

Surname	Centre Number	Candidate Number
First name(s)		0



**GCSE**

3300U60-1



**WEDNESDAY, 13 NOVEMBER 2024 – MORNING**

**MATHEMATICS  
UNIT 2: CALCULATOR-ALLOWED  
HIGHER TIER**

1 hour 45 minutes

**ADDITIONAL MATERIALS**

A calculator will be required for this examination.  
A ruler, 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.  
You may use a pencil for graphs and diagrams only.  
Write your name, centre number and candidate number in the spaces at the top of this page.  
Answer **all** questions.  
Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.  
Take  $\pi$  as 3.14 or use the  $\pi$  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.  
In question 1, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	7	
2.	4	
3.	3	
4.	3	
5.	6	
6.	4	
7.	5	
8.	5	
9.	4	
10.	2	
11.	3	
12.	3	
13.	2	
14.	4	
15.	4	
16.	3	
17.	1	
18.	4	
19.	5	
20.	8	
<b>Total</b>	<b>80</b>	

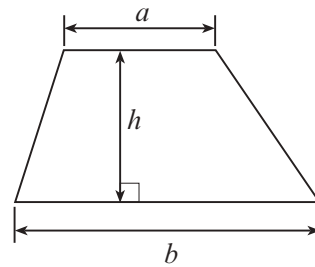
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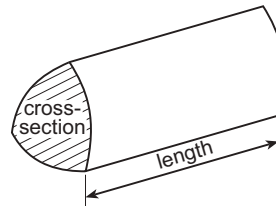
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## Formula List – Higher Tier

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

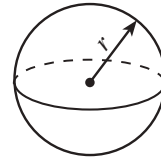


**Volume of prism** = area of cross-section  $\times$  length



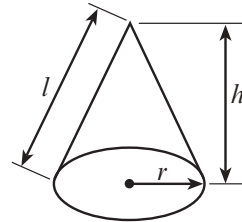
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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



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

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

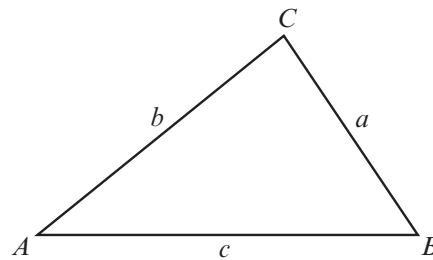


**In any triangle ABC**

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

**Annual Equivalent Rate (AER)**

AER, as a decimal, is calculated using the formula  $\left(1 + \frac{i}{n}\right)^n - 1$ , where  $i$  is the nominal interest rate per annum as a decimal and  $n$  is the number of compounding periods per annum.







3. Find five numbers so that:
- their mean is 4.5
  - their mode is 3.5.

Write your five numbers in the boxes below.

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The five numbers are

4. The interior angle of a regular polygon is  $171^\circ$ .
- How many sides does the polygon have?

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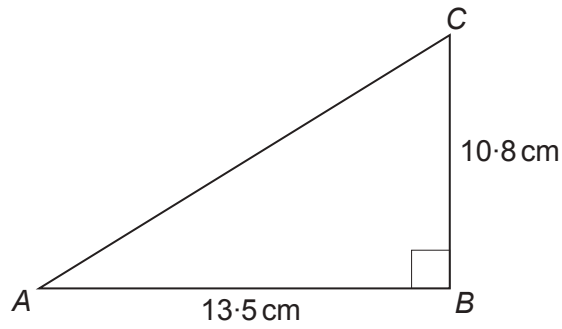
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5. (a) Calculate the length of AC.

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*Diagram not drawn to scale*

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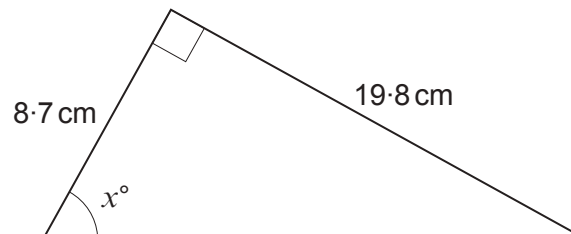
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- (b) Calculate the value of  $x$ .

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*Diagram not drawn to scale*

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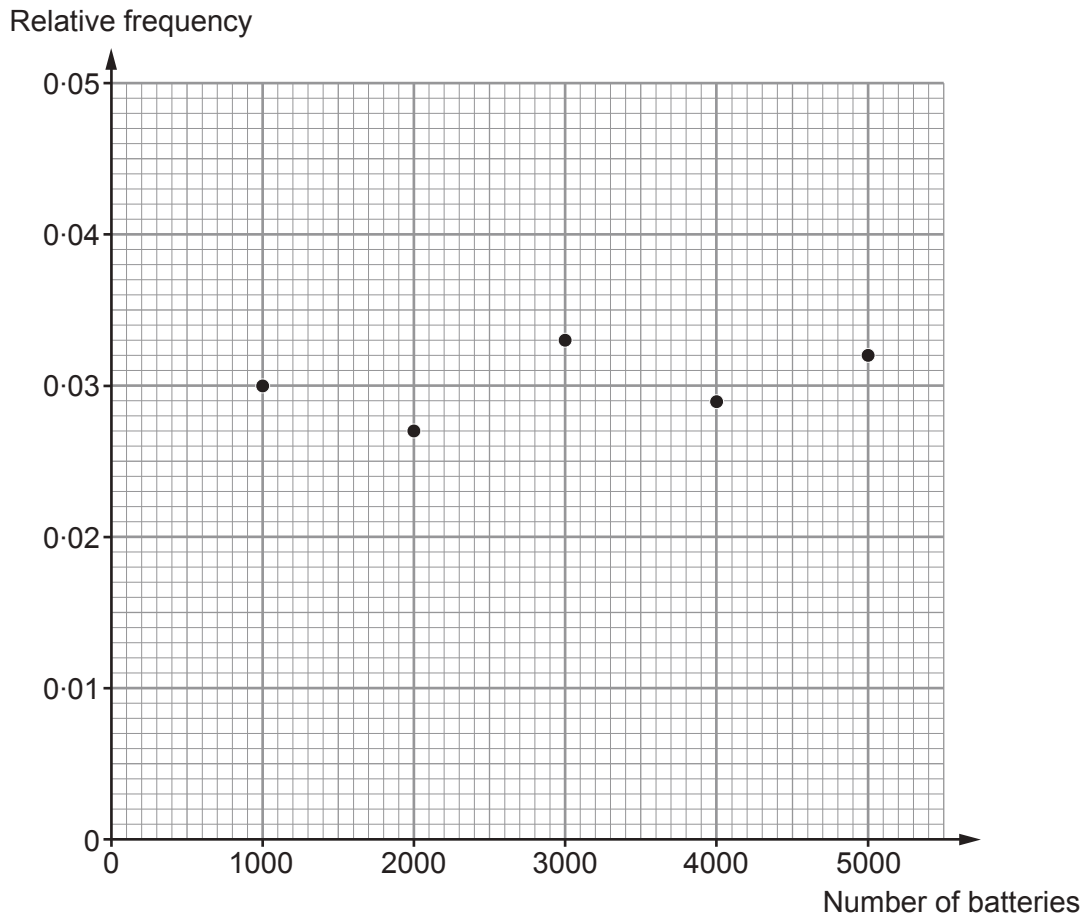
6. Line  $AB$  is drawn below.  
Point  $C$  lies **below** the line  $AB$ .  
The region in which point  $C$  is located is such that:

- $\hat{ABC} \leq 30^\circ$
- line  $BC \leq 5$  cm.

Use a ruler and a pair of compasses to **construct** suitable arcs and lines to show this region.  
You must show your construction arcs.  
Shade the region in which point  $C$  is located. [4]



7. PowrUp is a company that makes batteries. The quality of the batteries is tested regularly. PowrUp calculates the relative frequency of faulty batteries after checking a total of 1000, 2000, 3000, 4000 and 5000 batteries. The results are plotted on the graph below.



- (a) One battery is selected at random. Write down the best estimate for the probability that this battery will be faulty. You must give a reason for your choice. [2]

Probability = .....

Reason:

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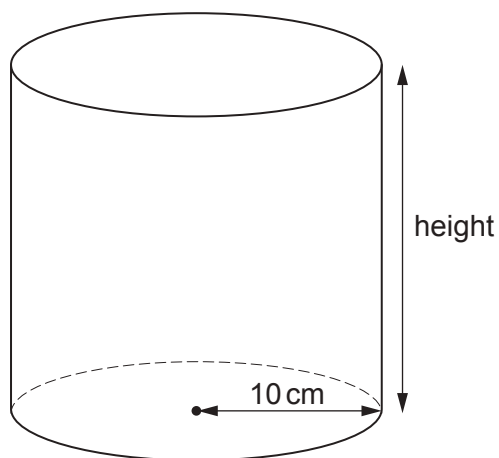
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8. The diagram shows a **solid** cylinder with radius 10 cm.  
The total **surface area** of the solid cylinder is  $1570.8 \text{ cm}^2$ .



*Diagram not drawn to scale*

Find the height of the cylinder.

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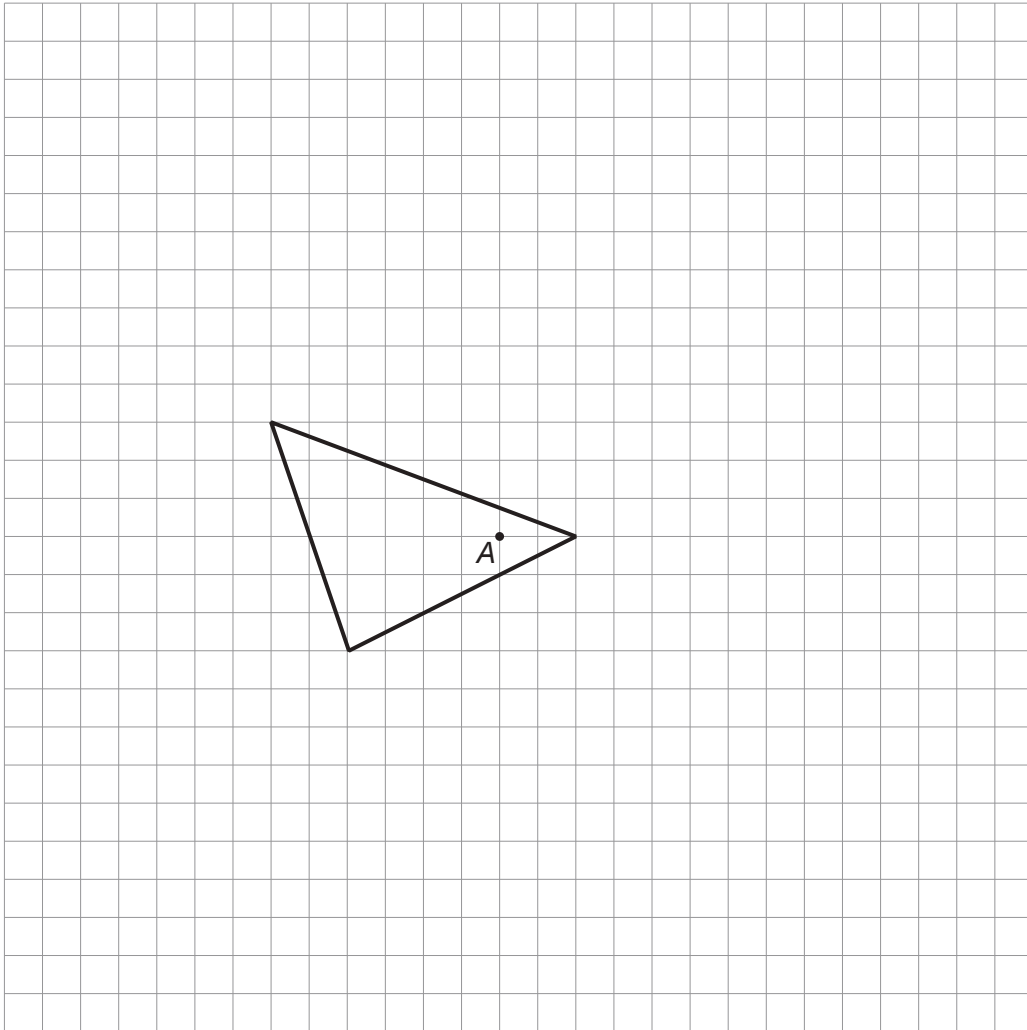
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10. Enlarge the given triangle by a scale factor of  $-2$ , using point  $A$  as the centre of enlargement. [2]



11. A solid has a height of 11 cm.  
A **similar** solid has a height of 23 cm.  
The volume of the smaller solid is  $107 \text{ cm}^3$ .  
Calculate the volume of the larger solid.

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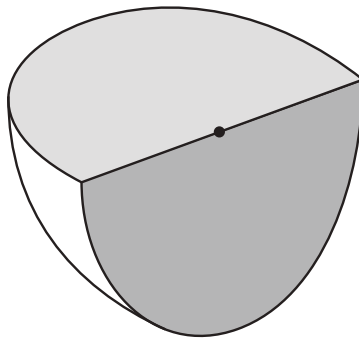
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12. The solid shown below is a quarter of a sphere with radius 7.3 cm.



*Diagram not drawn to scale*

- Calculate the volume of this solid.  
Give your answer correct to 3 significant figures.

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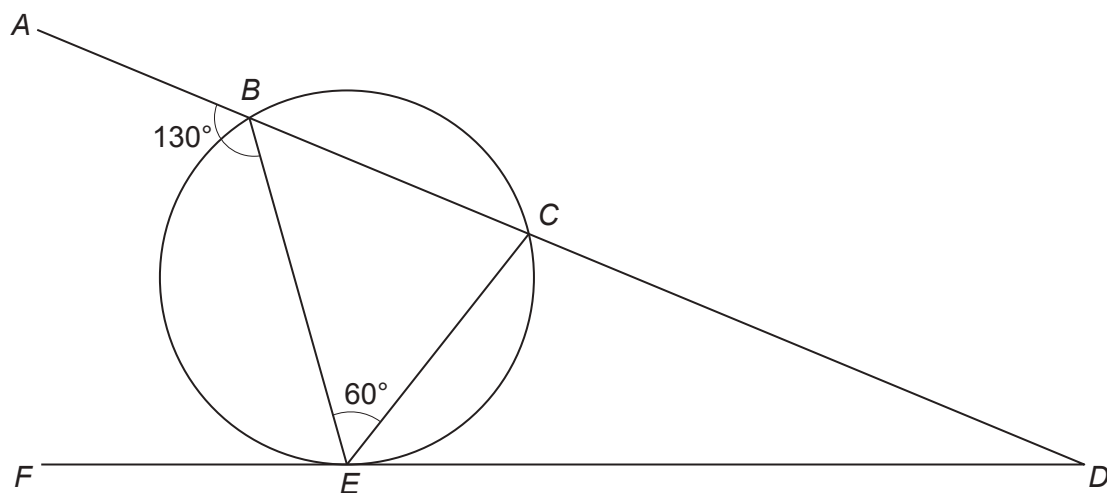
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13.  $FD$  is the tangent to the circle at point  $E$ , as shown below.  
 $ABCD$  is a straight line.  
 $\hat{A}BE = 130^\circ$  and  $\hat{B}EC = 60^\circ$ .



*Diagram not drawn to scale*

Calculate the size of  $\hat{C}DE$ .

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$$\hat{C}DE = \text{.....}^\circ$$





16. The first four terms of a sequence are

2, 11, 26, 47, .....

Find the  $n$ th term of the sequence.  
Hence, find the 250th term.

[3]

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$n$ th term = .....

250th term = .....



17. Circle the expression that is equivalent to  $(m^{64})^{\frac{3}{2}}$ .

[1]

$m^{16}$

$m^{\frac{125}{2}}$

$m^{\frac{131}{2}}$

$m^{96}$

$m^{512}$

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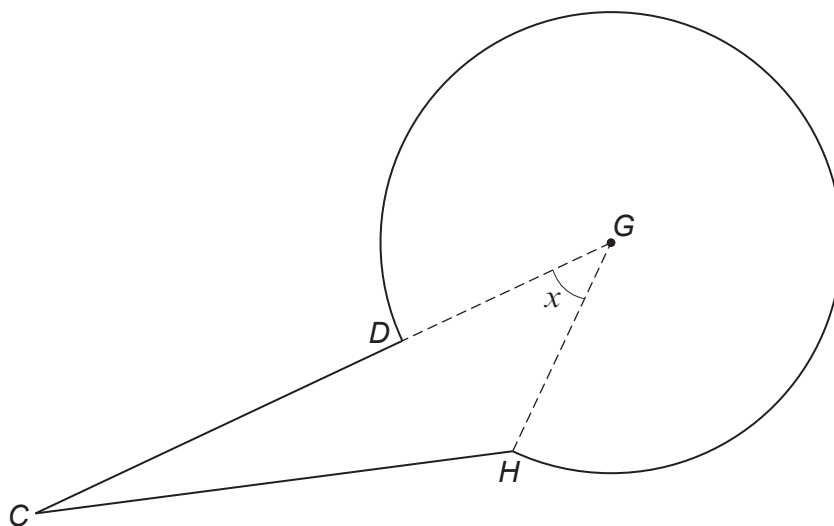
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20. In the shape shown below,  $CD = 6$  cm,  $CH = 7$  cm and  $GH = 5$  cm.  
 $\widehat{CGH} = x$ .  
 $GH$  is the radius of the circle with centre  $G$ .  
 $CDG$  is a straight line.



*Diagram not drawn to scale*

- (a) Calculate the size of angle  $x$ .

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Angle  $x = \dots\dots\dots^\circ$







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