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CANDIDATE NAME

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MATHEMATICS **0580/22**

Paper 2 Non-calculator (Extended) **February/March 2025**

2 hours

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- Calculators must **not** be used in this paper.
- You may use tracing paper.
- You must show all necessary working clearly.

INFORMATION

- The total mark for this paper is 100.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages.

[Turn over

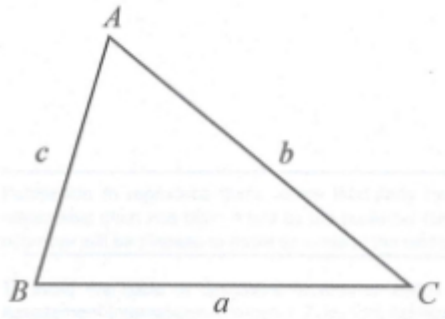
List of formulas

Area, A, of triangle, base b, height h.	$A = \frac{1}{2}bh$
Area, A, of circle of radius r.	$A = \pi r^2$
Circumference, C, of circle of radius r.	$C = 2\pi r$
Curved surface area, A, of cylinder of radius r, height h.	$A = 2\pi rh$
Curved surface area, A, of cone of radius r, sloping edge l.	$A = \pi rl$
Surface area, A, of sphere of radius r.	$A = 4\pi r^2$
Volume, V, of prism, cross-sectional area A, length l.	$V = Al$
Volume, V, of pyramid, base area A, height h.	$V = \frac{1}{3}Ah$
Volume, V, of cylinder of radius r, height h.	$V = \pi r^2 h$
Volume, V, of cone of radius r, height h.	$V = \frac{1}{3}\pi r^2 h$
Volume, V, of sphere of radius r.	$V = \frac{4}{3}\pi r^3$

For the equation $ax^2 + bx + c = 0$, where $a \neq 0$,

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

For the triangle shown,



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

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$\text{Area} = \frac{1}{2}ab\sin C$$

Calculators must **not** be used in this paper.

1 Oranges cost 220 rupees per kilogram.

Work out the cost of 9 kg of these oranges.

..... rupees [1]

2 Aryan goes on a journey.
He leaves home at 11 40 and arrives at 14 18.

Find how many hours and minutes the journey took.

..... h ..... min [1]

3 A quadrilateral has one line of symmetry.
The diagonals of the quadrilateral cross at right angles.

Write down the mathematical name of the quadrilateral.

..... [1]

4 $V = 4mp^2$

(a) Find V when $m = 10$ and $p = -3$.

$V =$ ..... [2]

(b) Find the positive value of p when $V = 3200$ and $m = 2$.

$p =$ ..... [2]

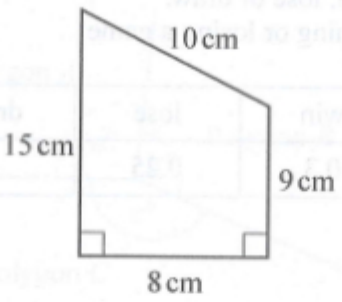
5 Write these lengths in order of size, starting with the smallest.

0.03 m 2.9 cm 32 mm 0.000 02 km

smallest

..... , ... , ... , ... [2]

6

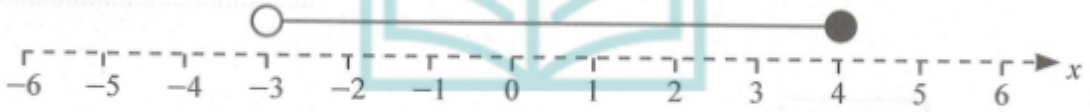


NOT TO SCALE

Work out the area of the trapezium.

..... cm^2 [2]

7



Write down the inequality for x represented on the number line.

.....

[2]

8 Pryanka plays a game in which she can win, lose or draw.
The table shows the probability of her winning or losing a game.

Result of game	win	lose	draw
Probability	0.3	0.25	

(a) Complete the table. [2]

(b) Pryanka plays this game 120 times.

Work out the expected number of games she wins.

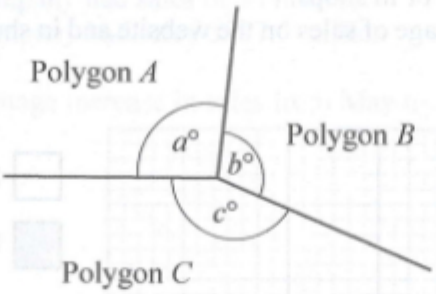
..... [1]

9 $$D = \sqrt{\frac{1.95 \times 9.92^2}{8.07}}$$

By writing each number correct to 1 significant figure, work out an estimate for D.

$D =$ ..... [3]

10

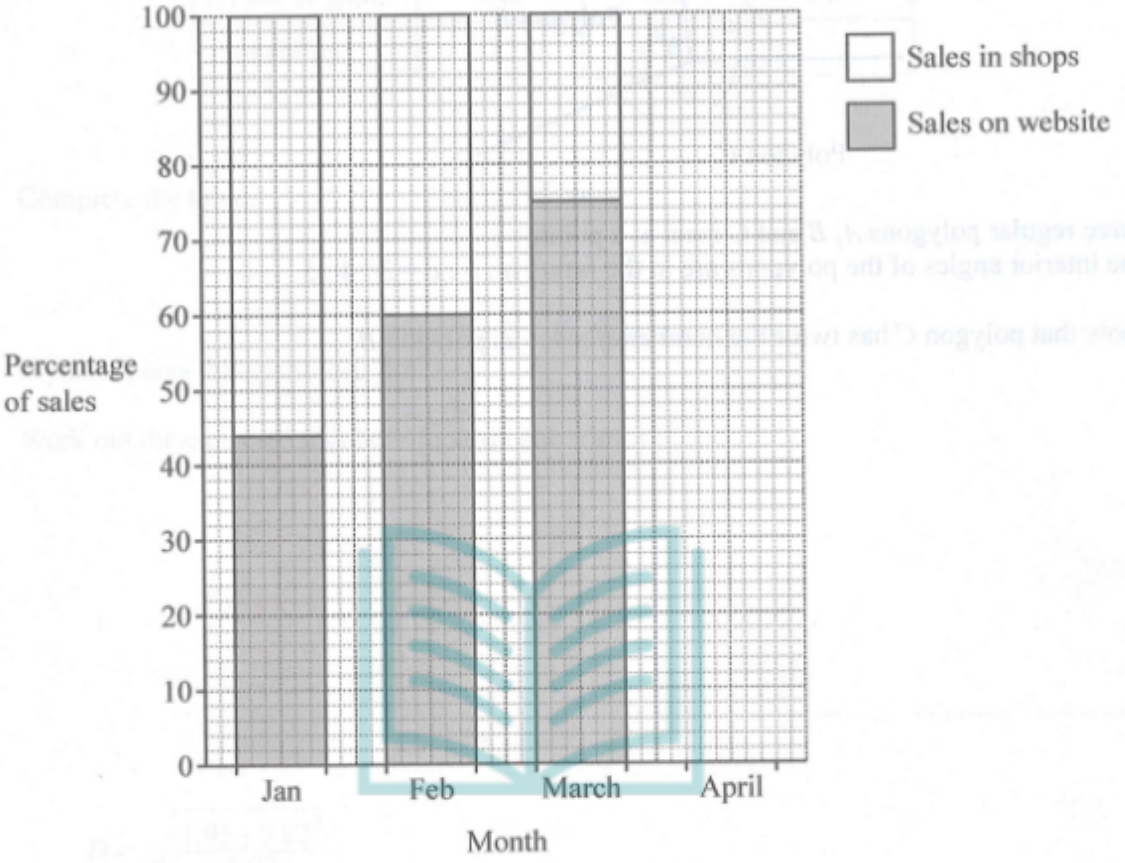


Three regular polygons A, B and C meet at a point.
The interior angles of the polygons are in the ratio $a : b : c = 3 : 4 : 5$.

Show that polygon C has twice the number of sides as polygon B.

[5]

11 A company sells items either on a website or in shops.
The composite bar chart shows the percentage of sales on the website and in shops for January, February and March.



(a) In April, $\frac{17}{20}$ of the company's sales were on the website.

On the grid, draw the bar for April. [2]

(b) In February, the company had sales of $3.5 million.

Work out the value of sales **in shops** in February.

$ ..... million [3]

(c) In May, the company had sales of \$6 million.
In June, the company had sales of \$7.5 million.

Find the percentage increase in sales from May to June.

..... % [3]

(d) In 2024, the company had total sales of \$52 million.
This was an increase of 30% on the total sales for 2023.

Work out the total sales in 2023.

\$ ..... million [2]

12 **(a)** Write as a single fraction in its simplest form.

$$\frac{x}{4}+\frac{3x}{8}-\frac{x+2}{12}$$

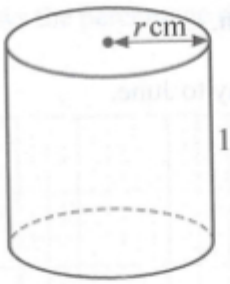
..... [3]

(b) Factorise.

$$3x(a+4y)-ay-4y^2$$

..... [1]

13



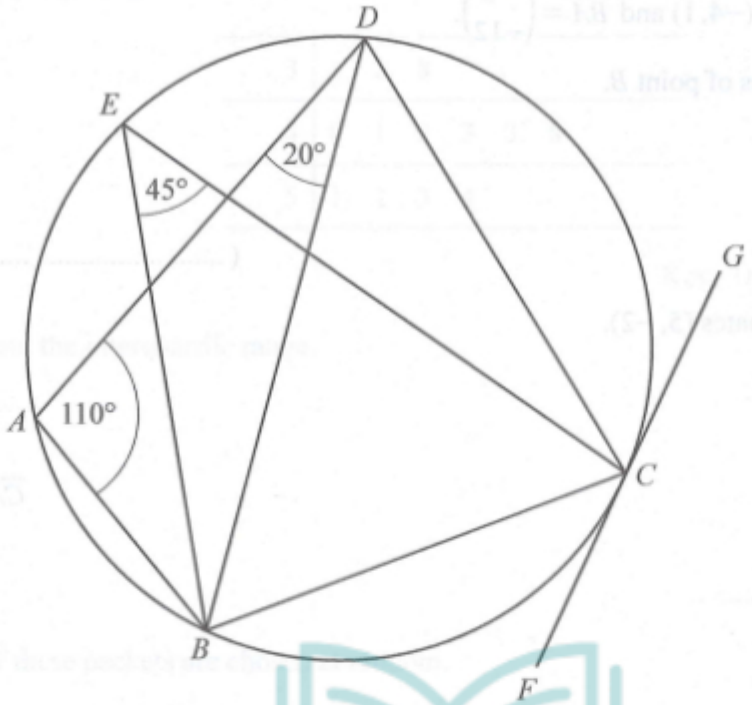
NOT TO SCALE

The diagram shows a cylinder with radius r cm and height 16 cm.
A sphere has radius 3 cm.
The volume of the cylinder is equal to the volume of the sphere.

Find the value of r.

$r =$ ..... [4]

14



NOT TO SCALE

A, B, C, D and E lie on a circle.
FG is a tangent to the circle at C.
Angle $BAD = 110°$, angle $ADB = 20°$ and angle $BEC = 45°$.

(a) Find angle BCD.
Give a geometrical reason for your answer.

Angle BCD = ... because .....

..... [2]

(b) (i) Find angle DBC.

Angle DBC = ... [2]

(ii) Find angle DCG.

Angle DCG = ... [1]

15 Point A has coordinates $(-4, 1)$ and $\overrightarrow{BA} = \begin{pmatrix} -5 \\ -12 \end{pmatrix}$.

(a) Find the coordinates of point B.

(....., ...) [2]

(b) Point C has coordinates $(5, -2)$.

Find the vector $\overrightarrow{CA}$.

$\overrightarrow{CA} = \begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [2]

(c) $\overrightarrow{EF} = 3\overrightarrow{BA}$

Find $|\overrightarrow{EF}|$.

..... [3]

16 The stem-and-leaf diagram shows the mass of each of 13 packets.

3	1 2 8
4	0 1 2 3 3 8
5	1 2 3 4

Key: 3| 1 represents 31 g

(a) Work out the interquartile range.

..... g [3]

(b) Two of these packets are chosen at random.

Find the probability that the one packet has a mass of more than 50 g and the other packet has a mass of less than 50 g.

..... [3]

17 Work out.

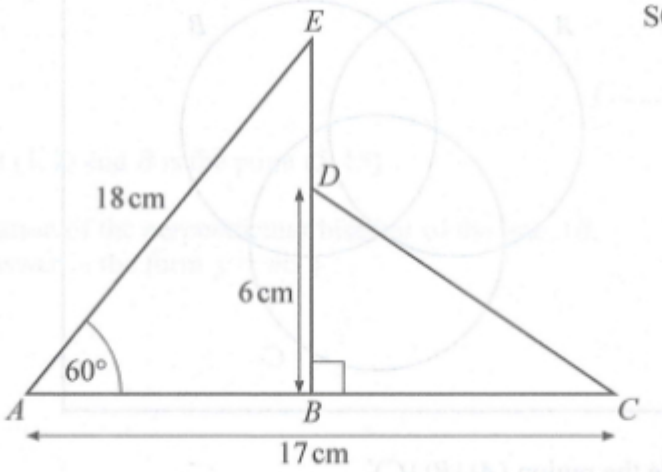
$$\frac{5}{9} + 0.2\dot{8}$$

Give your answer as a fraction in its simplest form.

..... [4]

18

NOT TO SCALE



The quadrilateral $ACDE$ is formed by two right-angled triangles ABE and BCD.
$AC = 17$ cm, $AE = 18$ cm and $BD = 6$ cm.

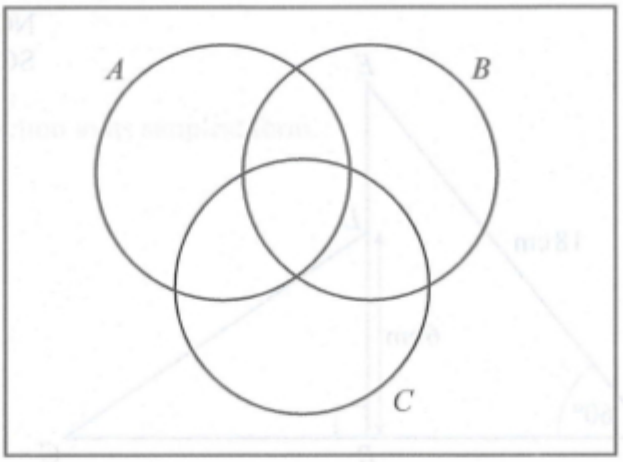
(a) Show that $CD = 10$ cm.

[5]

(b) Find the perimeter of the quadrilateral $ACDE$.
Give your answer in the form $p + k\sqrt{q}$.

..... cm [4]

19



In the Venn diagram, shade the region $(A \cup B \cup C)'$. [1]

20 **(a)** Simplify.

$$\sqrt{300} + \sqrt{48}$$

..... [2]

(b) Rationalise the denominator and simplify.

$$\frac{9}{2+\sqrt{7}}$$

..... [3]

21 **(a)** Write down the coordinates of the point where the graph of $y = 5x - 3$ crosses the y – axis.

(....., ...) [1]

(b) A is the point $(1, 7)$ and B is the point $(5, 15)$.

Find the equation of the perpendicular bisector of the line AB.
Give your answer in the form $y = mx + c$.

$y =$ ..... [5]

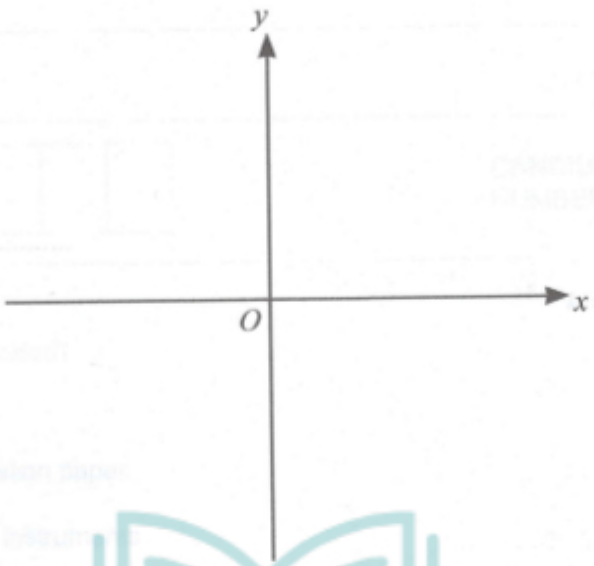
22 A curve has equation $y = x^3 + x^2 - x$.

The curve has a stationary point at $\left(\frac{1}{3}, -\frac{5}{27}\right)$.

(a) Find the coordinates of the other stationary point.

(....., ...) [5]

(b) By sketching the graph of $y = x^3 + x^2 - x$, determine whether the stationary point $\left(\frac{1}{3}, -\frac{5}{27}\right)$ is a maximum or a minimum.



$\left(\frac{1}{3}, -\frac{5}{27}\right)$ is a ..... [2]

(c) The equation $x^3 + x^2 - x = k$ has fewer than 3 solutions.

Find the range of possible values for k.

..... [2]

Question 23 is printed on the next page.

23 **(a)** Simplify $\left(\frac{x^2}{4}\right)^{\frac{3}{2}}$.

..... [2]

(b) $16^x \times \left(\frac{1}{2}\right)^x = 4^{x+3}$

Find the value of x.

$x =$ ..... [4]