

Please write clearly in block capitals.

Centre number

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Candidate number

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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.



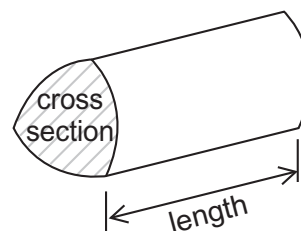
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Formulae Sheet: Higher Tier

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



Volume of prism = area of cross section \times 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 = $\pi r l$

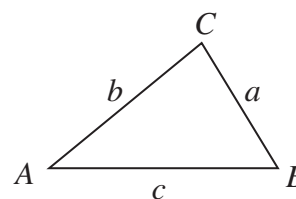


In any triangle ABC

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

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

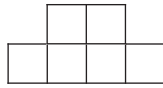


Answer **all** questions in the spaces provided.

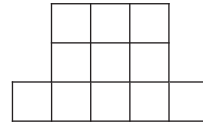
1 Here is a sequence of patterns made with squares.



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]

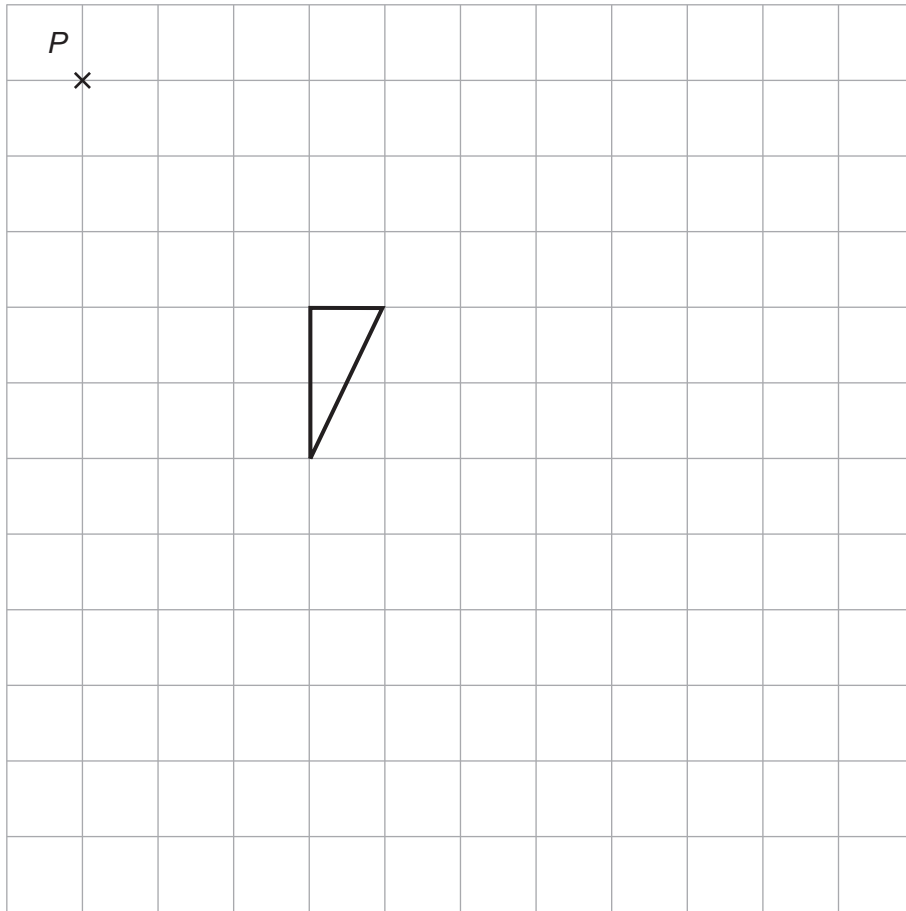
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Answer



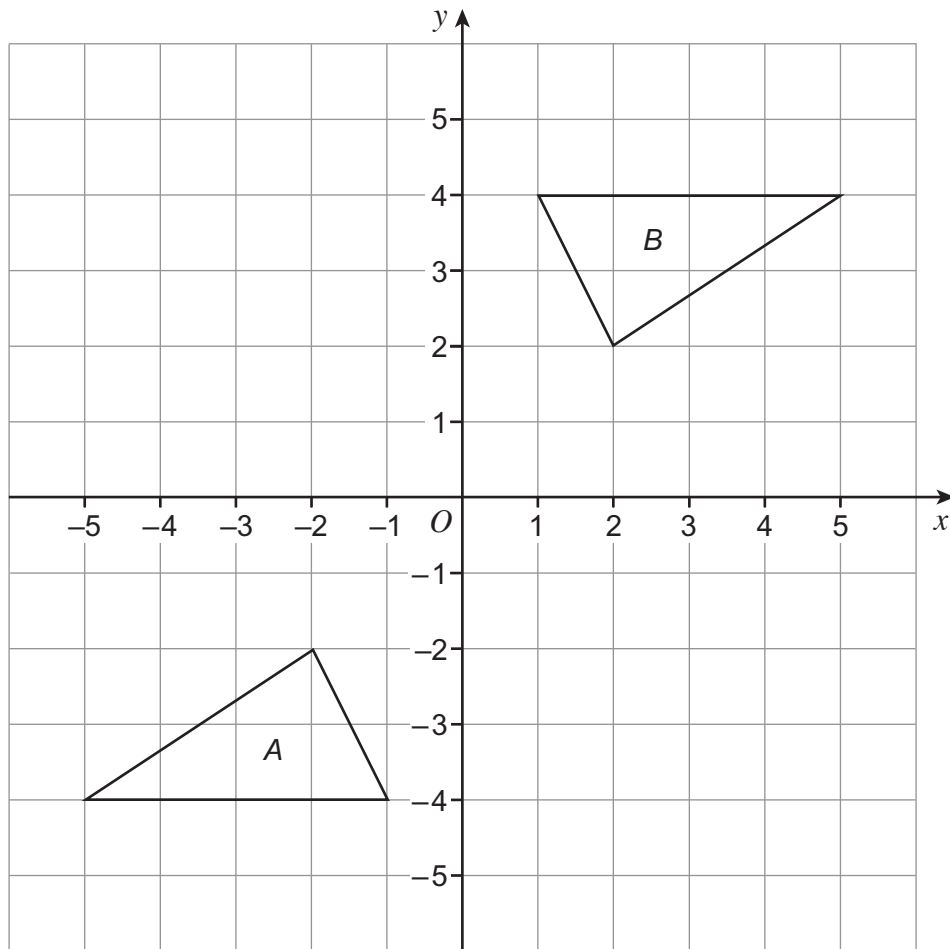
2 (a) Enlarge the triangle by scale factor 2, using point P as the centre of enlargement.

[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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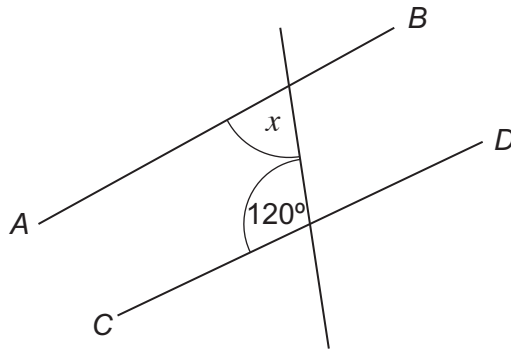
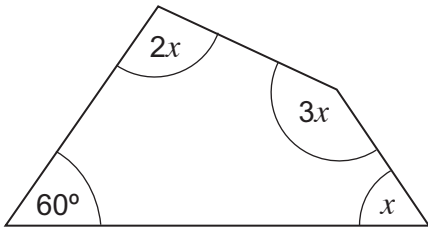
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Answer £



*4



Not drawn accurately

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

[4 marks]

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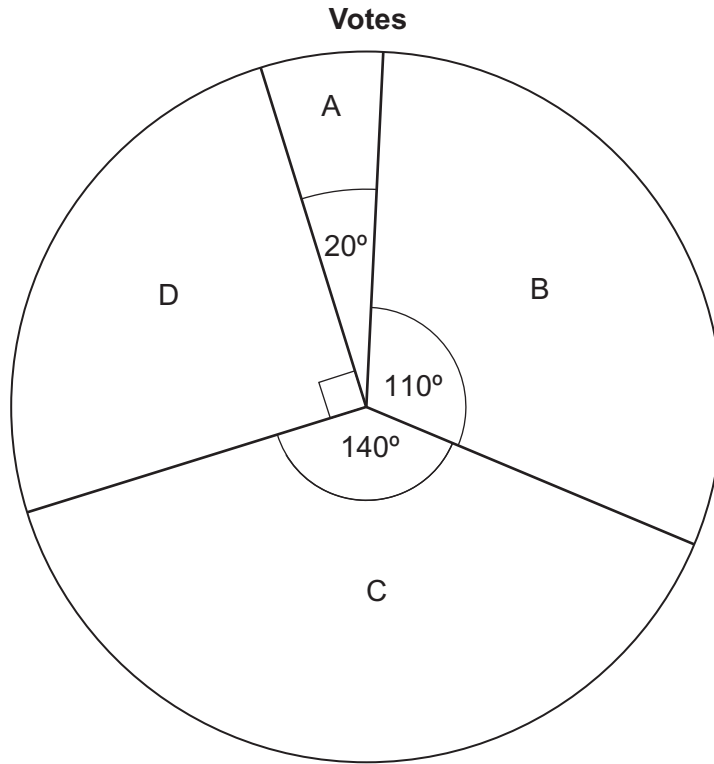
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Turn over for the next question

Turn over ►



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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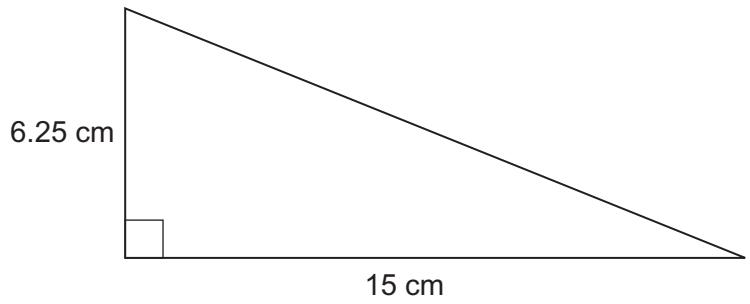
Answer £

12

Turn over ►



8 Work out the length of the hypotenuse.



Not drawn accurately

[3 marks]

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Answer cm



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

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

Turn over ►



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]

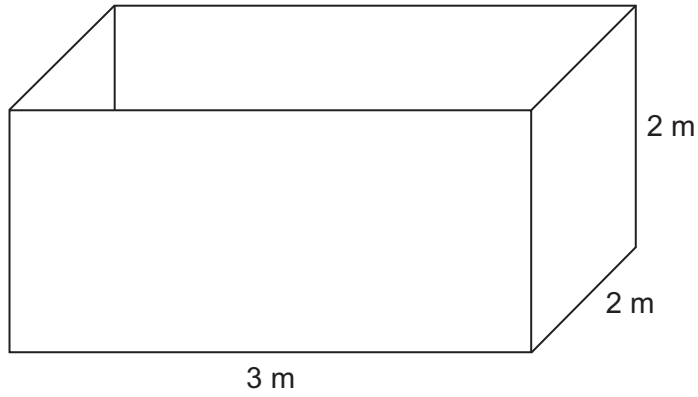
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11 An empty tank is in the shape of a cuboid as shown.



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

$1 \text{ m}^3 = 1000 \text{ litres}$

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

Turn over ►



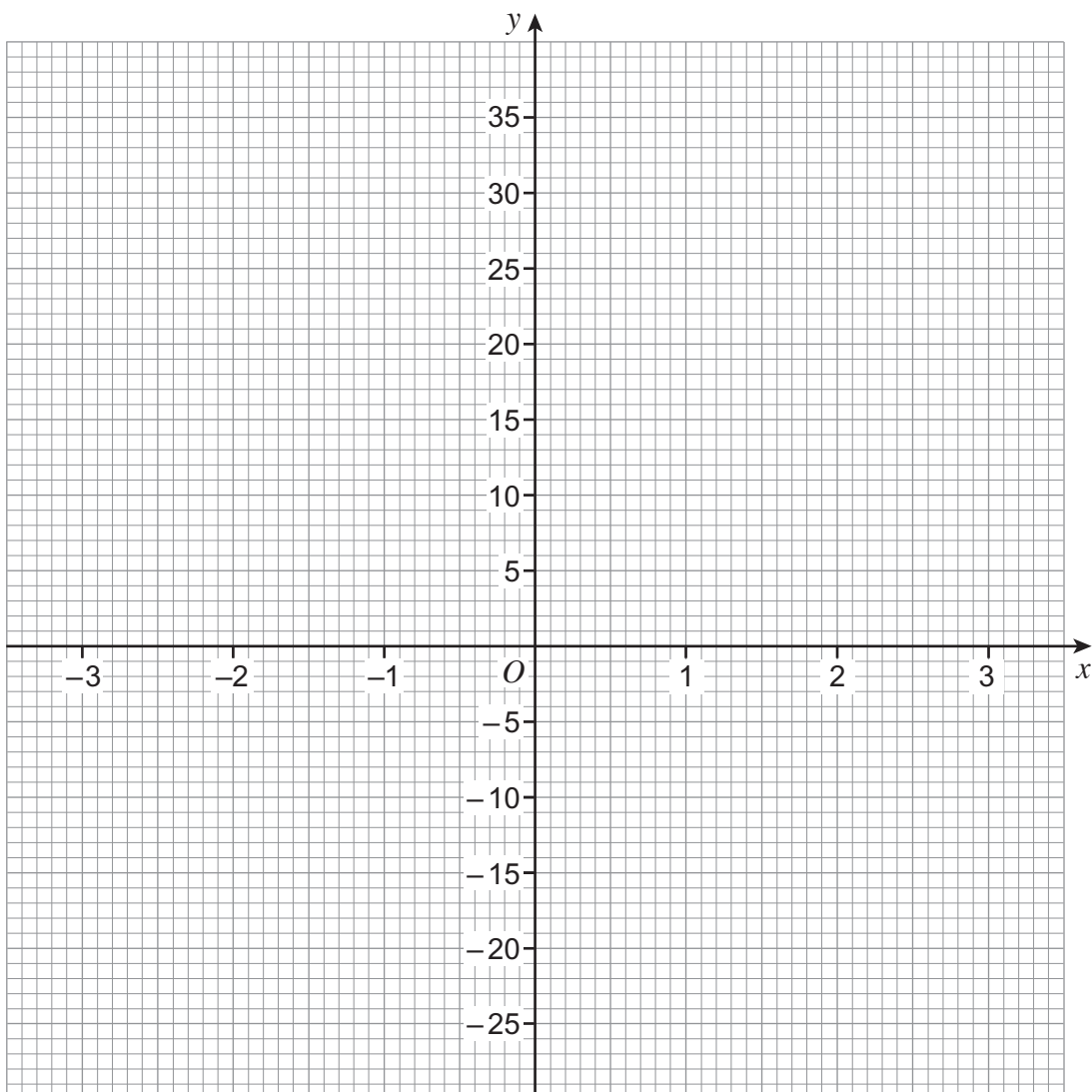
12 (a) Complete the table of values for $y = x^3 + 5$

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

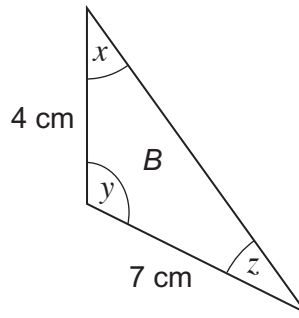
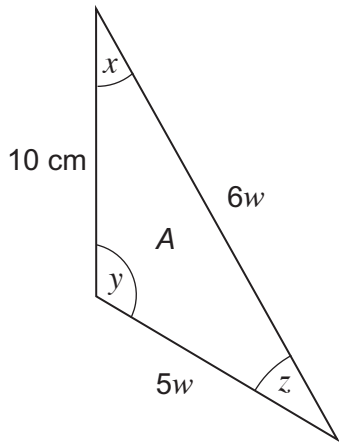
[2 marks]

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.



Not drawn
accurately

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



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]

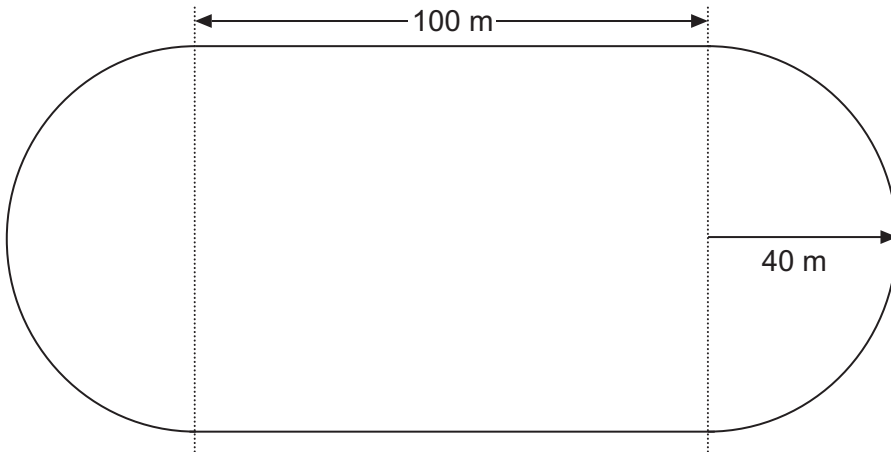
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Answer kg



*15

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



Not drawn accurately

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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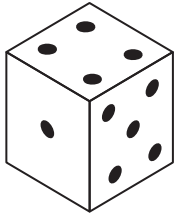
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Answer

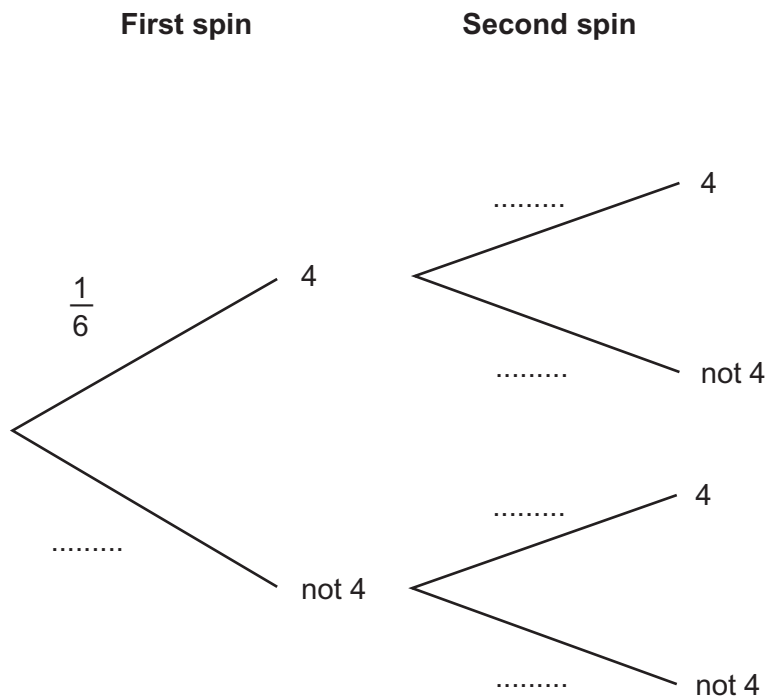


16 An ordinary fair dice is rolled.



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]

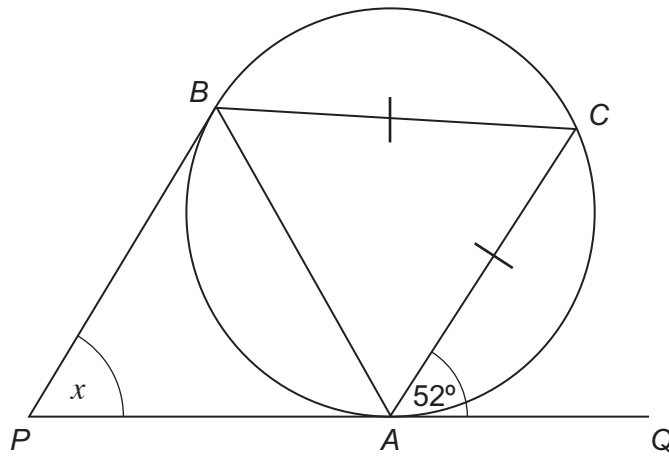
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Answer



17 PAQ and PB are tangents to the circle.

AC = BC



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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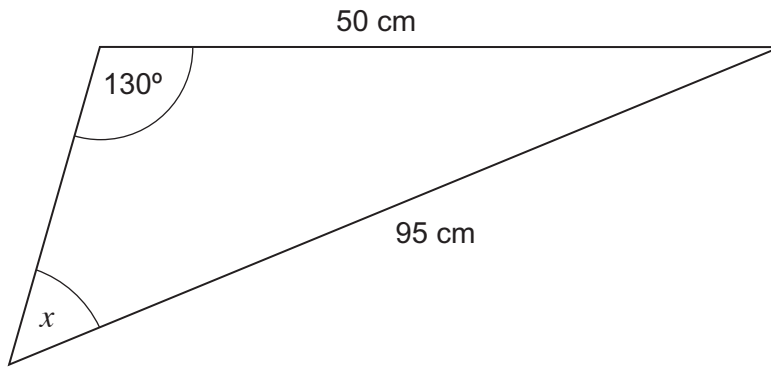
Answer degrees

7

Turn over ►



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



Not drawn
accurately

[3 marks]

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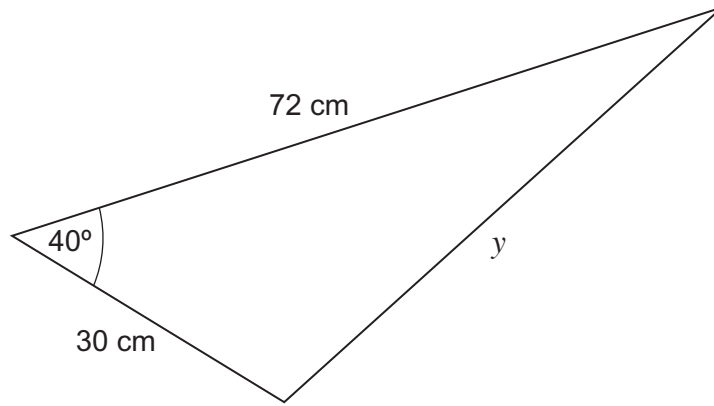
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Answer degrees



18 (b) Work out the length y .



Not drawn
accurately

[3 marks]

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Answer cm

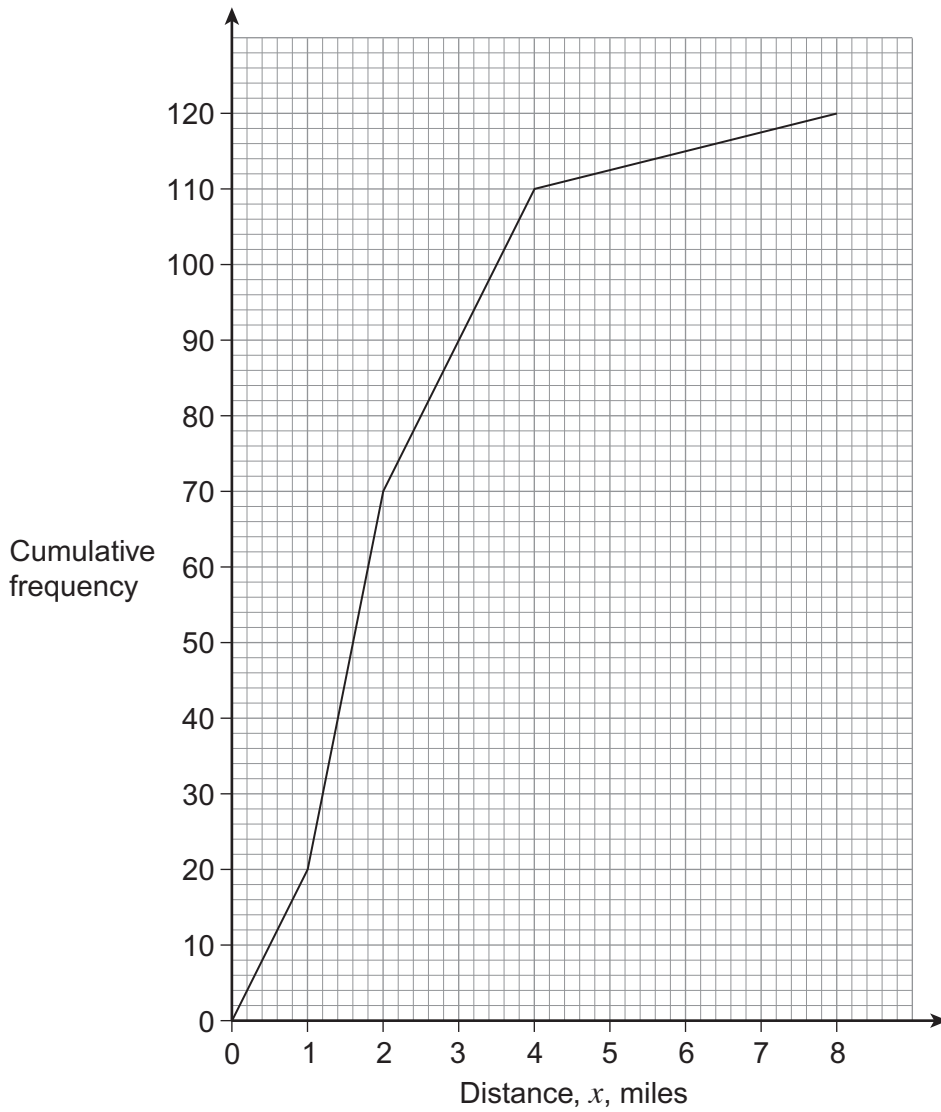
Turn over for the next question

6

Turn over ►



- 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	$0 \leq x < 1$	$1 \leq x < 2$	$2 \leq x < 4$	$4 \leq x < 8$
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Work out the number of students in the sample who are in the $2 \leq x < 4$ interval.

[4 marks]

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Answer

Turn over for the next question



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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Answer



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

[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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$a =$

$b =$



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

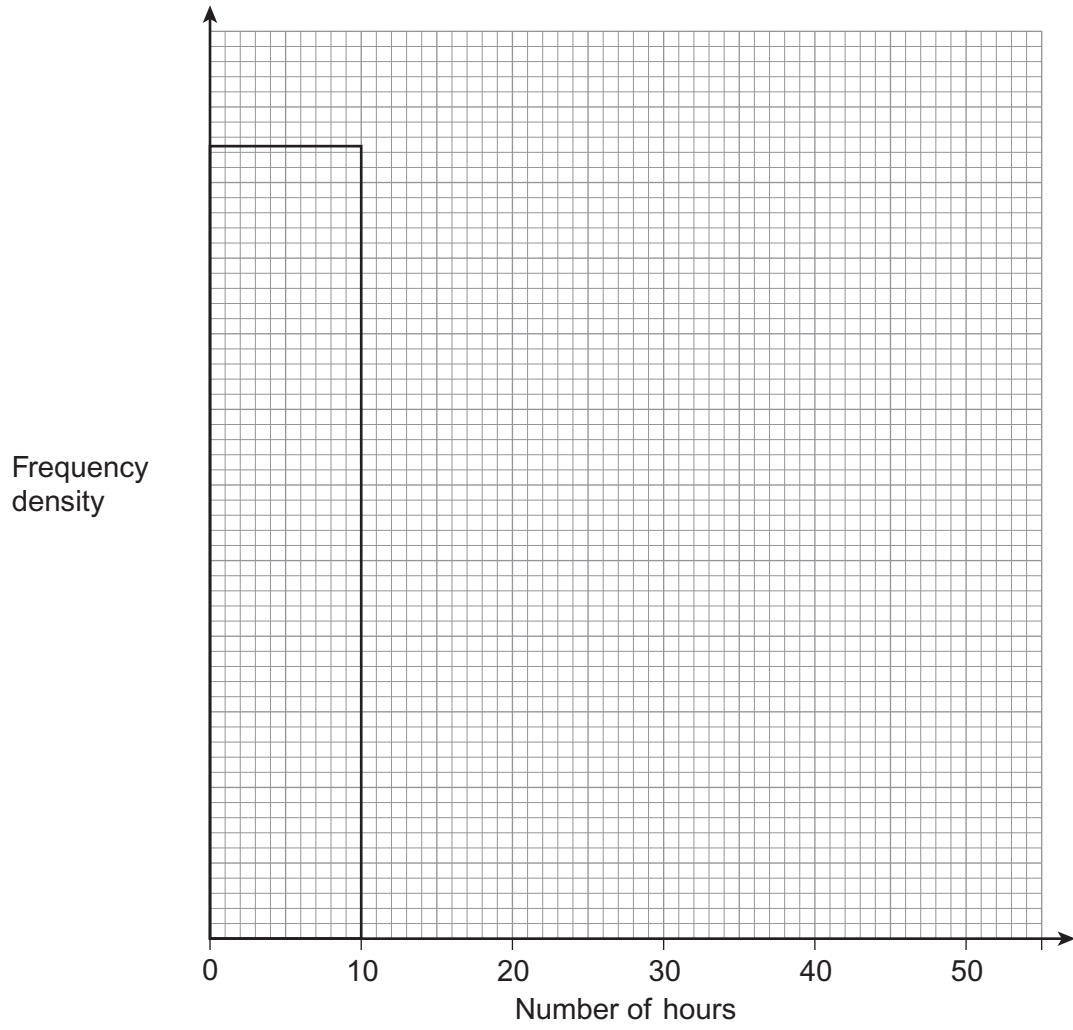
Number of hours, n	Frequency
$0 < n \leq 10$	21
$10 < n \leq 20$	x
$20 < n \leq 40$	y
$40 < n \leq 50$	17

$$x : y = 3 : 5$$

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

[6 marks]





6

Turn over ►



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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