Surname	Centre Number	Candidate Number
First name(s)		0



#### **GCSE**

3300U50-1



### **TUESDAY, 24 MAY 2022 - MORNING**

## MATHEMATICS UNIT 1: NON-CALCULATOR HIGHER TIER

1 hour 35 minutes

#### **ADDITIONAL MATERIALS**

The use of a calculator is not permitted in 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  $\pi$  as 3·14.

#### 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.

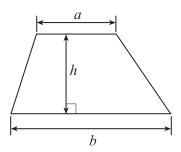
In question **1**, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

For Ex	aminer's us	se only
Question	Maximum Mark	Mark Awarded
1.	6	
2.	5	
3.	6	
4.	6	
5.	4	
6.	4	
7.	2	
8.	2	
9.	2	
10.	3	
11.	4	
12.	2	
13.	6	
14.	2	
15.	5	
16.	2	
17.	5	
18.	4	
Total	70	

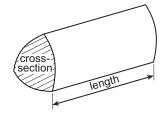


#### Formula List - Higher Tier

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

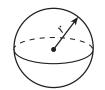


Volume of prism = area of cross-section × length



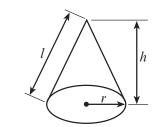
Volume of sphere =  $\frac{4}{3}\pi r^3$ 

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



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

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

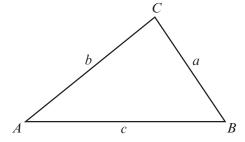


In any triangle ABC

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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	on	ly	

2. The table below shows some of the values of  $y = x^2 + x - 4$  for values of x from -3 to 3.

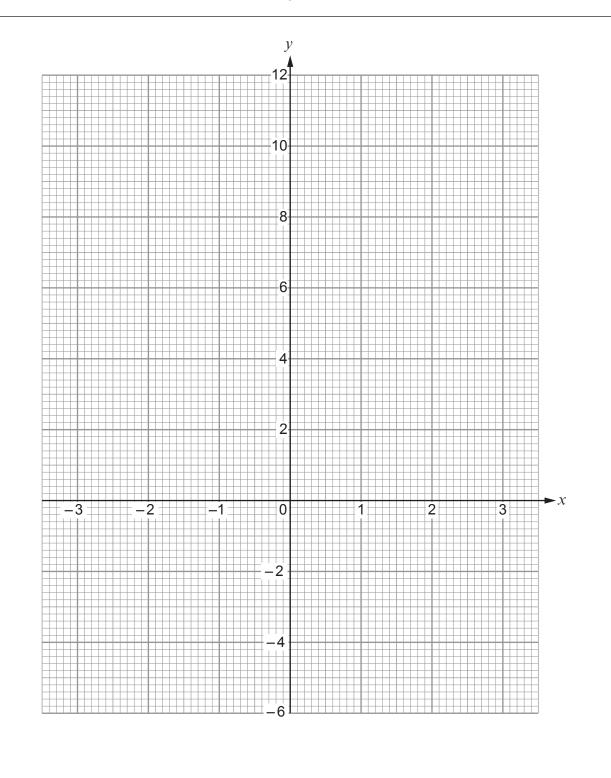
x	-3	-2	-1	0	1	2	3
$y = x^2 + x - 4$	2	-2		- 4		2	8

- (a) Complete the table by finding the values of y for x = -1 and for x = 1. [2]
- (b) On the graph paper opposite, draw the graph of  $y = x^2 + x 4$  for values of x from -3 to 3.
- (c) Use your graph to solve the equation  $x^2 + x 4 = 0$ . Give your answers correct to 1 decimal place. [1]

 $x = \dots$  or  $x = \dots$ 



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Turn over.

3.	The children in year 5 and year 6 in a primary school The children were asked, "How many pets do you have The results are shown in the pie chart and bar chart to No child in either year had more than 5 pets.	took part in a survey. /e?"	Examine only
	3 pets 1 pet	quency  8  10  10  10  10  10  10  10  10  10	
	Year 5	Year 6	
	There are 36 children in year 5.  One child is chosen at random from all the children in What is the probability that this child has no more that	year 5 and year 6. n 1 pet? [6]	



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(0)	Complete the tree diagram	
(a)	Complete the tree diagram.	
	B occurs	
	A occurs	
	0.6	
	B does not	
	occur	
	B occurs	
	A does not	
	occur	
	B does not	
	occur	
(b)	Calculate the probability of neither event A nor event B occurring.	
• • • • • • • • • •		



<ul> <li>In the diagram: <ul> <li>AB and ED are parallel</li> <li>triangles ABC and DEC are similar.</li> </ul> </li> </ul>	Examir only
8 cm C	10·5 cm  Diagram not
	drawn to scale
A	
(a) Calculate the length of <i>CE</i> .	[2]
(b) Calculate the length of <i>AB</i> .	[2]



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rea maer enem an year memm	us equations using an algebraic (not gra g.	
	2x + 3y = 29	
	5x - 4y = -8	



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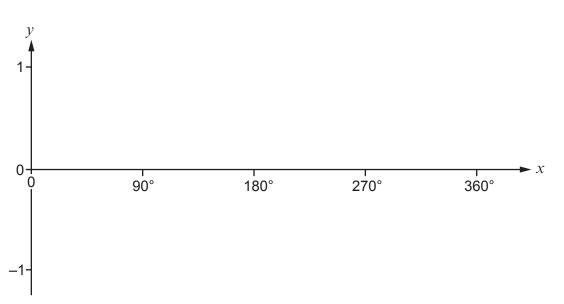
(a) $7\cdot 2\text{m}^3$ is equal to [1] $720\text{cm}^3$ $72\text{v}10^5\text{cm}^3$ $7\cdot 2\text{v}10^3\text{cm}^3$ $7\cdot 2\text{v}10^6\text{cm}^3$ (b) $36^{\frac{1}{2}}$ is equal to [1] $18$ $6$ $1/18$ $1/6$ $1/36$ Find the value of $30000 \over 1\cdot 5\text{v}10^5$ .	(a) $7.2 \mathrm{m}^3$ is equal to [1] $720 \mathrm{cm}^3$ $72000 \mathrm{cm}^3$ $7.2 \times 10^5 \mathrm{cm}^3$ $7.2 \times 10^3 \mathrm{cm}^3$ $7.2 \times 10^6 \mathrm{cm}^3$ (b) $36^{\frac{1}{2}}$ is equal to [1] $18 - 6 - \frac{1}{18} - \frac{1}{6} - \frac{1}{36}$ Find the value of $\frac{30000}{1.5 \times 10^5}$ . Write your answer as a decimal. [2]	Circle	e the cori	ect answer	for eac	h of the following	statements			
(b) $36^{\frac{1}{2}}$ is equal to [1] $18  6  \frac{1}{18}  \frac{1}{6}  \frac{1}{36}$ Find the value of $\frac{30000}{1.5 \times 10^5}$ . Write your answer as a decimal. [2]	(b) $36^{\frac{1}{2}}$ is equal to [1] $18  6  \frac{1}{18}  \frac{1}{6}  \frac{1}{36}$ Find the value of $\frac{30000}{1.5 \times 10^5}$ . Write your answer as a decimal. [2]									[1]
Find the value of $\frac{30000}{1.5 \times 10^5}$ .  Write your answer as a decimal. [2]	Find the value of $\frac{30000}{1.5 \times 10^5}$ .  Write your answer as a decimal. [2]	720	cm <sup>3</sup>	72 000 cr	m <sup>3</sup>	$7.2 \times 10^5 \text{ cm}^3$	7·2 × ′	10 <sup>3</sup> cm <sup>3</sup>	$7.2 \times 10^6 \text{ cm}^3$	
Find the value of $\frac{30000}{1.5\times10^5}$ .  Write your answer as a decimal. [2]	Find the value of $\frac{30000}{1.5 \times 10^5}$ .  Write your answer as a decimal. [2]	(b)	$36^{\frac{1}{2}}$ is	equal to						[1]
Write your answer as a decimal. [2]	Write your answer as a decimal. [2]			18	6	<u>1</u> 18	<u>1</u> 6	1 36		
										[2]



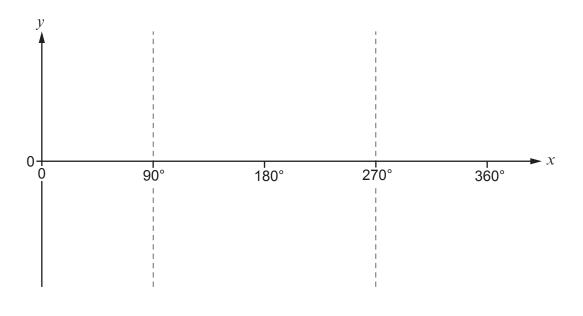
[1]

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**9.** (a) Sketch the curve  $y = \sin x$ , for values of x in the range  $x = 0^{\circ}$  to  $x = 360^{\circ}$ .



(b) Sketch the curve  $y = \tan x$ , for values of x in the range  $x = 0^{\circ}$  to  $x = 360^{\circ}$ . [1]



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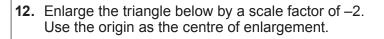
Turn over.

10.	Rearrange the following formula to make <i>x</i> the subject.	Examine only
. • •	5x + 4 = t - yx	
	You must show all your working.	[3]

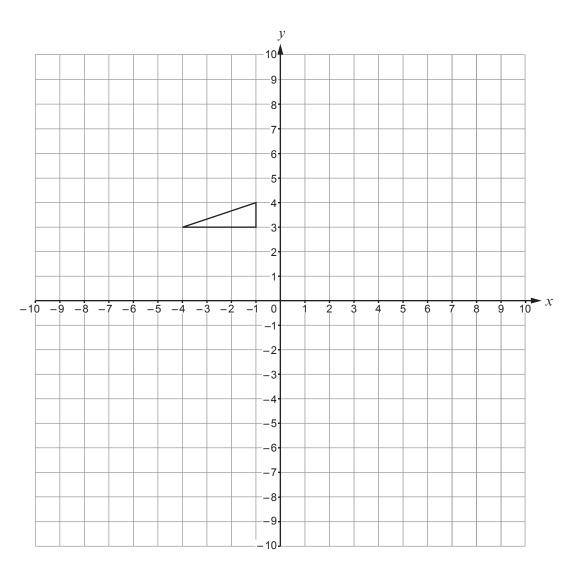


The wavelength of a sound wave, $\it W$ metres, is <b>inversely proportional</b> to its frequency, $\it f$ hertz (Hz).	
Richard is measuring the wavelengths of different sound waves. The wavelength is $0.5\text{m}$ when the frequency is 1200 Hz.	
What is the frequency when the wavelength is 10 m?	[4]





[2]





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Examiner only

•	Marian is competing in a race. The race is $(6x + 5)$ miles long. She completes the race in $x$ hours. Her average speed during the race is $(2x + 3)$ miles per hour.	
	Calculate how long Marian takes to complete the race. You must use an algebraic method (not trial and improvement).  [6]	



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4	Find the value of $125^{-\frac{1}{3}}$ .		Exami only
· <b>-</b> .	Simplify your answer.	[2]	



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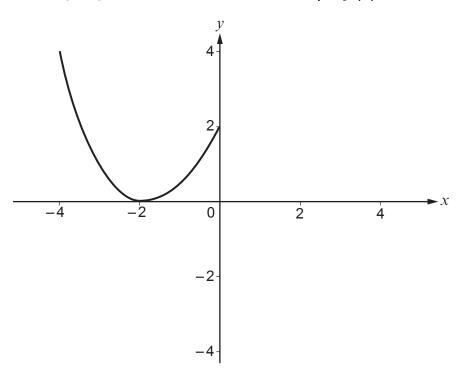
5.	Simplify the following.	on
	$\frac{\sqrt{800}}{\left(\sqrt{2}\right)^3} + \left(3 - \sqrt{7}\right)^2$	
	State whether the answer is rational or irrational. [5]	I
	The answer is rational The answer is	
		-



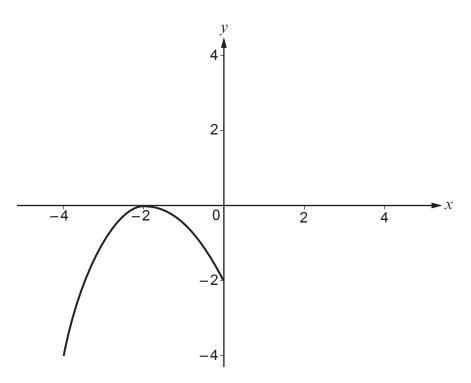
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**16.** (a) The following diagram shows a sketch of the curve y = f(x).



The curve is transformed, as shown below.



Using function notation, complete the equation of the transformed curve.

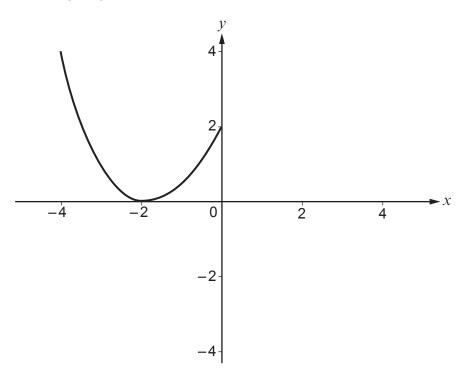
*y* = .....



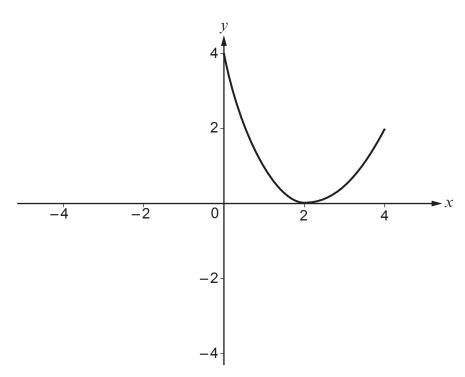
[1]

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(b) The following diagram shows a sketch of the curve y = f(x).



The curve is transformed, as shown below.



Using function notation, complete the equation of the transformed curve.

y = .....



of t	g contains 10 balls. he balls are blue, 4 of the balls are red and 1 ball is green. e balls are chosen at random, one at a time, without replacement.
(a)	Calculate the probability that the first ball is blue, the second ball is red and the third bal is green.
	You must show all your working. [2
•••••	
•••••	
(b)	Calculate the probability that at least one blue ball is chosen. You must show all your working.
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	You must show all your working. [3
	You must show all your working. [3



20

		Examine
18.	implify $\frac{6x-15}{4x^2-25}$ . [4]	
		•
	END OF PAPER	



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