Surname	Centre Number	Candidate Number
First name(s)		0



GCSE

3300U60-1



TUESDAY, 14 JUNE 2022 - MORNING

MATHEMATICS UNIT 2: CALCULATOR-ALLOWED HIGHER TIER

1 hour 35 minutes

ADDITIONAL MATERIALS

A calculator will be required for this examination.

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.

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 the questions in the spaces provided.

If you run out of space, use the additional page at the back of the booklet. Question numbers must be given for all work written on the additional page.

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.

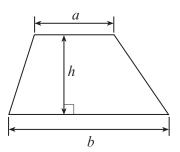
In question **4**, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	2	
2.	4	
3.	5	
4.	8	
5.	5	
6.	1	
7.	6	
8.	6	
9.	4	
10.	3	
11.	6	
12.	3	
13.	2	
14.	3	
15.	3	
16.	6	
17.	3	
Total	70	

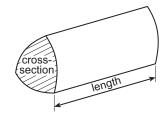


Formula List - Higher Tier

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



Volume of prism = area of cross-section × length

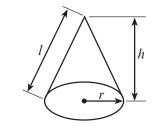


Volume of sphere = $\frac{4}{3}\pi r^3$ Surface area of sphere = $4\pi r^2$



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

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

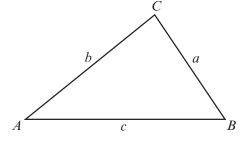


In any triangle ABC

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 $a \ne 0$ are given by $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

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

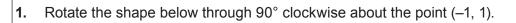
Annual Equivalent Rate (AER)

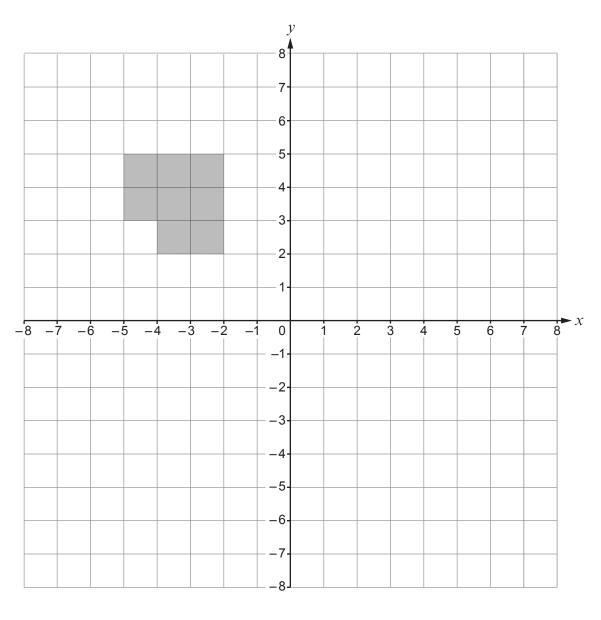
AER, as a decimal, is calculated using the formula $\left(1+\frac{i}{n}\right)^n-1$, where i is the nominal interest rate per annum as a decimal and n is the number of compounding periods per annum.



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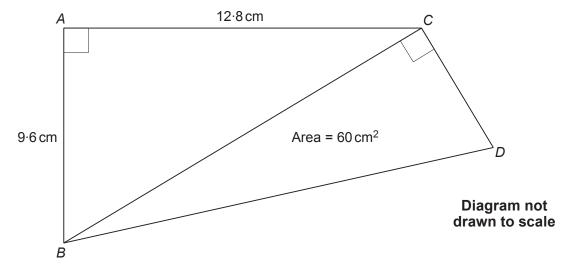
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2.	(a)	Make m the subject of the formula $w = 8m - 3$.	[2]
	(b)	Expand and simplify $(y+5)(y-4)$.	[2]
3.	The Find Give	height of a cylinder is 24·8 cm. ratio of the diameter of the cylinder to the height of the cylinder is 3 : 2. the volume of the cylinder. your answer correct to 2 significant figures. must show all your working.	[5]



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4. In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.



In the diagram above, the area of triangle BCD is 60cm^2 . Calculate the length of CD .	
You must show all your working.	[6 + 2 OCW]



κ c

	Facto	orise $8x^2$	² + 6xy.				[2]
(b)	(i)	Factori	ise $x^2 + 13x + 4$	0.			[2]
	(ii)	Explair	າ how you can c	check that your ansv	ver to part (i) is cor	rect.	[1]
Circle	the c	correct a		–3·648 × 10 ⁶	3·648 × 10 ³	3·648 × 10 ⁶	[1]
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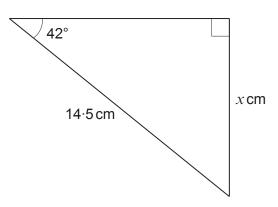


Diagram not drawn to scale

Calculate the value of x.

7.

[3]

The diagram below shows a different right-angled triangle. (b)

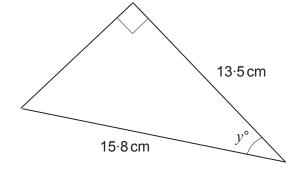


Diagram not drawn to scale

Calculate the value of y. [3]



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- This cuboid has:
 - length = $5 \, \text{cm}$

 - width = x cm height = $(x^2 + 3)$ cm volume = 132 cm³.

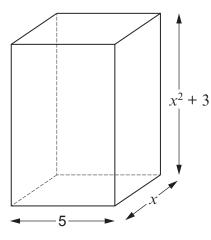


Diagram not drawn to scale

(a) Show that $5x^3 + 15x = 13$	(a`	nat $5x^3 + 15x^3$	that $5x^3 + 15x = 132$
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[1]

A solution of the equation (b)

$$5x^3 + 15x = 132$$

lies between 2 and 3.

Use the method of trial and improvement to find this solution correct to 1 decimal

You must show all your working. [4]



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(ii) Hence, find the height of the cuboid.	[1]
Height of the cuboid =cm	



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Calculate the total surface area of a solid hemisphere with a radius of 34 cm. [4]
Diagram not drawn to scale
Total surface area =cm ²



10	The value of y is found using the formula $y = \frac{t}{w}$.	Examine only
10.		
	t = 98, correct to 2 significant figures. w = 0.5, correct to 1 significant figure.	
	Calculate the least value of <i>y</i> . Give your answer correct to 1 decimal place. You must show all your working. [3]	
	Least value of $y = \dots$	



12 **11.** The diagram shows a triangle *ABC* and a circle with centre *A*. The points *B* and *D* lie on the circumference of the circle. The length of the line AC is 27 cm. The area of triangle ABC is 112 cm². 10 cm D Diagram not drawn to scale Calculate the area of the shaded region. [6] Area of shaded region =cm²



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Express the following as a single fraction in its simplest form.	[3]
$\frac{4}{3x-7} + \frac{5}{2x+9}$	
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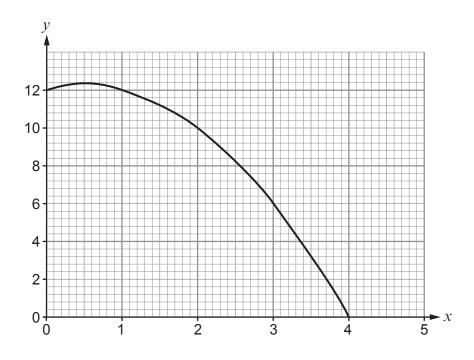


13. Three fair spinners are shown in the diagram below.	Exami only
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
The three spinners are spun. Calculate the probability that all the spinners will land on an even number.	[2]



14. The graph of $y = 12 + x - x^2$, for values of x from x = 0 to x = 4, is drawn below.

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Use the trapezium rule, with the ordinates x = 0, x = 1, x = 2, x = 3 and x = 4, to estimate the area of the region bounded by the curve, the positive x-axis and the positive y-axis. [3]

34 cm /	Y			Exar or
X	73 cm	55 cm	Diagram drawn to s	not cale
Calculate the size of $X\widehat{Y}Z$.				[3]
xŶz		0		



Shape A is a sqı	uare and Shape B i	s a rectar	ngle, as shov	vn below.	
(7 - 2x) cm	A			В	2x cm
$(7-2x)$ GIII \Rightarrow	^			5x + 1) cm	Diagrams not drawn to scale
The area of squa	are A is equal to the	e area of ı	rectangle B.		drawn to scale
Give your answe You must show a	on in x and hence care correct to 1 decinal your working.	nal place.	The value of X)



Solid A and Soli	d B are similar .	
Solid A has a vo	lume of 8000 cm ³ and a height of 30 cm. lume of 4913 cm ³ .	
Calculate the he	ight of Solid B.	[3]
	Height of Solid B =cm	
	END OF PAPER	



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



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