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MATHEMATICS

0580/21

Paper 2 Non-calculator (Extended)

October/November 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 **16** pages.

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 .

$$V = \frac{1}{3}\pi r^2 h$$

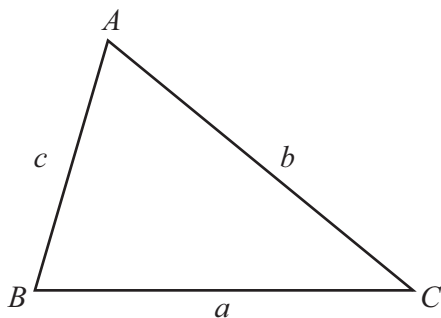
Volume, V , of sphere of radius r .

$$V = \frac{4}{3}\pi r^3$$

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,



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

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

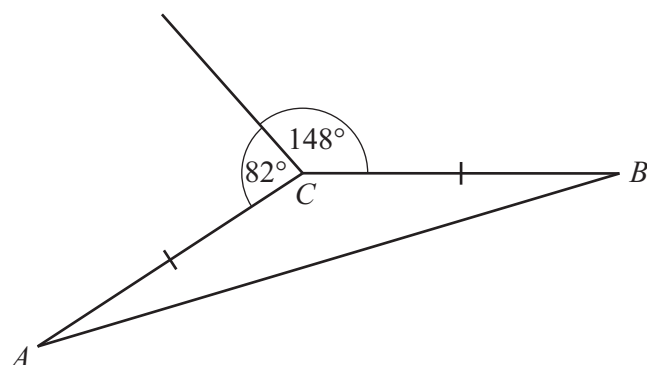
$$\text{Area} = \frac{1}{2}ab \sin C$$

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

- 1 Divide \$90 in the ratio 2 : 3.

\$, \$ [2]

2



NOT TO
SCALE

In the diagram, $AC = BC$.

Work out angle CAB .

Angle $CAB =$ [3]

- 3 Find the interior angle of a regular 20-sided polygon.

..... [2]

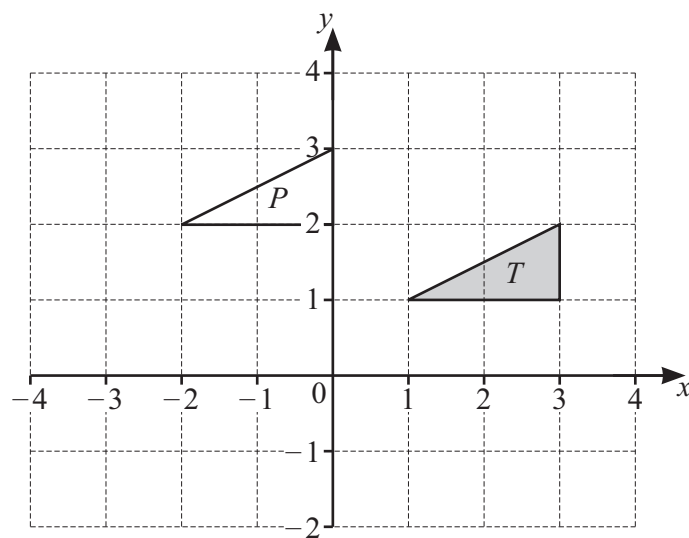


- 4 The area of a triangle is 12 cm^2 .
The length of the base of the triangle is 8 cm.

Work out the height of the triangle.

..... cm [2]

5



- (a) Describe fully the **single** transformation that maps triangle T onto triangle P .

..... [2]

- (b) Draw the image of triangle T after an enlargement of scale factor 2, centre $(3, 3)$. [2]

- 6 Find the value of

(a) $5^{-5} \times 5^5$

..... [1]

(b) $125^{\frac{2}{3}}$.

..... [2]



7 Simplify.

(a) $\frac{p}{t} \div \frac{2}{t}$

..... [2]

(b) $\frac{3x}{4} - \frac{x-1}{2}$

..... [2]

- 8 The cost of one orange is t cents.
The cost of one apple is w cents.

The total cost of 3 oranges and 1 apple is 51 cents.
The total cost of 6 oranges and 5 apples is 129 cents.

Use simultaneous equations to find the value of t and the value of w .
You must show all your working.

$t =$

$w =$

[5]



- 9 Nina walks at an average speed of 5 km/h, correct to the nearest km/h. She walks for exactly 2 hours.

Work out the lower bound for the distance Nina walks.

..... km [2]

- 10 $\mathcal{C} = \{n: n \text{ is an integer and } 1 \leq n \leq 8\}$
 $A = \{\text{factors of } 12\}$
 $B = \{\text{odd numbers}\}$

Find

(a) $A \cap B$

$A \cap B = \{\dots\dots\dots\}$ [1]

(b) $n(A' \cup B)$.

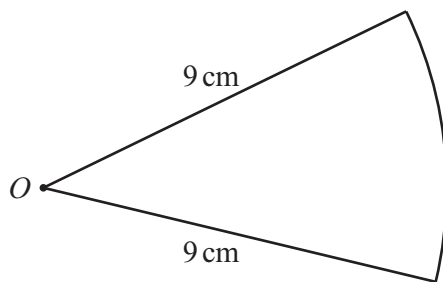
..... [1]

- 11 Write $0.\dot{2}\dot{4}$ as a fraction in its simplest form.

..... [2]



- 12 The diagram shows a sector of a circle with centre O and radius 9 cm.



NOT TO
SCALE

The perimeter of the sector is $(18 + 2\pi)$ cm.

Find the area of the sector.

Give your answer in terms of π .

..... cm^2 [4]

- 13 These are Rahul's 10 test scores.

9 8 9 10 7 x 9 9 x 7

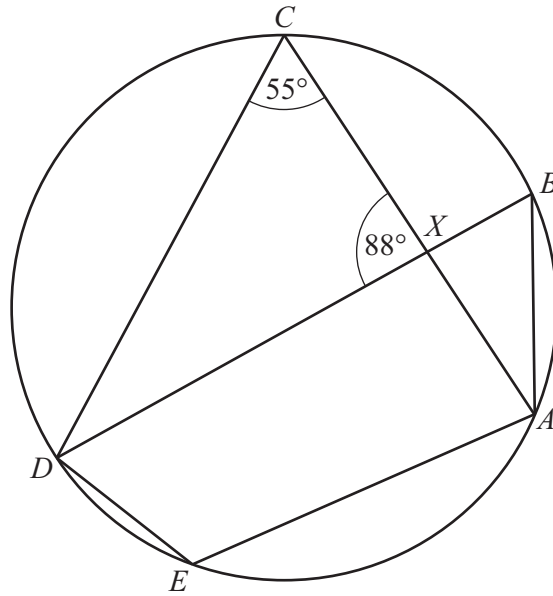
The mean of these scores is 8.

Find the interquartile range.

You must show all your working.

..... [4]





NOT TO
SCALE

A, B, C, D and E lie on the circle.
 AC and BD intersect at X .
 Angle $ACD = 55^\circ$ and angle $CXD = 88^\circ$.

(a) Complete the statements, giving a geometrical reason in each part.

Angle $CDB = \dots\dots\dots$ because $\dots\dots\dots$
 $\dots\dots\dots$

Angle $ABD = \dots\dots\dots$ because $\dots\dots\dots$
 $\dots\dots\dots$

Angle $AED = \dots\dots\dots$ because $\dots\dots\dots$
 $\dots\dots\dots$

[6]



- (b) Triangle CXD is mathematically similar to triangle BXA .
 $DX = 8.0$ cm, $BX = 2.7$ cm and $AX = 4.0$ cm.

(i) Work out the length of CX .

$CX = \dots\dots\dots$ cm [2]

(ii) Complete the statement.

Area of triangle CXD : area of triangle $BXA = \dots\dots\dots : \dots\dots\dots$ [1]

- 15 (a) Write 66 000 in standard form.

$\dots\dots\dots$ [1]

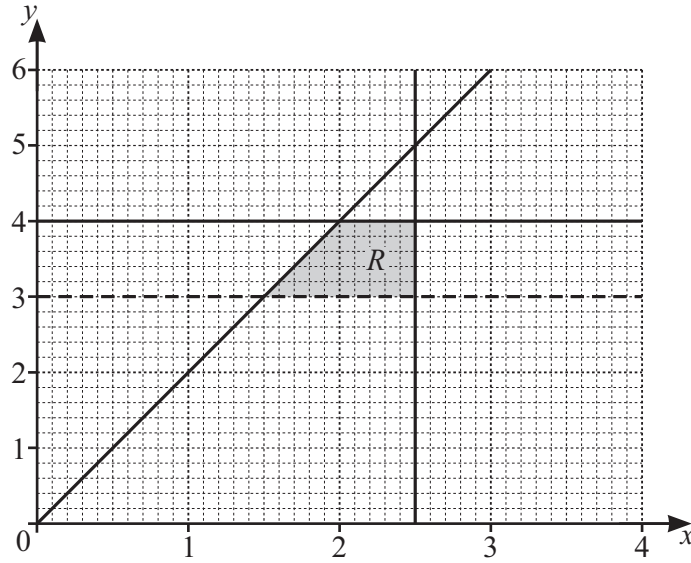
- (b) Work out $(3.7 \times 10^8) + (3.7 \times 10^7)$.

Give your answer in standard form.

$\dots\dots\dots$ [2]



16



Write down all the inequalities that define the region R .

.....

.....

.....

.....

[4]

17 $I = M(k^2 + c^2)$

(a) Find the value of I when $M = 7$, $k = 3$ and $c = 2$.

$I =$ [2]

(b) Rearrange the formula to write k in terms of I , M and c .

$k =$ [3]



18 $f(x) = 2x + 5$

$$f(x)f(x) - ff(x) = ax^2 + bc + c$$

Find the value of a , the value of b and the value of c .

$$a = \dots\dots\dots$$

$$b = \dots\dots\dots$$

$$c = \dots\dots\dots$$

[4]

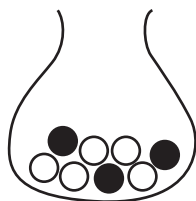
19 Solve.

$$\left(\frac{1}{3}\right)^x = 9^{x+4}$$

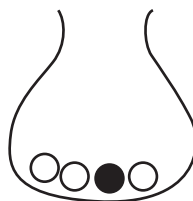
$$x = \dots\dots\dots$$

[3]





Bag A



Bag B

Bag A contains 5 white balls and 3 black balls.
Bag B contains 3 white balls and 1 black ball.

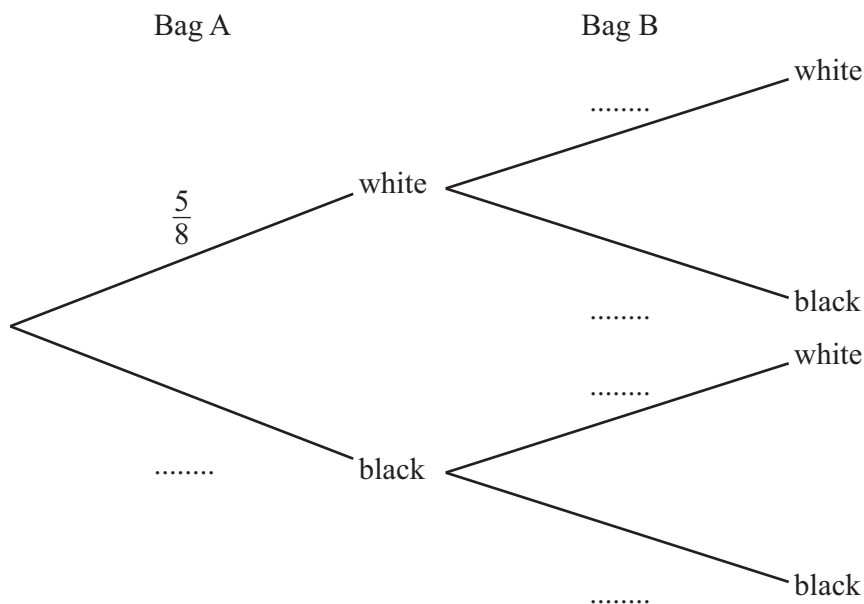
- (a) Two balls are picked at random from bag B without replacement.

Find the probability that both balls are black.

..... [1]

- (b) The balls are replaced into bag B.
Kyle picks a ball at random from each bag.

- (i) Complete the tree diagram.



[2]

- (ii) Find the probability that the two balls are the same colour.

..... [3]





- (c) The balls are replaced into their bags.
Jo picks a ball at random from bag A and places it into bag B.
She then picks a ball at random from bag B.

Find the probability that she picks a black ball from bag B.

..... [3]





21 (a) $(3 - \sqrt{5})(2 + 3\sqrt{5}) = a + b\sqrt{5}$

Find the value of a and the value of b .

$a = \dots\dots\dots$

$b = \dots\dots\dots$

[2]

- (b) Rationalise the denominator.
Write your answer in its simplest form.

$$\frac{6}{\sqrt{2}}$$

$\dots\dots\dots$ [2]

22 Solve.

$$\frac{2}{x-1} = \frac{x}{x+2}$$

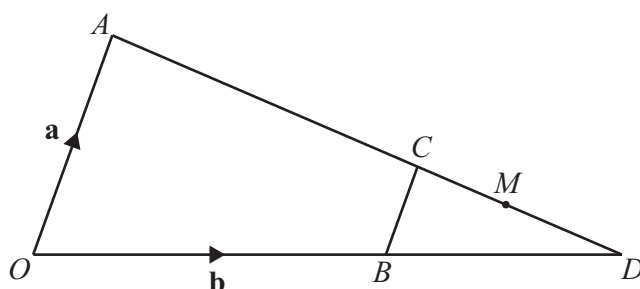
$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [5]



- 23 Find the coordinates of the turning point on the graph of $y = 7 - 2x - x^2$.

(..... ,) [4]

24



NOT TO
SCALE

In the diagram, OBD and ACD are straight lines.

O is the origin, the position vector of A is $\mathbf{a}$ and the position vector of B is $\mathbf{b}$.

$$\overrightarrow{BC} = \frac{1}{3} \overrightarrow{OA}$$

M is the midpoint of CD .

Find the position vector of M .

Give your answer in terms of $\mathbf{a}$ and $\mathbf{b}$, in its simplest form.

..... [4]

Questions 25 and 26 are printed on the next page.



25 Simplify.

$$\frac{10ax + 6bx - 25a - 15b}{4x^2 - 25}$$

..... [4]

26 Solve $\tan x = -\frac{1}{\sqrt{3}}$ for $0^\circ \leq x \leq 360^\circ$.

$x = \dots\dots\dots$, $x = \dots\dots\dots$ [3]

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