



Duration – 1 hour



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 – 40

Attempt ALL questions.

You must NOT 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 $s = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$

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

Total marks – 40
Attempt ALL questions

DO NOT
WRITE IN
THIS
MARGIN

MARKS

1. Expand and simplify $(2x+1)(3x^2-x+5)$.

3

2. Evaluate $2\frac{1}{5} + \frac{3}{4}$.

2

3. Vectors **a** and **b** are given by $\mathbf{a} = \begin{pmatrix} 4 \\ -1 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} -6 \\ -3 \end{pmatrix}$.

Find the resultant vector $\mathbf{a} + \frac{2}{3}\mathbf{b}$.

Express your answer in component form.

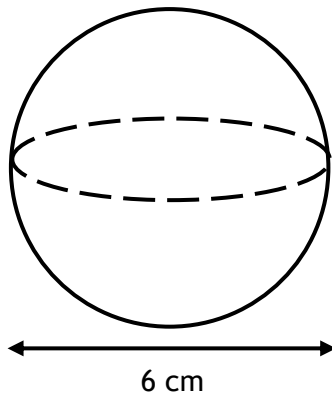
2

[Turn over

4. Express $x^2 - 6x + 11$ in the form $(x - a)^2 + b$.

2

5. The diagram shows a sphere with diameter 6 centimetres.



Calculate the volume of the sphere.

Give your answer in terms of π .

2

6. Stephanie buys 4 large dracaena plants and 3 small dracaena plants.
The total cost is £52.

(a) Write down an equation to illustrate this information.

1

Colin buys 2 large dracaena plants and 5 small dracaena plants.
The total cost is £40.

(b) Write down an equation to illustrate this information.

1

(c) Calculate the cost of one large dracaena plant and the cost of one small dracaena plant.

4

[Turn over

7. WrestleMania is a global professional wrestling event, taking place in early April each year.

At the first WrestleMania, the attendance was 19,200.

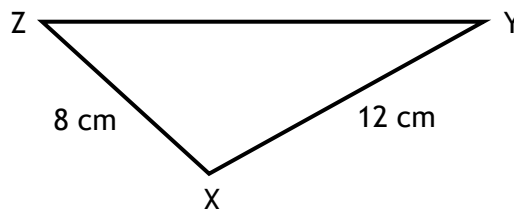
This is 15% of the expected attendance for WrestleMania 40.

Calculate the expected attendance for WrestleMania 40.

3

8. In triangle XYZ:

- $\sin Y = \frac{1}{3}$
- $XY = 12$ centimetres
- $XZ = 8$ centimetres



Find the value of $\sin Z$.

Give your answer in its simplest form.

2

9. A function $f(x)$ is defined by $f(x) = 3\sqrt{x}$ where $x \geq 0$.

(a) Evaluate $f(20)$.

Give your answer as a surd in its simplest form.

2

(b) Find the value of a such that $f(a) = 15$.

2

10. A parabola has equation $y = 3 - (x - 1)^2$.

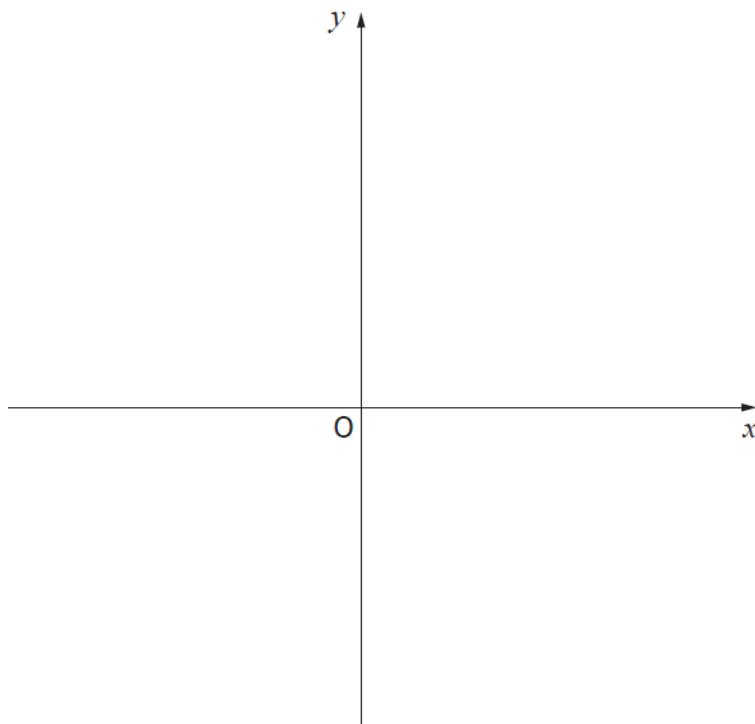
(a) State the axis of symmetry of the parabola.

1

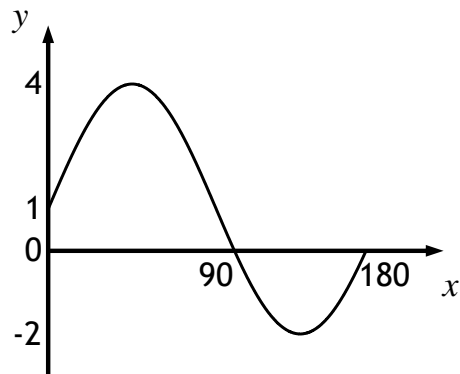
(b) Sketch the graph of $y = 3 - (x - 1)^2$.

On your diagram, show clearly the coordinates of the turning point and the point of intersection with the y -axis.

3



11. Part of the graph of $y = a \sin bx^\circ + c$ is shown.



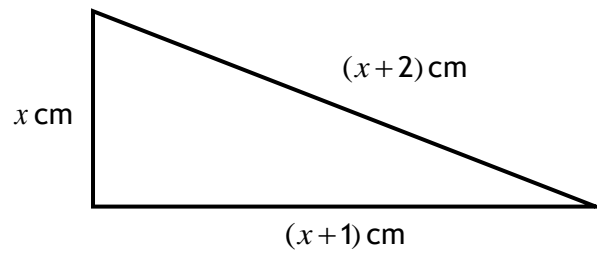
State the values of a , b and c .

3

12. Evaluate $125^{\frac{2}{3}}$.

2

13. A right-angled triangle has dimensions x centimetres, $(x+1)$ centimetres and $(x+2)$ centimetres as shown in the diagram below.



Find the value of x .

5