Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4353/02

S15-4353-02

MATHEMATICS (UNITISED SCHEME)
UNIT 3: Calculator-Allowed Mathematics
HIGHER TIER

A.M. MONDAY, 8 June 2015

1 hour 45 minutes

ADDITIONAL MATERIALS

A calculator will be required for this paper.

A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

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

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

Take π as 3·14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **8**.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**6**	
2.	**3**	
3.	**6**	
4.	**2**	
5.	**3**	
6.	**3**	
7.	**4**	
8.	**7**	
9.	**7**	
10.	**4**	
11.	**3**	
12.	**3**	
13.	**6**	
14.	**3**	
15.	**8**	
16.	**3**	
17.	**3**	
18.	**3**	
19.	**7**	
20.	**6**	
Total	**90**	

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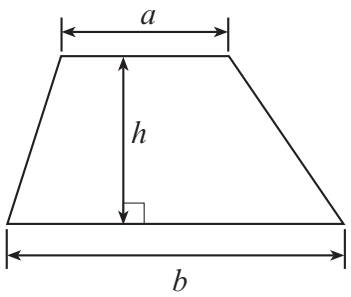
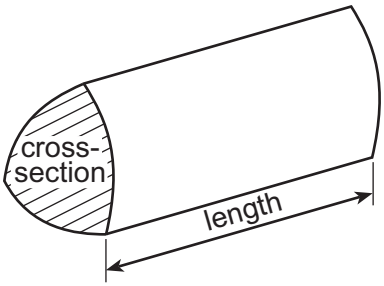
Formula List

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

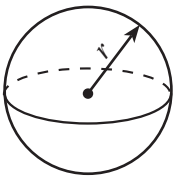


Volume of prism = area of cross-section × length



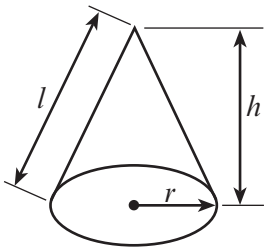
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

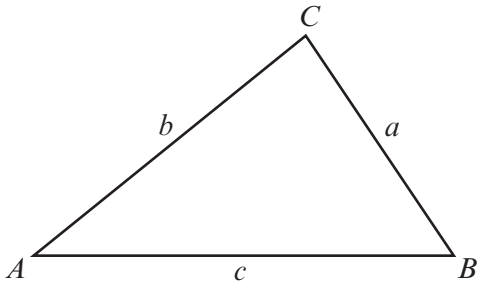


In any triangle ABC

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

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

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



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

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

Examiner only

1. *(a)* Factorise $10x - 15$. [1]

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(b) Given that $p = 1\frac{1}{2}$, $r = -4$ and $t = 5$, evaluate the expression $pr - t^2$. [2]

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(c) Solve the equation $8x - 77 = 2x - 5$. [3]

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2. Calculate the area of the triangle.
State the units of your answer. [3]

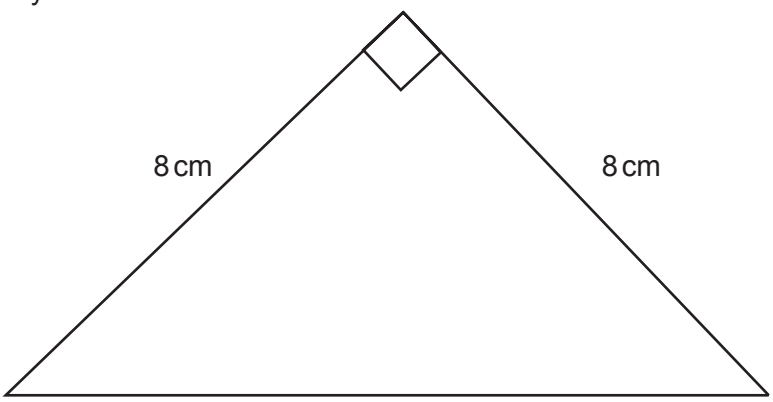

Diagram not drawn to scale

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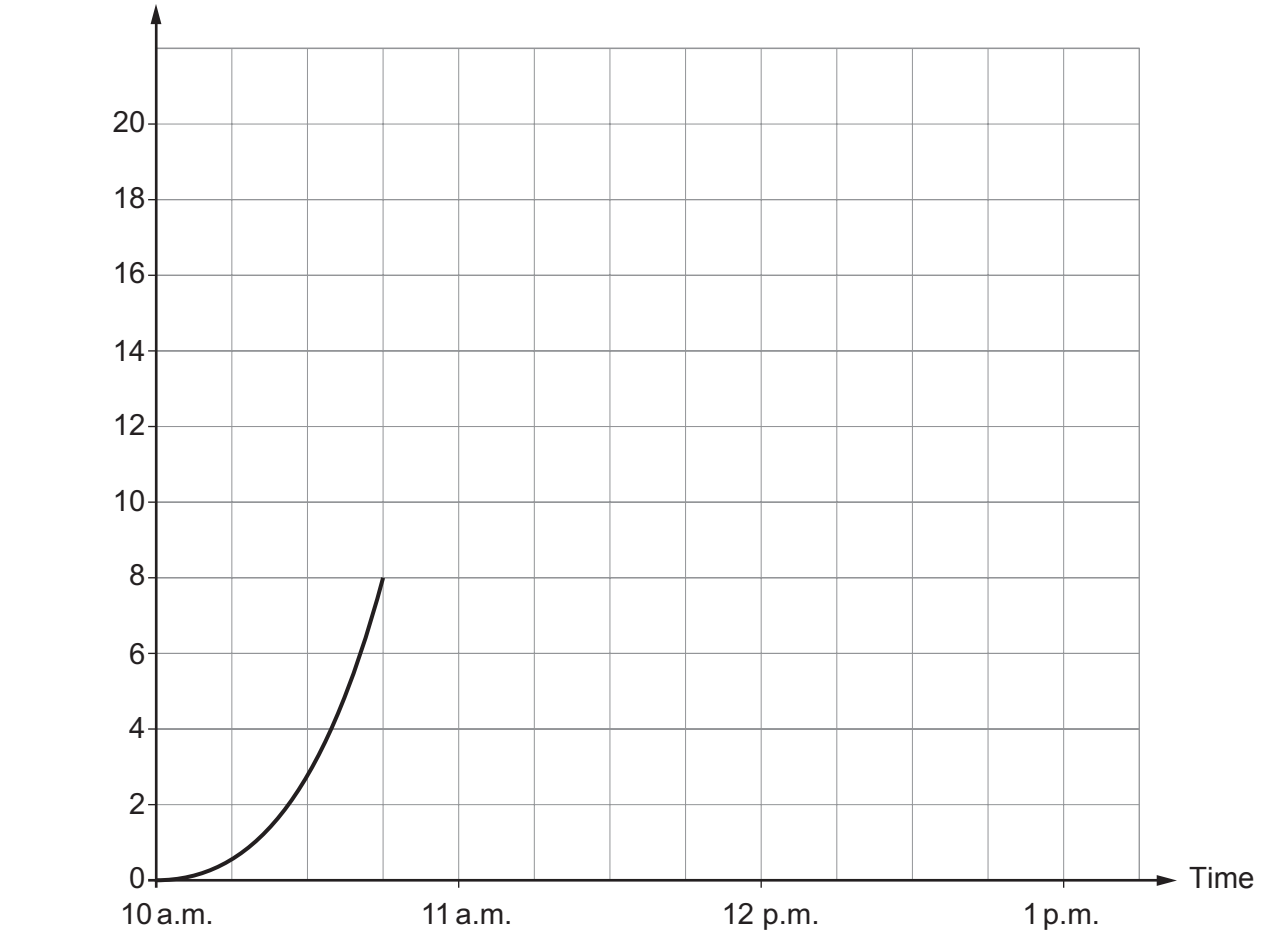
Examiner only

3. John travels 20 miles to his friend's house. He begins his journey at 10 a.m.
The first part of his journey is shown on the travel graph below.



(a) Describe how John's speed changes over the first part of his journey. [1]

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(b) John splits the remainder of the 20 mile journey into two equal sections.
He has a 15 minute stop for a break between the two sections.
He travels at the same constant speed for both sections.
John arrives at his friend's house at 1 p.m.
Draw the remainder of the journey on the travel graph. [3]

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Examiner only

(c) What was John's average speed for the entire 20 mile journey? [2]

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4. Evaluate $\sqrt{\frac{5{\cdot}3 \times 7{\cdot}4}{6{\cdot}1 - 2{\cdot}7}}$. Give your answer correct to 2 decimal places. [2]

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5. Rishal gets paid every month.

He spends $\frac{1}{3}$ of his pay on rent and puts $\frac{1}{5}$ of his pay into savings.

What fraction of his pay does Rishal then have left? [3]

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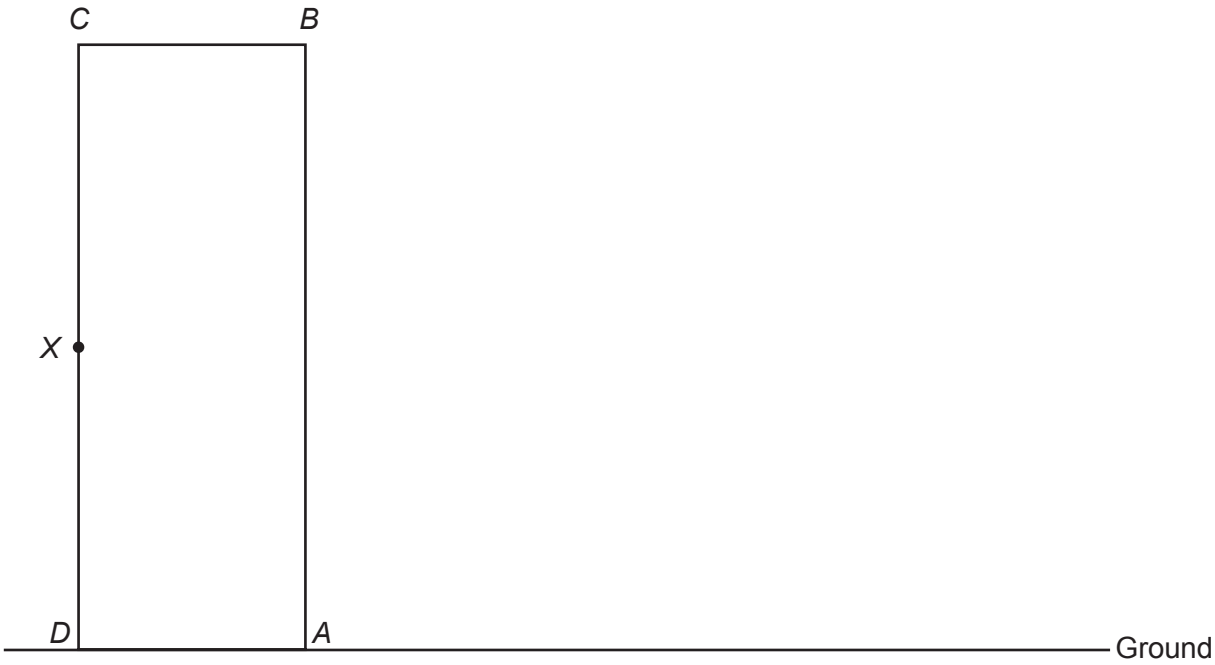
Examiner only

6. *ABCD* represents a rectangular side of a box.
X is the midpoint of the edge *CD*.
The box is rotated clockwise about point *A* until *B* comes into contact with the ground.
Accurately draw the new position of *ABCD* and the locus of the point *X* as the box rotates about *A*. [3]



7. A packet contains cake mixture weighing 385 g.
The mixture is made up of only flour, sugar and raisins. The weight of the flour is twice the weight of the sugar, and the weight of the sugar is twice the weight of the raisins.
Calculate the weight of flour, sugar and raisins in the packet. [4]

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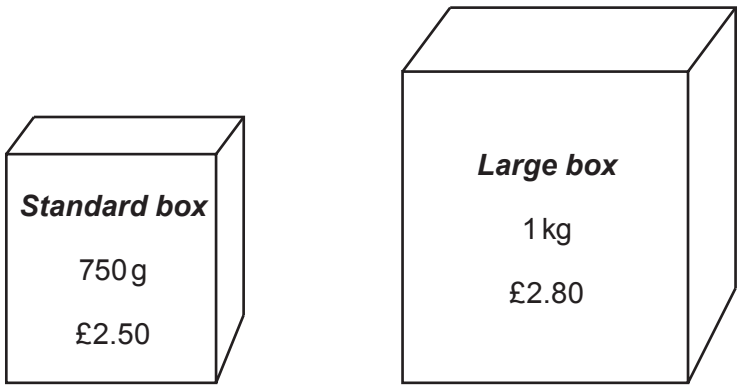
Flour: ..... g Sugar: ..... g Raisins: ..... g

Examiner only

8. *You will be assessed on the quality of your written communication in this question.*

A supermarket sells the same type of breakfast cereal in 2 different-sized boxes.
The weight and **usual** price of each box are shown below.



Diagrams not drawn to scale

This week the price of a standard box is reduced by 18%.
Which box is the best value for money this week?
Show all your working. [7]

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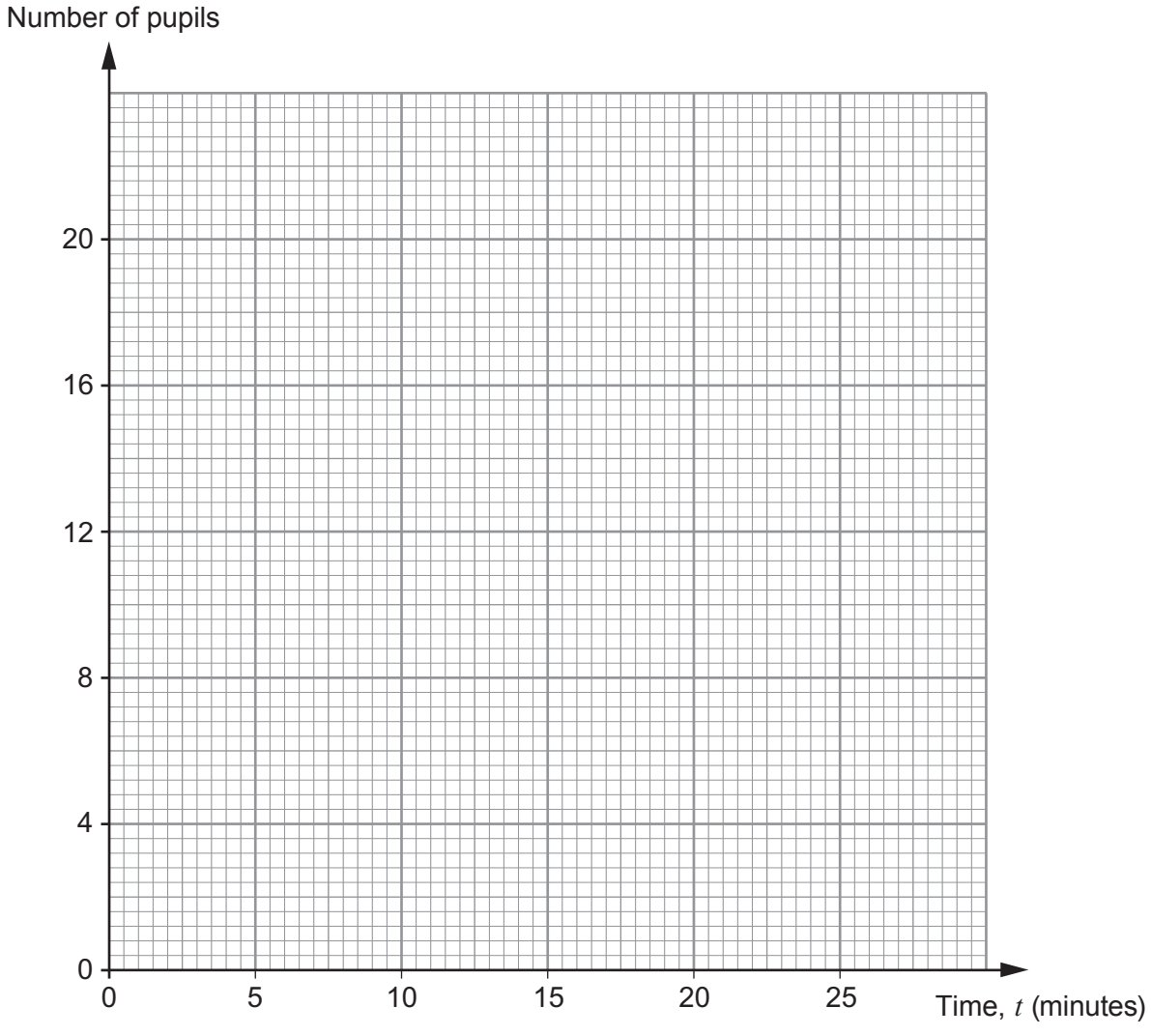
Examiner only

9. A group of pupils was timed in completing a maths test. The results are shown in the grouped frequency table below.

Time, t (minutes)	Number of pupils
$0 < t \leqslant 5$	19
$5 < t \leqslant 10$	17
$10 < t \leqslant 15$	10
$15 < t \leqslant 20$	5
$20 < t \leqslant 25$	2

(a) Draw a grouped frequency diagram to illustrate these results. [2]



Examiner only

(b) Calculate an estimate of the mean time taken to complete the test. [4]

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(c) Write down the modal group. [1]

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Turn over.

Examiner only

10.

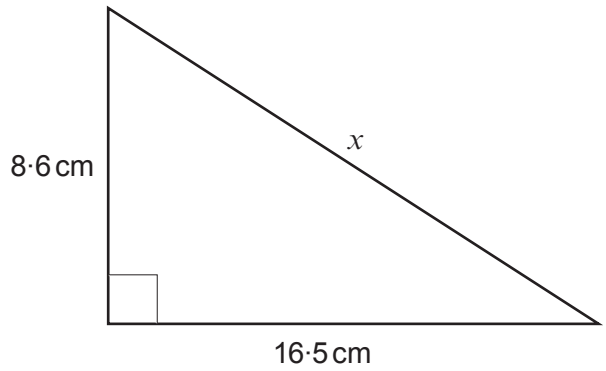

Diagram not drawn to scale

(a) Gwen is asked to calculate the length x in the triangle above.

Her answer is 14·1 cm.

Without calculating x, explain why Gwen's answer cannot be correct. [1]

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(b) Calculate the length x. [3]

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Examiner only

11. Factorise the expression $x^2 + 11x + 24$, and hence solve the equation $x^2 + 11x + 24 = 0$. [3]

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12. The Millennium Stadium can seat 72 500 people.
The population of Wales would fill the Millennium Stadium forty-two times.

Use this information to calculate the population of Wales.
Give your answer in standard form correct to 3 significant figures. [3]

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Turn over.

Examiner only

13.

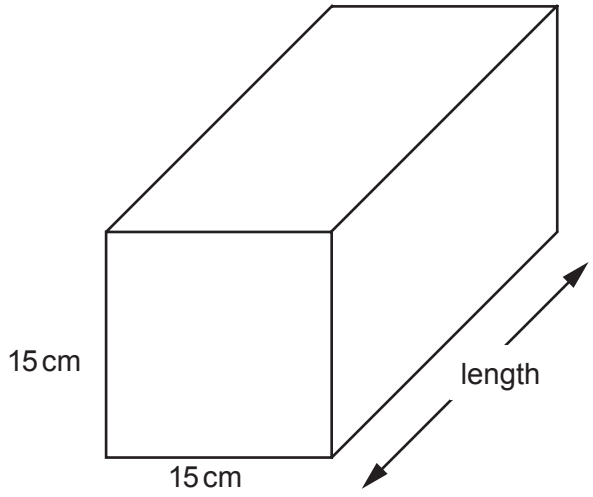


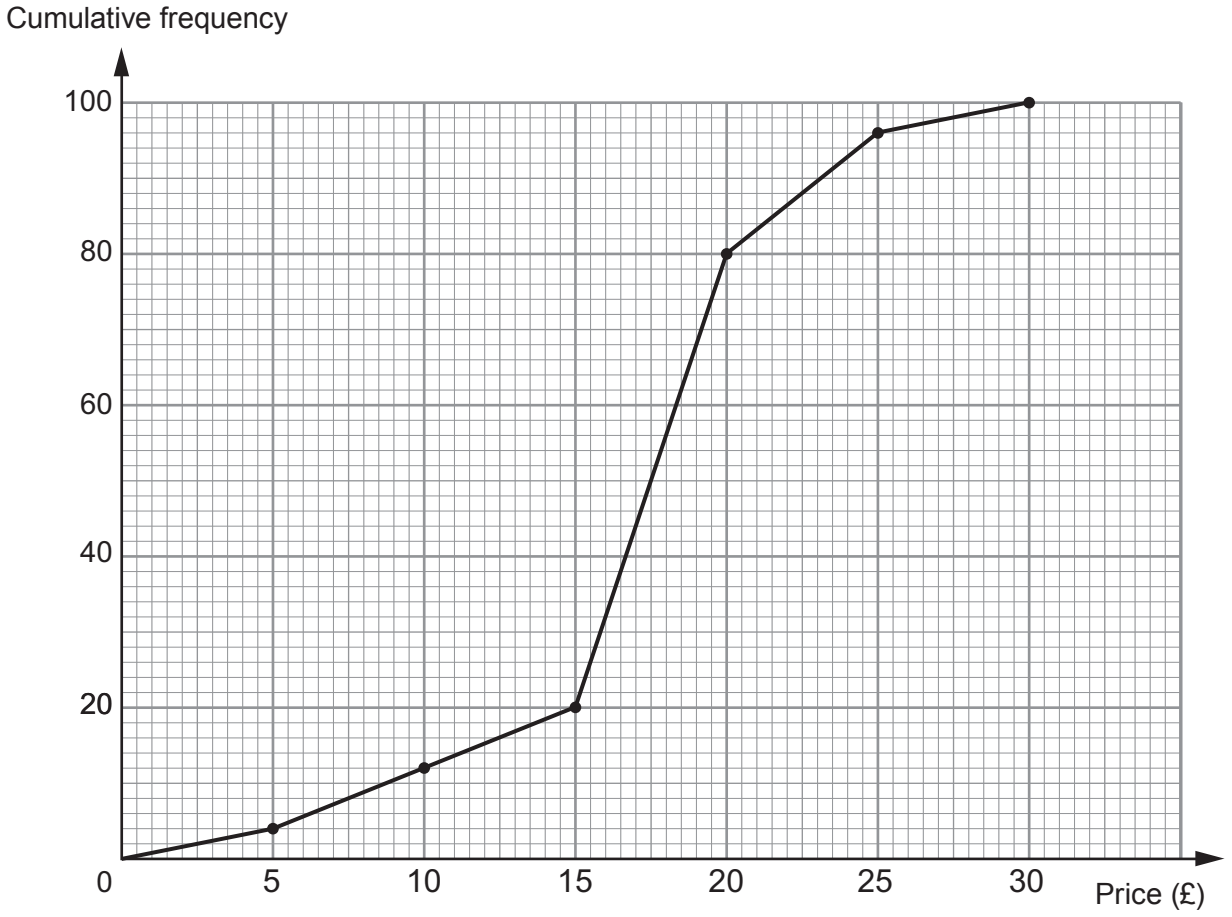
Diagram not drawn to scale

The solid block shown above is made from a metal that has a density of 2·7 g/cm^3.
The volume of the solid block is 40 500 cm^3.

A hole is drilled through the entire length of the block.
The hole has a cross-sectional area of 25 cm^2.
Calculate the mass of the block that remains. [6]

Examiner only

14. The cumulative frequency diagram shows the prices of 100 items in a shop.



(a) Write down an estimate for the median price of these items. [1]

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(b) Calculate an estimate for the interquartile range of these items. [2]

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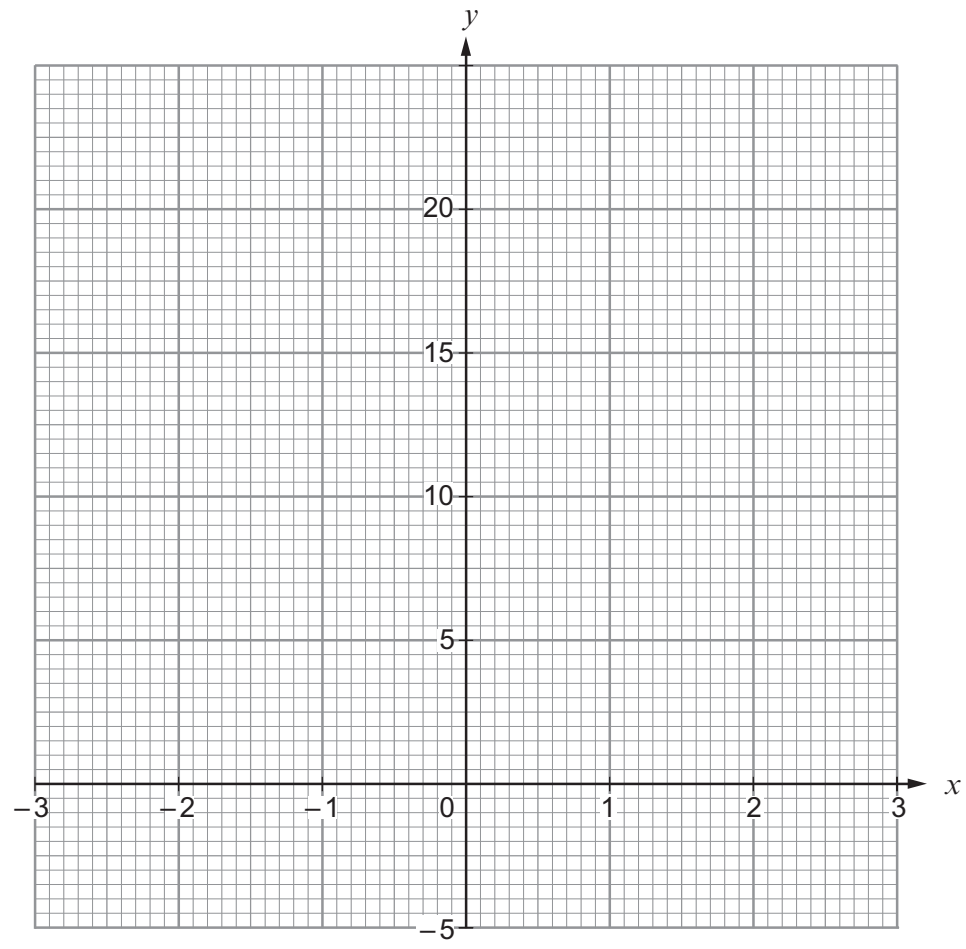
Examiner only

15. *(a)* On the graph paper below, draw the graph of $y = 2x^2 - x - 3$ for values of x from -3 to 3. [4]



(b) Use your graph to write down the solutions of the equation $2x^2 - x - 3 = 0$. [1]

Examiner only

(c) By drawing an appropriate straight line on the same set of axes, use your graph to solve the equation $2x^2 - 7 = 0$. [3]

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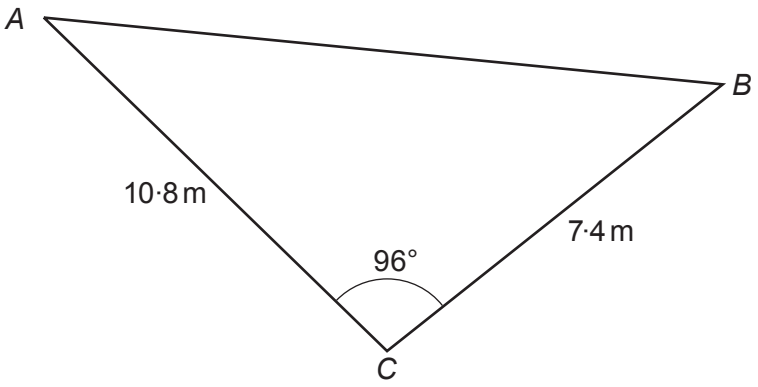

Diagram not drawn to scale

Calculate the length of the side *AB*. [3]

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Examiner only

17. Use the quadratic formula to solve the equation $12x^2 - 27x - 2 = 0$, giving your solutions correct to 2 decimal places. [3]

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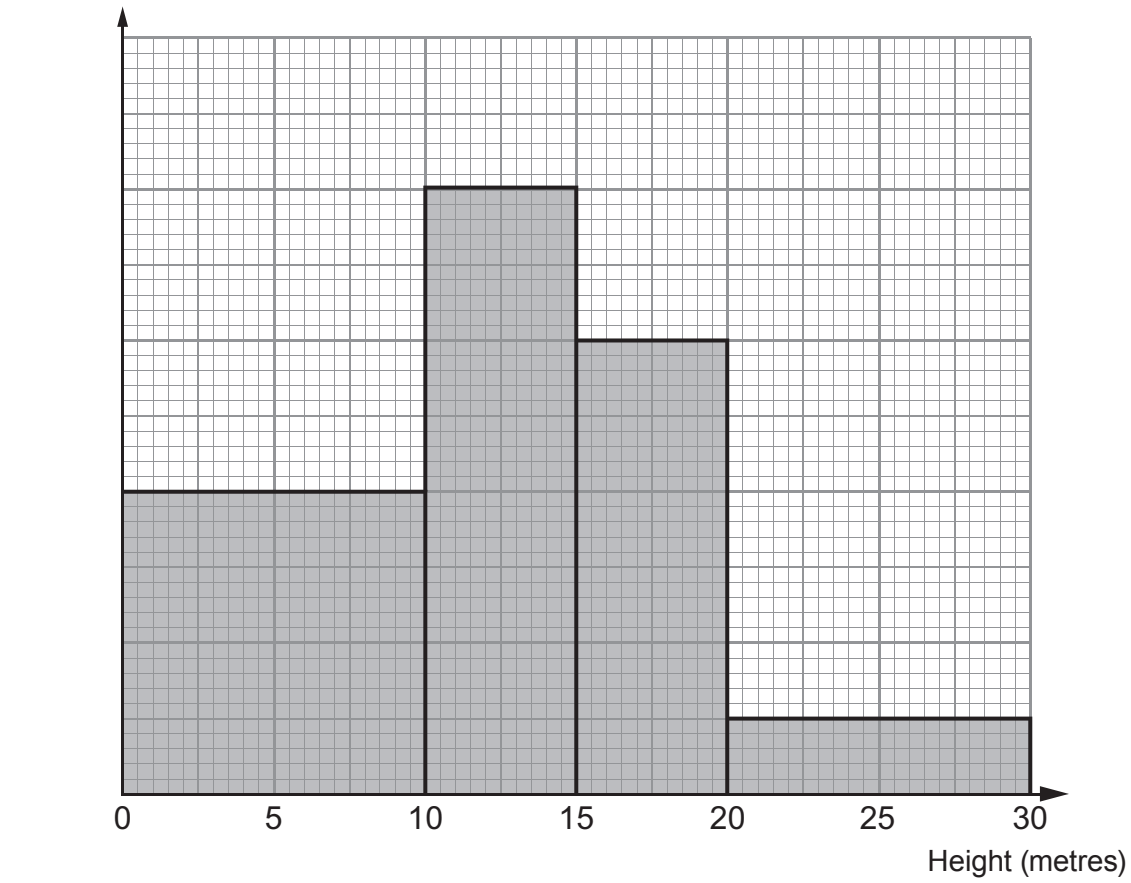
Examiner only

18. This histogram shows the distribution of heights, in metres, of 240 trees in a wood.



How many trees were between 10 and 15 metres in height? [3]

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Turn over.

Examiner only

19.

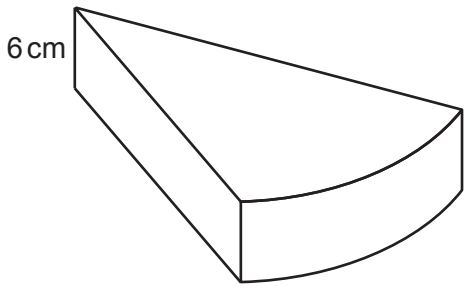


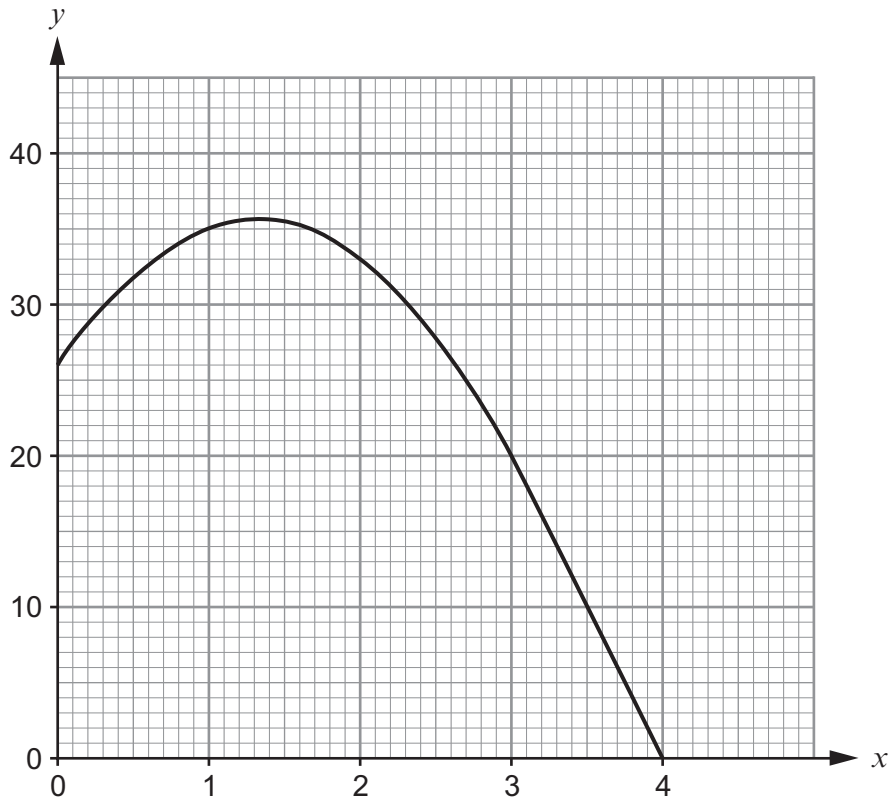
Diagram not drawn to scale

The shape above is $\frac{1}{12}$ of a solid cylinder of radius 15 cm and height 6 cm.

Calculate the total surface area of this shape. [7]

Examiner only

20. The graph of $y = f(x)$ between $x = 0$ and $x = 4$ is shown below.



(a) Estimate the gradient of the curve at $x = 2$. [3]

(b) Use the trapezium rule with ordinates $x = 0$, $x = 1$, $x = 2$, $x = 3$ and $x = 4$ to estimate the area bounded by the curve $y = f(x)$, the x-axis and the y-axis. [3]

END OF PAPER

Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

Examiner only