working.

[4 marks]

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Answer .....

7

10 a and b are different prime numbers with $a > b$

10 (a) Give an example to show that $a^2 + b^2$ could be even.

[1 mark]

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10 (b) Give an example to show that $a^2 + b^2$ could be odd.

[1 mark]

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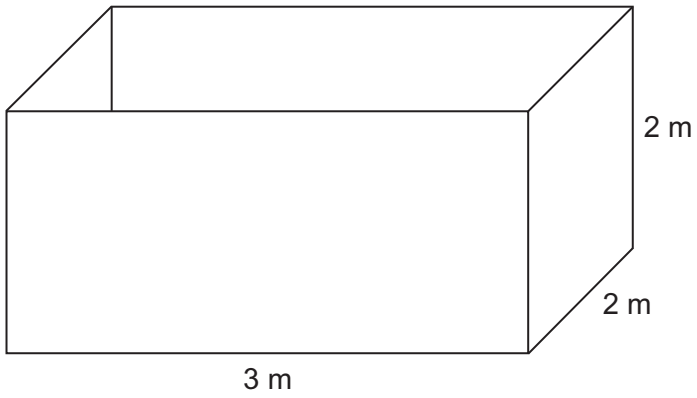
11 An empty tank is in the shape of a cuboid as shown.



The tank is to be filled with water at 1.25 litres per second.

1 m^3 = 1000 litres

Work out the time taken to fill the tank.
Give your answer in hours and minutes.

[5 marks]

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Answer ..... hours ..... minutes

7

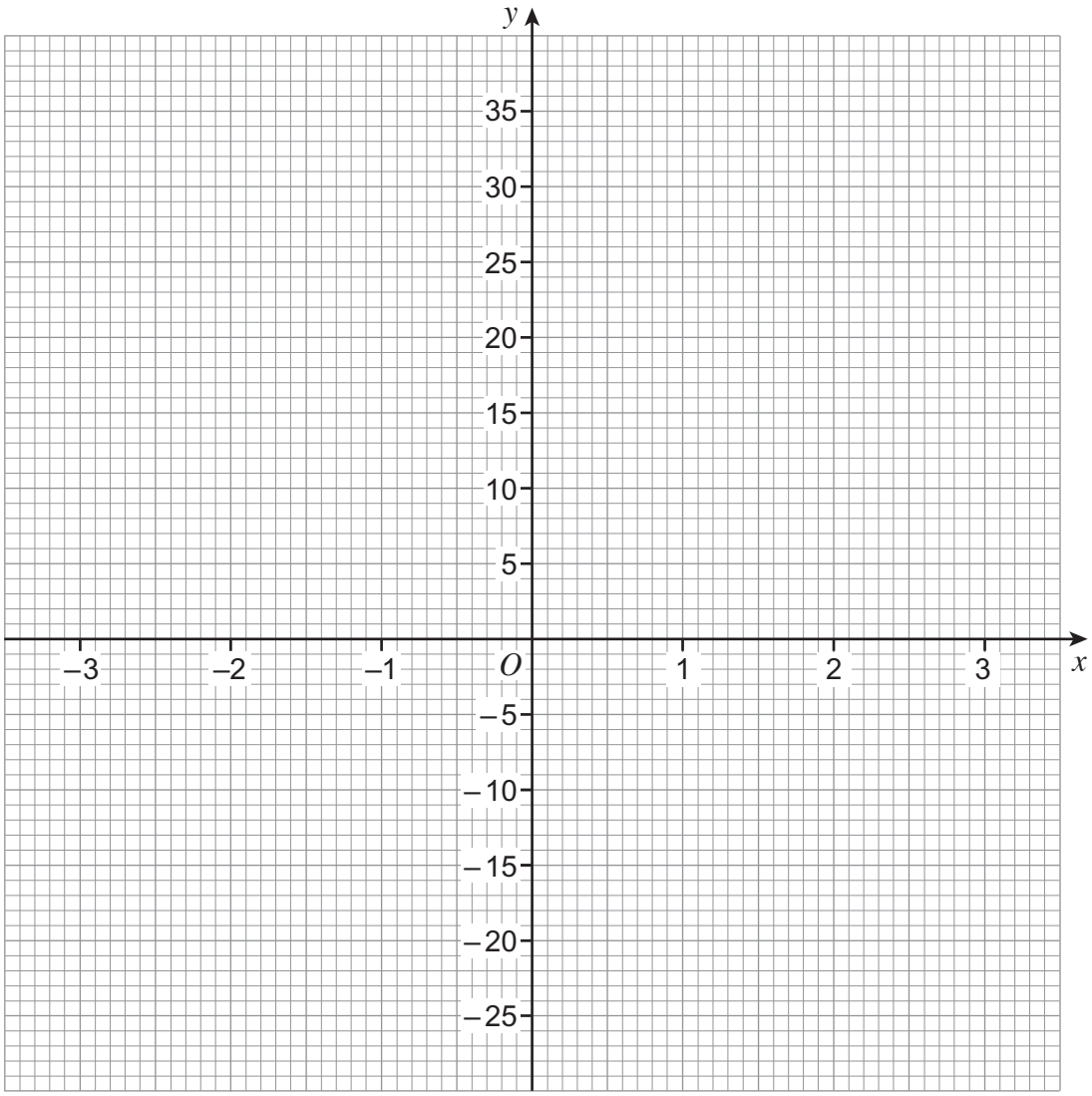
12 (a) Complete the table of values for $y = x^3 + 5$

x	-3	-2	-1	0	1	2	3
y	-22		4	5	6	13	

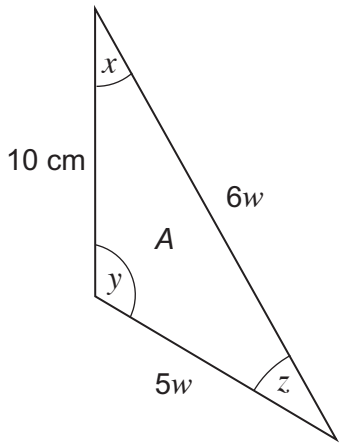
[2 marks]

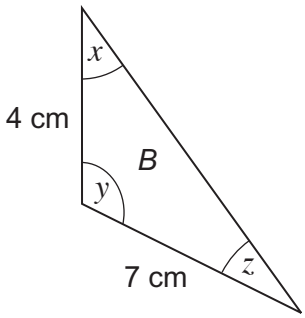
12 (b) On the grid, draw the graph of $y = x^3 + 5$ for values of x from -3 to 3

[2 marks]



13 *A* and *B* are similar triangles.





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13 (a) Circle the scale factor from *A* to *B*.

[1 mark]

-6 $\frac{2}{5}$ $\frac{5}{2}$ 6

13 (b) Work out the perimeter of triangle *B*.

[4 marks]

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Answer ..... cm

9

Turn over ▶

14 (a) Which calculation works out the total amount after decreasing £50 by 8%?
Circle the correct answer.

$£50 \times 0.08$ $£50 \times 0.92$ $\frac{£50}{0.08}$ $\frac{£50}{1.08}$

[1 mark]

14 (b) Adrian is going on holiday.

He has two bags.

The mass of one bag is 9 kg
This is 45% of the total mass of the two bags.

What is the mass of his other bag?

[3 marks]

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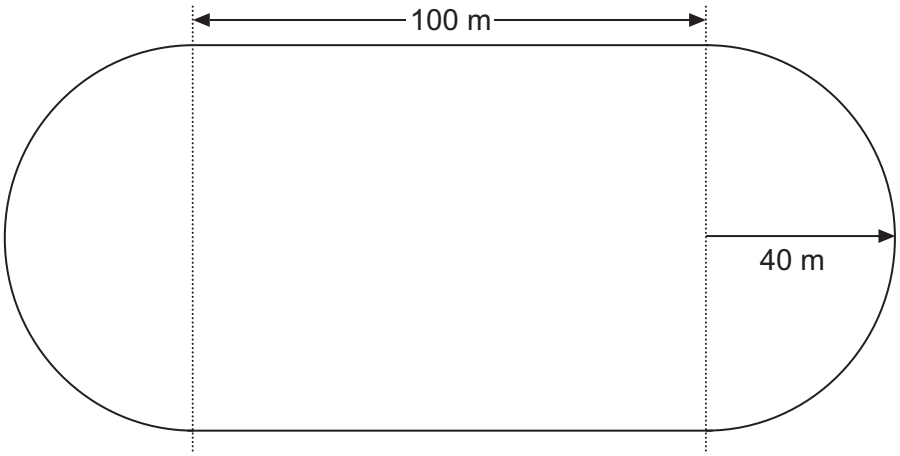
Answer ..... kg

***15** A cycle track has two identical semi-circular ends and two straight sides as shown.



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A cyclist completes one lap.

Her average speed is 18 m/s
Her target time to complete one lap is 30 seconds.

Does she beat her target?
You **must** show your working.

[4 marks]

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Answer .....

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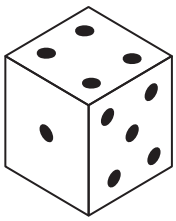
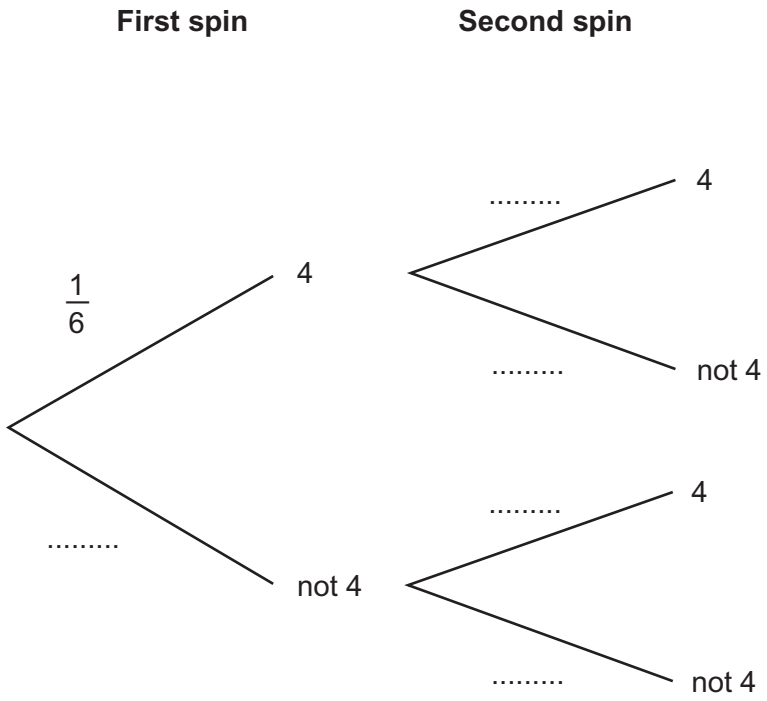
16 An ordinary fair dice is rolled.



16 (a) Complete the tree diagram for the dice landing on 4

[1 mark]



16 (b) Work out the probability of the dice landing on 4 both times.

[2 marks]

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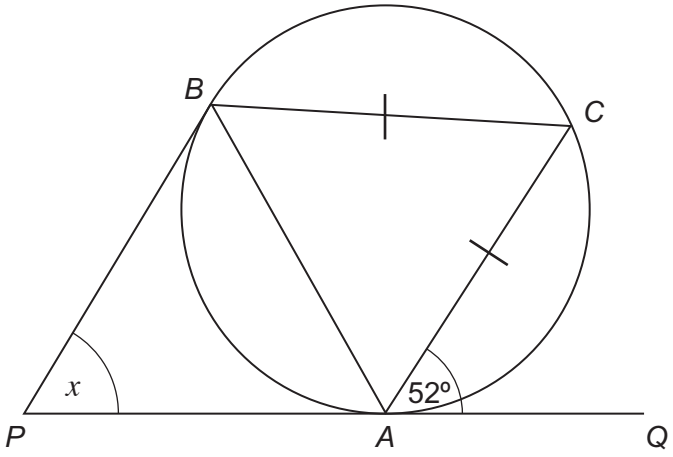
Answer .....

17 *PAQ* and *PB* are tangents to the circle.

AC = *BC*



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

[4 marks]

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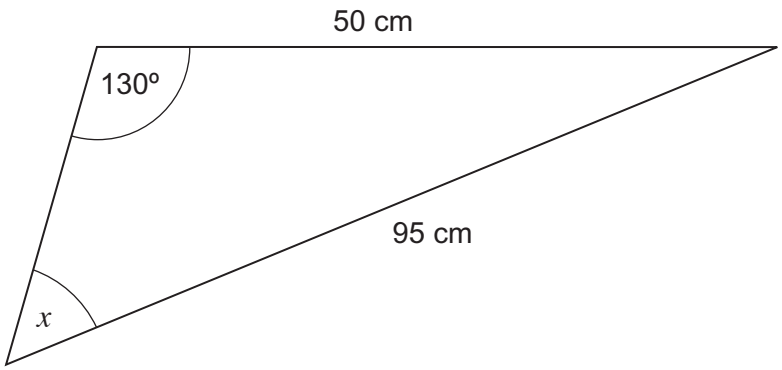
Answer ..... degrees

7

Turn over ▶

18 (a) Work out the size of angle x.



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[3 marks]

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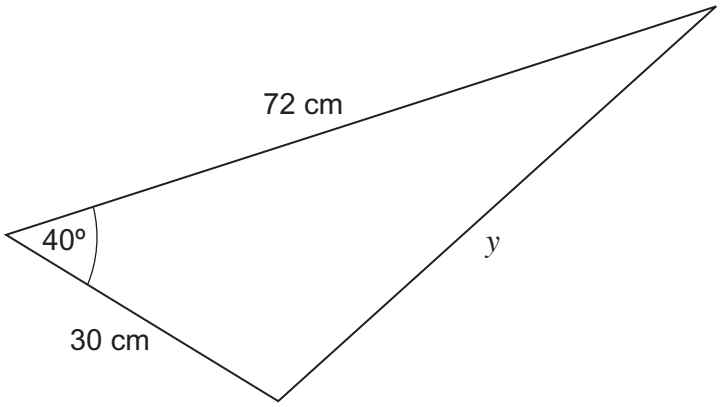
Answer ..... degrees

18 (b) Work out the length y.



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[3 marks]

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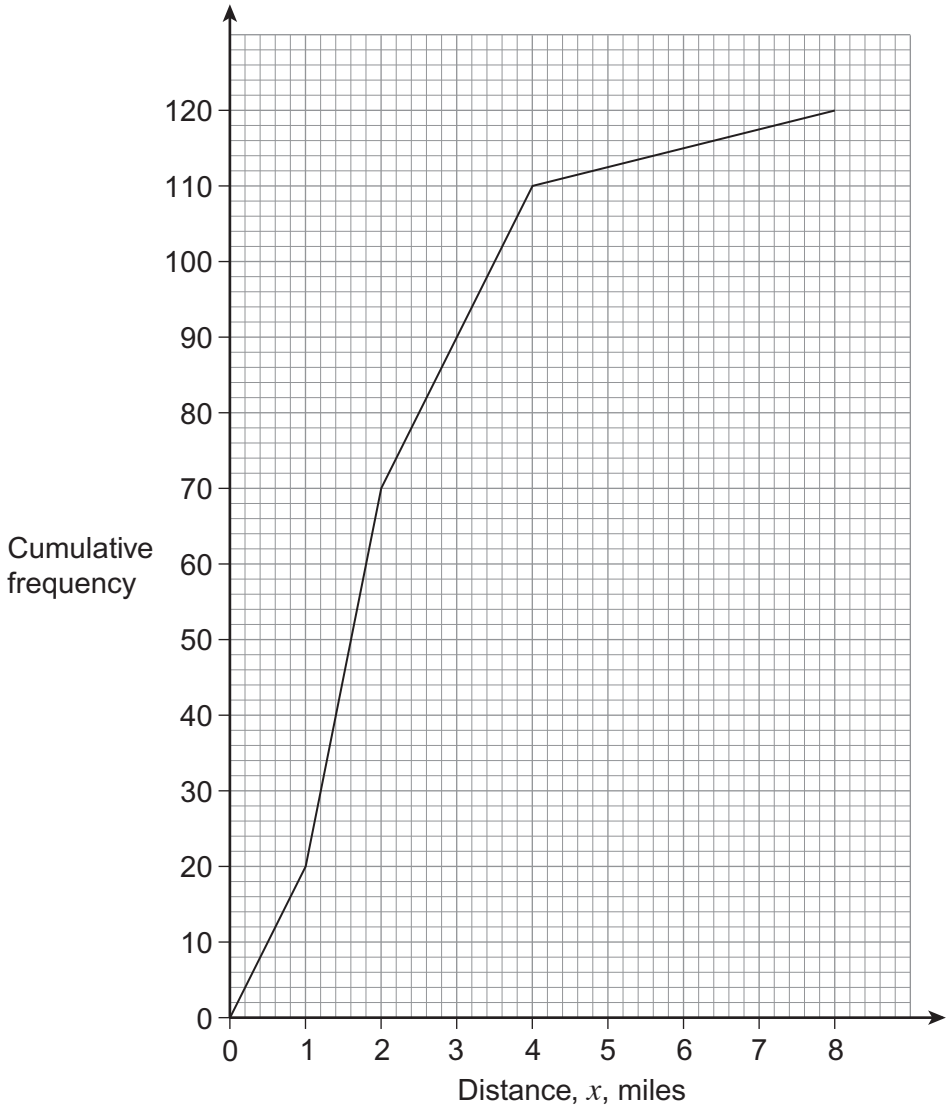
Answer ..... cm

Turn over for the next question

6

19 The cumulative frequency diagram shows information about the distances, in miles, that 120 students travel to school.



19 (a) Work out the interquartile range.

[2 marks]

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Answer ..... miles

19 (b) A sample of 25 students is taken from the 120 students.
The sample is stratified by distance travelled using the intervals below.

Distance, x, miles	$0 \leqslant x < 1$	$1 \leqslant x < 2$	$2 \leqslant x < 4$	$4 \leqslant x < 8$

Work out the number of students in the sample who are in the $2 \leqslant x < 4$ interval.

[4 marks]

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Answer .....

Turn over for the next question

6

20 (a) Expand and simplify $(5x - 2y)(x + 2y)$

[3 marks]

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Answer .....

20 (b) Solve $x^2 - 2x - 2 = 0$

Give your answers to 1 decimal place.

[3 marks]

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20 (c) Simplify $\dfrac{3x^2 - x - 10}{x^2 - 4}$

[3 marks]

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Answer .....

21 You are given that $x^2 + ax + b \equiv (x - 5)^2 + 7$

Work out the values of a and b.

[3 marks]

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a = ...

b = ...

12

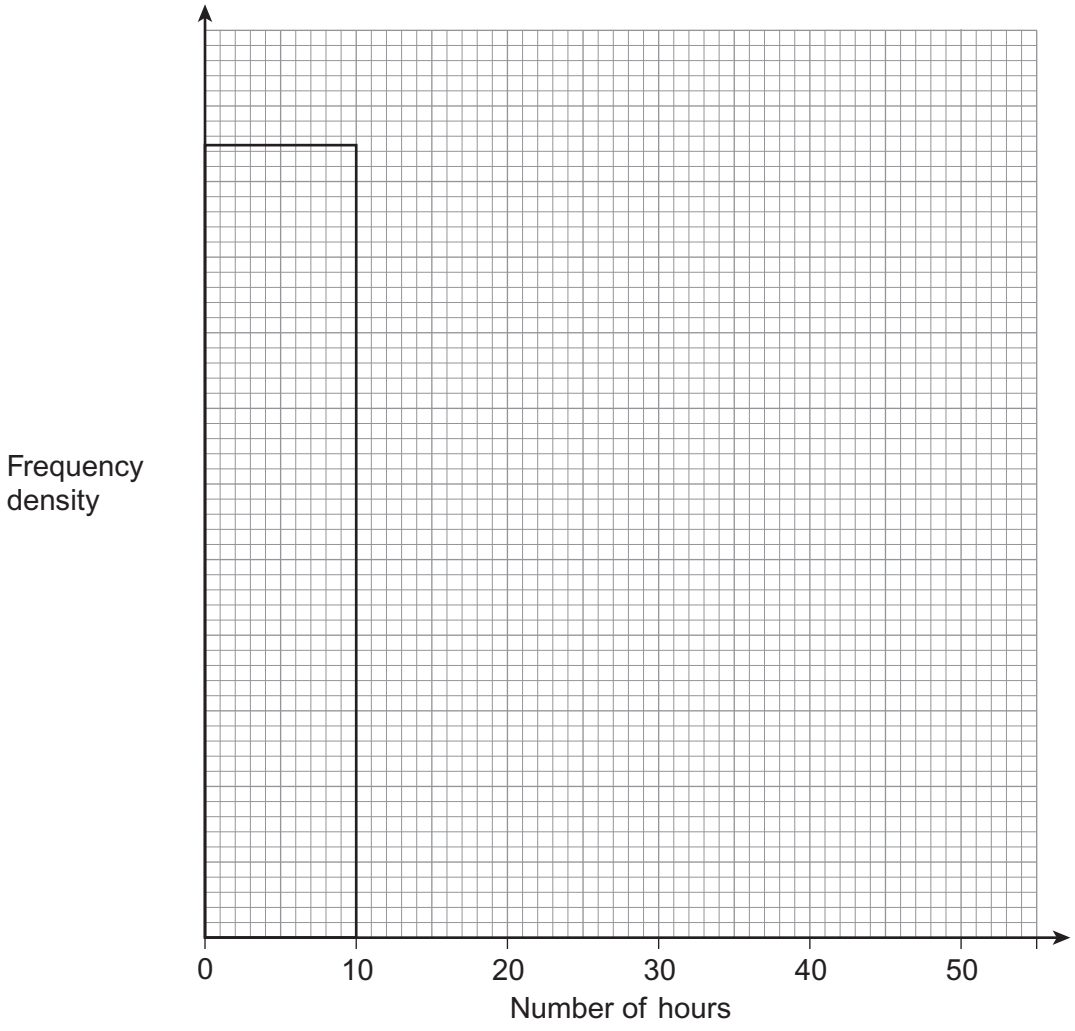
22 70 people gave information about the number of hours they worked in one week.
The table and histogram show some of that information.

Number of hours, n	Frequency
$0 < n \leqslant 10$	21
$10 < n \leqslant 20$	x
$20 < n \leqslant 40$	y
$40 < n \leqslant 50$	17

$x : y = 3 : 5$

Complete the histogram.
Remember to label the **scale** on the frequency density axis.

[6 marks]



6

23 Solve the simultaneous equations

$y = 4x + 1$

$y = 2x^2 + 7x - 1$

[5 marks]

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Answer .....

24 x = 400 to 1 significant figure.
y = 25 to 2 significant figures.

Work out the maximum **integer** value of $\frac{x}{y}$

[3 marks]

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Answer .....

END OF QUESTIONS

8

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