GradeMax

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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.

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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. $V = \frac{1}{3}Ah$

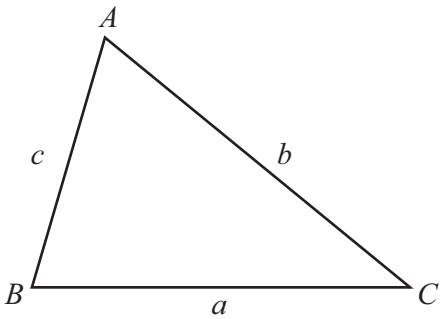
Volume, V, of cylinder of radius r, height h. $V = \pi r^2 h$

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,



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

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

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

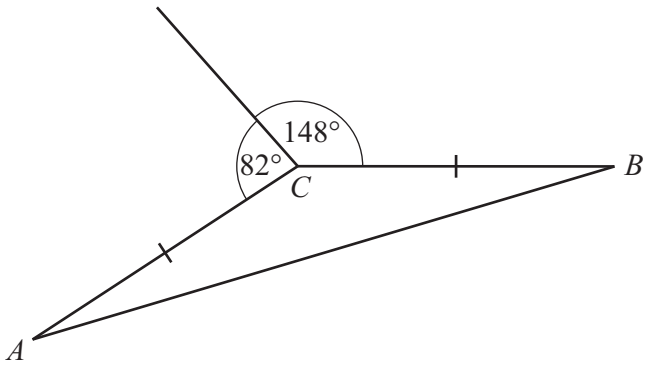
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1 Divide \$90 in the ratio 2 : 3.

\$ ..... , \$ ..... [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]

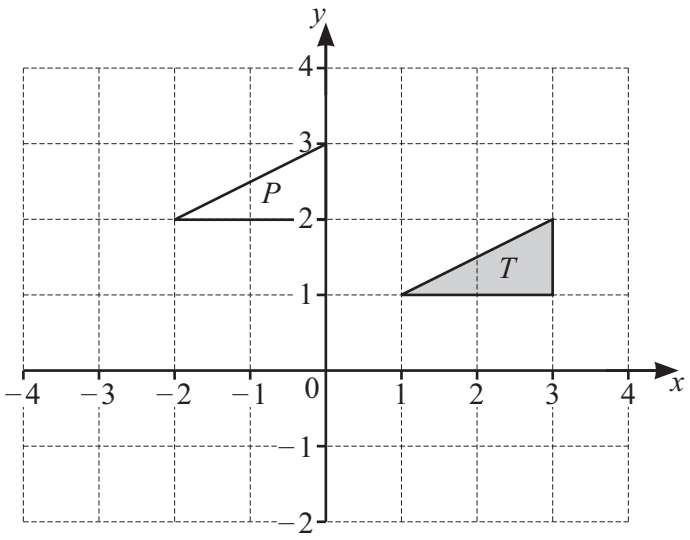
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4 The area of a triangle is $12\,\text{cm}^2$.
The length of the base of the triangle is 8 cm.

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]

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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]

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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 $\mathscr{E} = \{n: n \text{ is an integer and } 1 \leqslant n \leqslant 8\}$
$A = \{\text{factors of } 12\}$
$B = \{\text{odd numbers}\}$

Find

(a) $A \cap B$

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

(b) $\text{n}(A' \cup B)$.

..... [1]

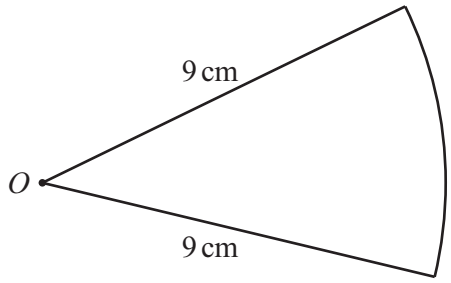
11 Write $0.\dot{2}\dot{4}$ as a fraction in its simplest form.

..... [2]

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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

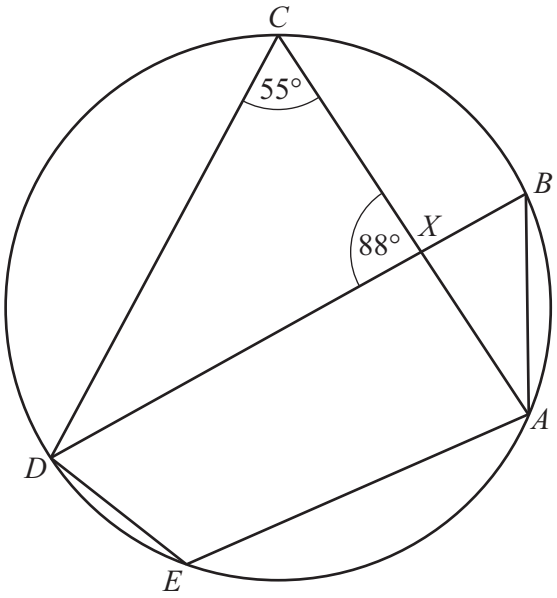
The mean of these scores is 8.

Find the interquartile range.
You must show all your working.

..... [4]

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14



NOT TO SCALE

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

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

Angle CDB = ... because .....

.....

Angle ABD = ... because .....

.....

Angle AED = ... because .....

.....

[6]

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(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.

$CX =$ ..... cm [2]

(ii) Complete the statement.

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

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

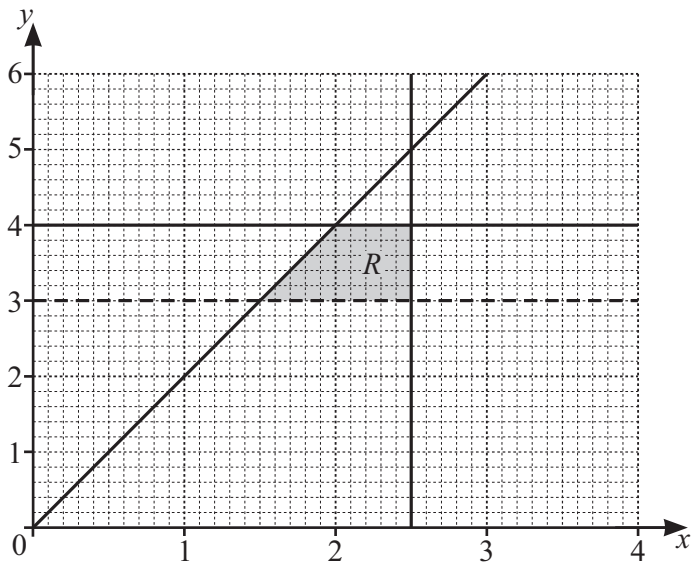
..... [1]

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

Give your answer in standard form.

..... [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]

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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.

$a =$ .....

$b =$ .....

$c =$ .....

[4]

19 Solve.

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

$x =$ ..... [3]

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20



Bag A Bag B

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

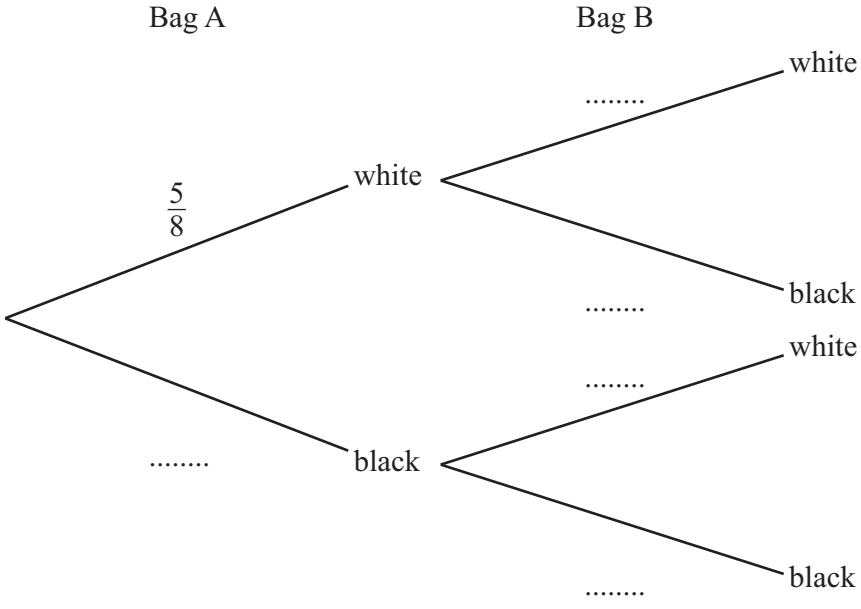
(a) Two balls are picked at random from bag B without replacement.

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]

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(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]

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

Find the value of a and the value of b.

$a =$ .....

$b =$ .....

[2]

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

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

..... [2]

22 Solve.

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

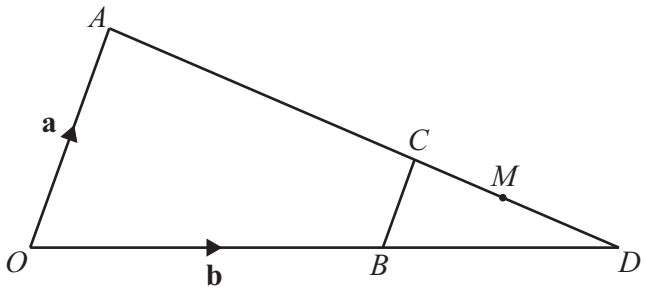
$x =$ ..... or $x =$ ..... [5]

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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 **a** and the position vector of B is **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 **a** and **b**, in its simplest form.

..... [4]

Questions 25 and 26 are printed on the next page.

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25 Simplify.

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

..... [4]

26 Solve $\tan x = -\frac{1}{\sqrt{3}}$ for $0° \leqslant x \leqslant 360°$.

$x =$ ..... , $x =$ ..... [3]

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