Surname	Centre Number	Candidate Number
First name(s)		0

GCSE

3300U60-1

A22-3300U60-1

WEDNESDAY, 16 NOVEMBER 2022 – MORNING

MATHEMATICS
UNIT 2: CALCULATOR-ALLOWED
HIGHER TIER

1 hour 45 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 organisation, communication and accuracy in writing.

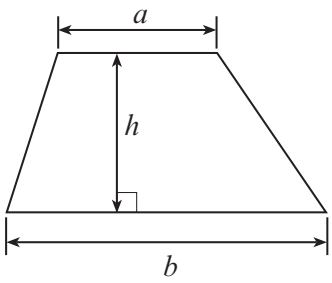
For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**4**	
2.	**4**	
3.	**5**	
4.	**9**	
5.	**3**	
6.	**3**	
7.	**2**	
8.	**5**	
9.	**4**	
10.	**4**	
11.	**3**	
12.	**3**	
13.	**4**	
14.	**4**	
15.	**1**	
16.	**3**	
17.	**1**	
18.	**5**	
19.	**5**	
20.	**8**	
Total	**80**	

3300U601
01

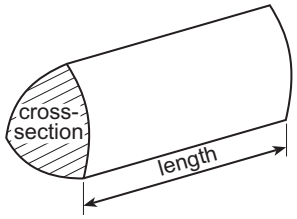
NOV223300U60101

Formula List – Higher Tier

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

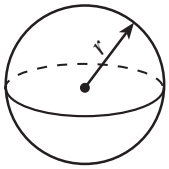


Volume of prism = area of cross-section × length



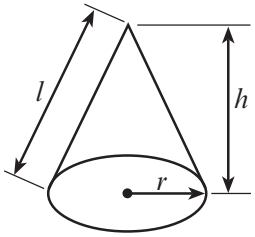
Volume of sphere $= \frac{4}{3}\pi r^3$

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



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

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

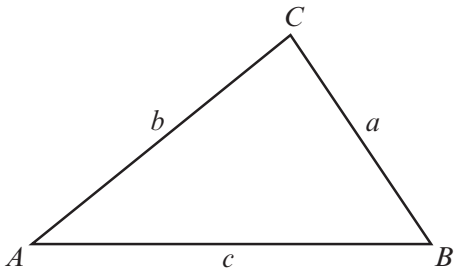


In any triangle ABC

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 $a \neq 0$ 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.

Examiner only

1. A solid metal cylinder has a radius of 2·3 cm and a height of 5 cm.

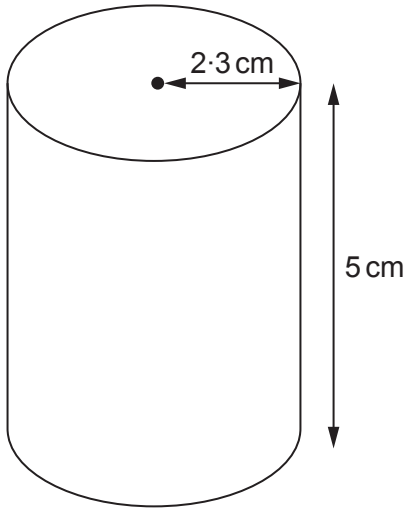


Diagram not drawn to scale

The mass of the cylinder is 423·1 g.

Find the density of the metal.
Give your answer in g/cm^3. [4]

Examiner only

2. A solution to the equation

$$x^3 + 5x - 8 = 0$$

lies between 1 and 2.
Use the method of trial and improvement to find this solution correct to 1 decimal place.
You must show all your working. [4]

Examiner only

3. A rectangle has a width of $4x - 10$.

(a) Given that x is a whole number, explain why the value of x cannot be less than 3. [1]

(b) The perimeter of the rectangle is $14x - 4$.

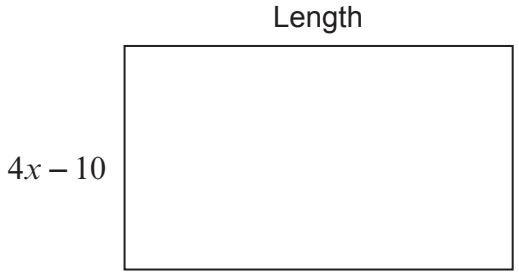


Diagram not drawn to scale

Find the length of the rectangle in **terms of** x. [4]

Examiner only

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

A, *B* and *C* are points on the circumference of a circle with centre *O*.
The length of *BC* is 10 cm.
The diameter of the circle is 18 cm.

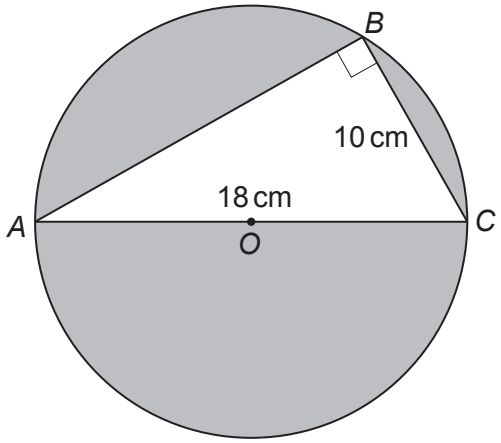


Diagram not drawn to scale

Calculate the shaded area.
You must show all your working. [7 + 2 OCW]

Examiner only

5. Calculate the length of the side *YZ* in the triangle *XYZ* shown below. [3]

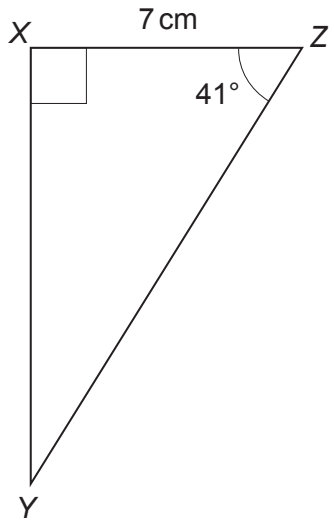


Diagram not drawn to scale

.....

.....

.....

.....

.....

.....

.....

.....

3300U601
07

Examiner only

6. Two times are recorded correct to the **nearest 0·1 second**.

12·4 seconds
25·5 seconds

Calculate the greatest possible difference between these times. [3]

7. A number has been increased by 60% to give an answer of 64.
What was the original number? [2]

Examiner only

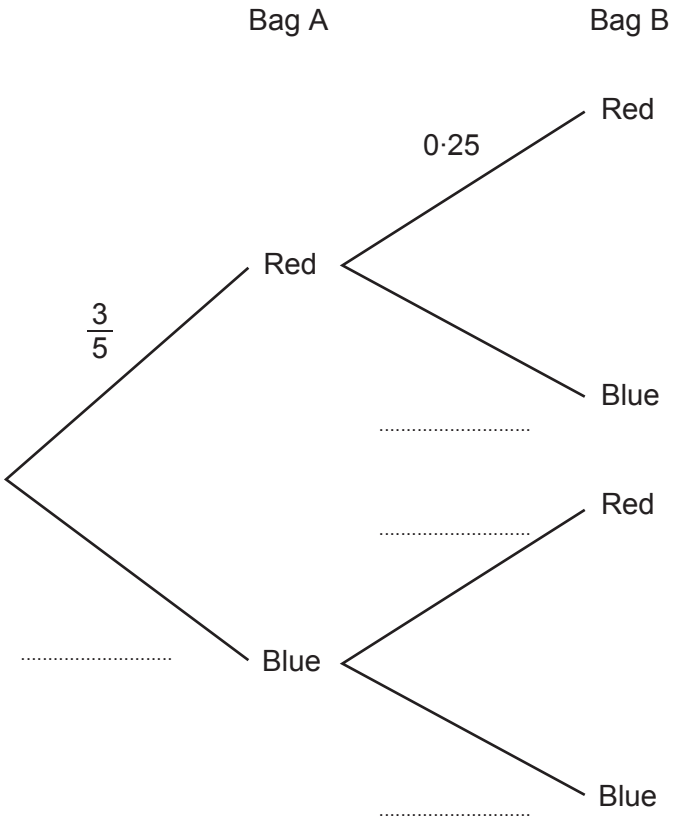
8. Bag A and Bag B contain only red and blue balls.

The probability of choosing a red ball from Bag A is $\frac{3}{5}$.

The probability of choosing a red ball from Bag B is 0·25.

A ball is chosen at random from each bag.

(a) Complete the tree diagram below. [2]



(b) Find the probability that the two balls chosen are the same colour. [3]

Examiner only

9. Solve the following simultaneous equations using an algebraic (not graphical) method.
Do not use a trial and improvement method.
You must show all your working. [4]

$$3x + 5y = -2$$
$$5x + 4y = -12$$

Examiner only

10. (a) Expand and simplify $(2h+3t)(5h-7t)$. [3]

(b) Simplify $\dfrac{7(d+5)^8}{(d+5)^{-2}}$. [1]

Examiner only

11. A cone is joined to a hemisphere, as shown below.
The cone has a base radius of 8 cm and a slant height of 17 cm.
The hemisphere has the same radius as the cone.
Calculate the **surface area** of the composite solid. [3]

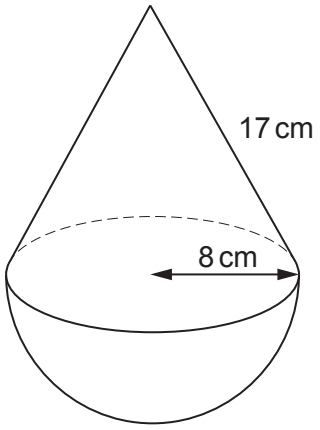


Diagram not drawn to scale

Examiner only

12. Solve the equation $59x^2 - 7x - 13 = 0$.
Give your answers correct to 2 decimal places.
You must show all your working. [3]

13. Two similar shapes have perimeters of 241 cm and 719 cm.
The area of the smaller shape is 2063 cm^2.

Calculate the area of the larger shape.
Give your answer in m^2. [4]

Examiner only

14. *DE* is the tangent to the circle at point *A*, as shown below.
BC = 7 cm and *AC* = 13 cm.
$B\hat{A}D$ = 68° and $C\hat{A}E$ = 80°.

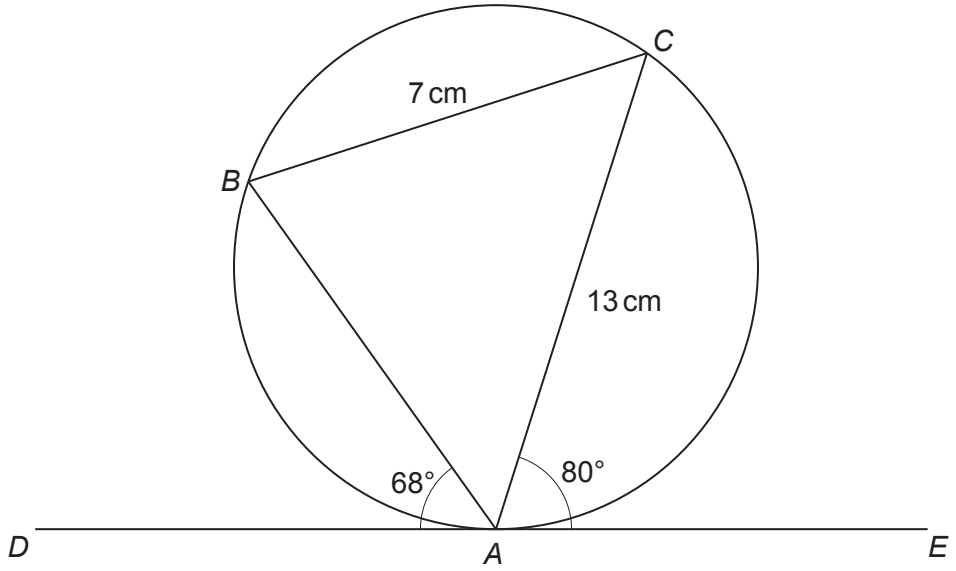


Diagram not drawn to scale

(a) Find the size of $A\hat{C}B$.
State the angle property you have used to find your answer. [2]

.....

.....

.....

(b) Calculate the area of the triangle *ABC*. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

Examiner only

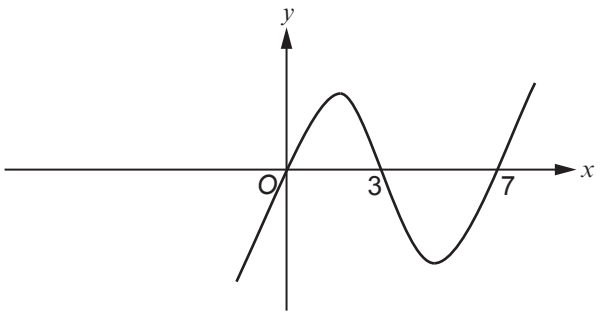
15. Write down an **irrational** number whose value is between 9 and 10.
Write your answer in the box below. [1]

Irrational number is:

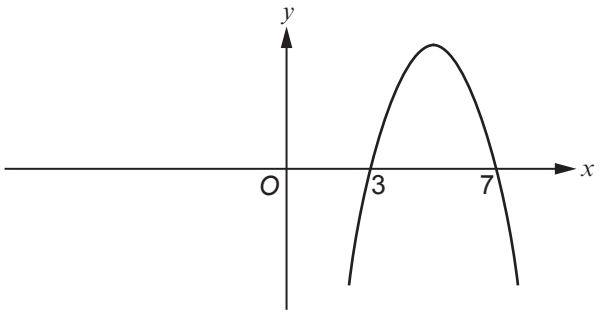
16. Fully factorise the expression $k^3p - kp^3$. [3]

Examiner only

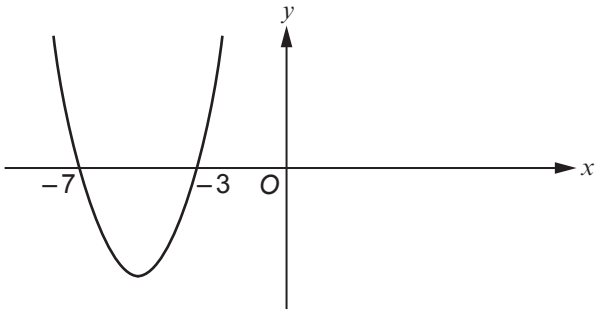
17. The equation $y = (x-3)(x-7)$ describes only **one** of the graphs below.
Put a tick (✓) in the box next to the graph that correctly shows this equation. [1]



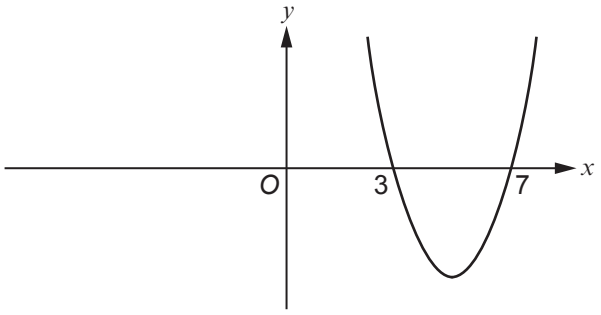
☐



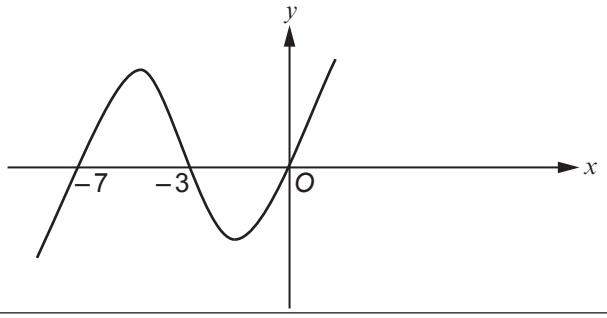
☐



☐



☐



☐

Examiner only

18. The following nine cards are placed in a box.

A	F	O	N	G	R	O	N	W

Catherine chooses **three** cards at random from the box, without replacement.

(a) Calculate the probability that the three cards drawn show the letters 'A', 'F' and 'O' in that order. [2]

(b) Calculate the probability that two of the three cards show the same letter. [3]

Examiner only

19. Make c the subject of the following formula. [5]

$$a\left(b+c^2\right)+d\left(e-c^2\right)=f$$

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

20. The diagram shows a triangle *ABC* and a circle with centre *C*.
The points *B* and *D* lie on the circumference of the circle.

The length of the line *AB* is 19 cm.
The length of the line *AC* is 29 cm.
The radius of the circle is x cm.

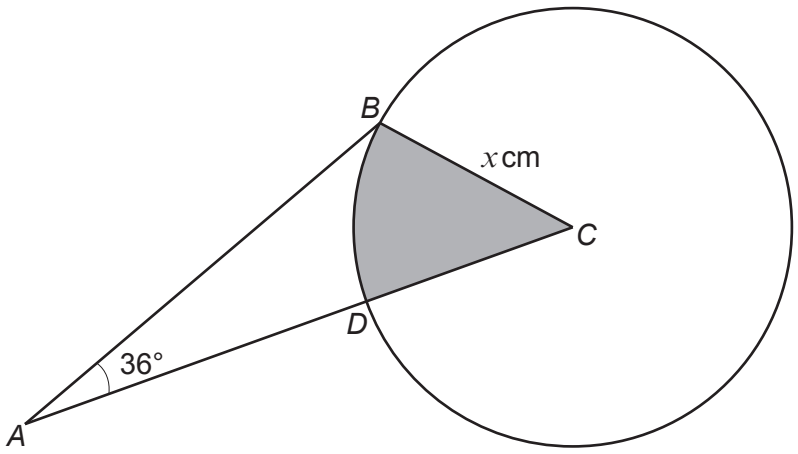


Diagram not drawn to scale

Examiner only

Calculate the area of the shaded sector *BCD*. [8]

END OF PAPER

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

Examiner only