



Duration – 1 hour 30 minutes

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Number of seat

Date of birth

Day

Month

Year

Scottish candidate number

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Total marks – 50

Attempt ALL questions.

You may use a calculator.

To earn full marks you must show your working in your answers.

State the units for your answer where appropriate.

Write your answers clearly in the spaces provided in this booklet. Additional space for answers is provided at the end of this booklet. If you use this space you must clearly identify the question number you are attempting.

Use **blue** or **black** ink.

Before leaving the examination room you must give this booklet to the Invigilator; if you do not, you may lose all the marks for this paper.

FORMULAE LIST

The roots of $ax^2 + bx + c = 0$ are $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

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

Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$ or $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

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

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

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

Volume of a pyramid $V = \frac{1}{3} Ah$

Standard deviation $s = \sqrt{\frac{\Sigma(x - \bar{x})^2}{n - 1}}$

or $s = \sqrt{\frac{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}{n - 1}}$, where n is the sample size.

Total marks – 50
Attempt ALL questions

DO NOT
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MARKS

1. Find the equation of the line passing through the points $(1,-3)$ and $(-2,6)$.
Give your answer in its simplest form.

3

2. In 2022, 868 school pupils sat the first ever Higher Applications of Mathematics exam.

This is expected to increase by 85% each year for the next three years.

Calculate the expected number of pupils who will sit the 2025 Higher Applications of Maths exam.

Give your answer correct to the nearest hundred.

3

[Turn over

3. The carbon dioxide (CO₂) concentration levels in 5 Maths classrooms are recorded at the start of the school day.

The CO₂ concentration levels, measured in parts per million (ppm), for the 6 classrooms are shown below.

634 850 721 983 1037

- (a) Calculate the mean and standard deviation of the CO₂ concentration levels in the 5 Maths classrooms.

4

The CO₂ concentration levels in 5 English classrooms are also recorded at the start of the school day.

In these classrooms, the mean of the CO₂ concentration levels is 923 ppm and the standard deviation of the CO₂ concentration levels is 180 ppm.

- (b) Make two valid comments comparing the CO₂ concentration levels in the Maths and English classrooms.

2

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MARKS

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5. Solve the equation $5x^2 - 10x + 3 = 0$.
Give your answers correct to one decimal place.

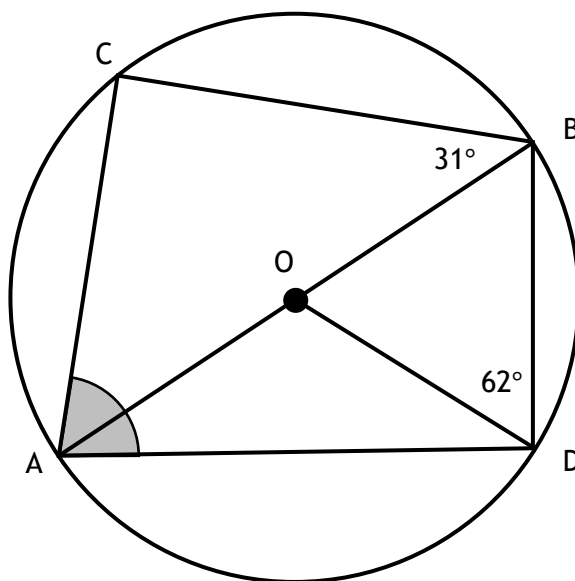
4

[Turn over

6. Solve, algebraically, the inequation $3 - 2(x + 1) < 6x + 5$.

3

7. The diagram below shows a circle, centre O.



- AB is a diameter of the circle
- Angle ABC is 31°
- Angle BDO is 62°

Calculate the size of angle CAD.

3

MARKS

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7. A straight line has equation $2x - 7y = 3$.
Find the gradient of the line.

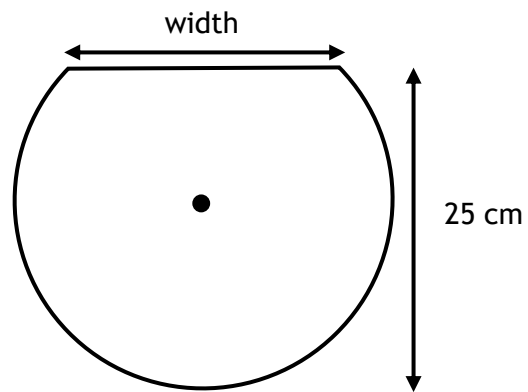
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8. Change the subject of the formula $y = (3x + 4)^2$ to x .

3

[Turn over

9. The shape below is part of a circle, centre C.



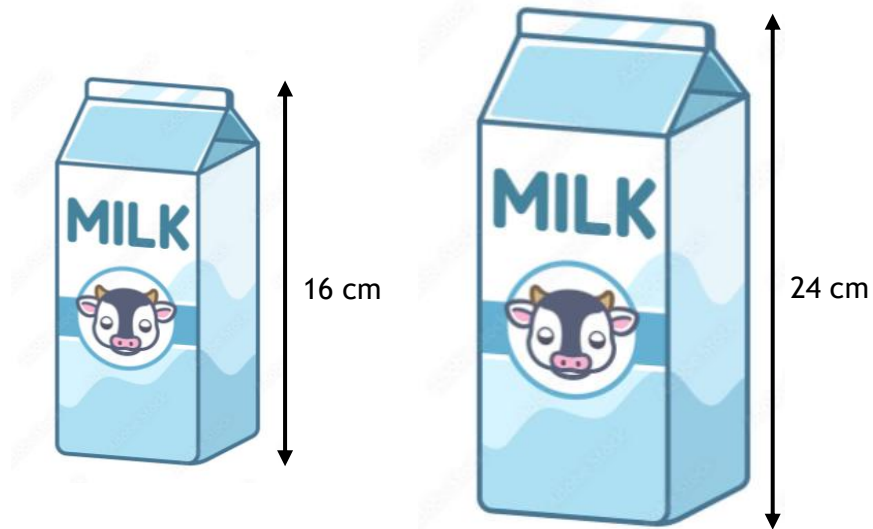
The height of the shape is 25 centimetres.

The radius of the circle is 14 centimetres.

Calculate the width of the shape.

4

10. The two cartons of milk below are mathematically similar.



The smaller carton has a height of 16 centimetres and volume 650 millilitres.
The larger carton has a height of 24 centimetres.

Calculate the volume of the larger carton of milk.

3

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MARKS

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11. Solve the equation $3 \tan x^\circ + 4 = 2$, for $0 \leq x \leq 360$.

3

12. Calculate $|\mathbf{v}|$, the magnitude of vector $\mathbf{v} = \begin{pmatrix} 3 \\ -4 \\ 5 \end{pmatrix}$.

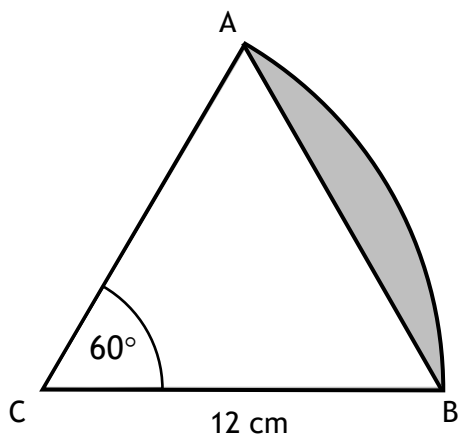
2

13. Express $\frac{2x+18}{5} \times \frac{1}{x+9}$ as a single fraction in its simplest form.

2

[Turn over

14. The diagram shows a sector of a circle with centre C. Angle ABC is 60° .



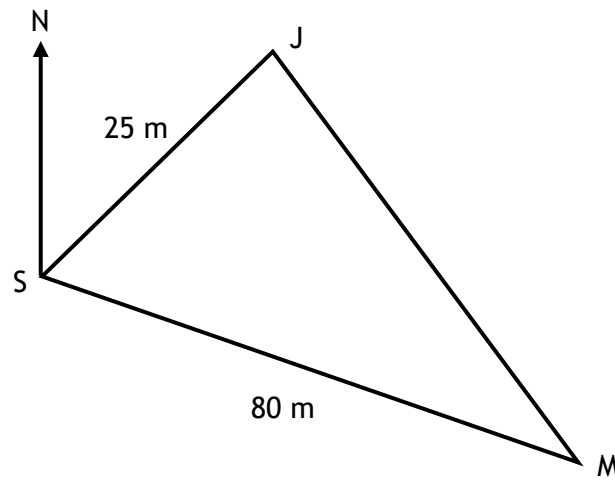
The radius of the circle is 12 centimetres.
 AB splits the sector into triangle ABC and the shaded segment.
 Calculate the area of the shaded segment.

5

15. Julian and Michael are testing out their new drones together at point S.

From the starting point:

- Julian's drone (J) travels 25 metres on a bearing of 045°
- Michael's drone (M) travels 80 metres on a bearing of 110°



Calculate the distance between the two drones.

4