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1575869511

MATHEMATICS **0580/23**

Paper 2 Non-calculator (Extended) **May/June 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 [ ].

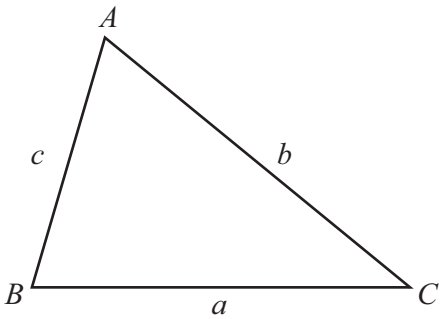
This document has **16** pages.

[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,



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

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

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

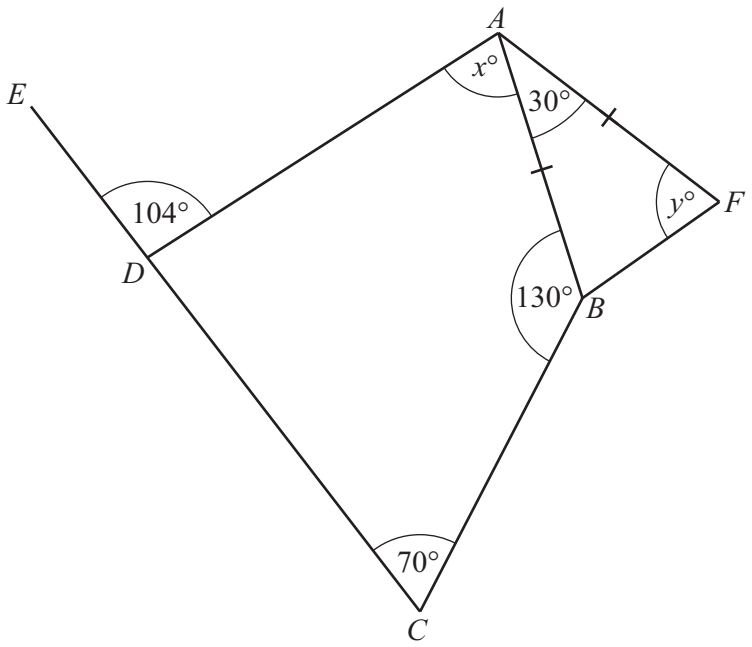
Calculators must **not** be used in this paper.

1 The probability of picking a green pen from a box is 0.17 .

Find the probability of not picking a green pen from the box.

..... [1]

2



NOT TO SCALE

ABCD is a quadrilateral.
CDE is a straight line.
AFB is an isosceles triangle.

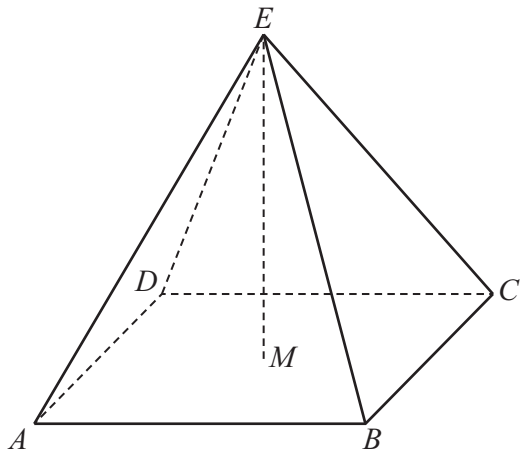
Find the value of x and the value of y.

$x =$ .....

$y =$ .....

[4]

3



NOT TO SCALE

The diagram shows a pyramid *ABCDE* with a square base.
M is the centre of the square base.
E is vertically above *M*.

(a) Write down the number of planes of symmetry of this pyramid.

..... [1]

(b) Using two of the letters from *A*, *B*, *C*, *D*, *E* and *M*, complete the statement about the pyramid.

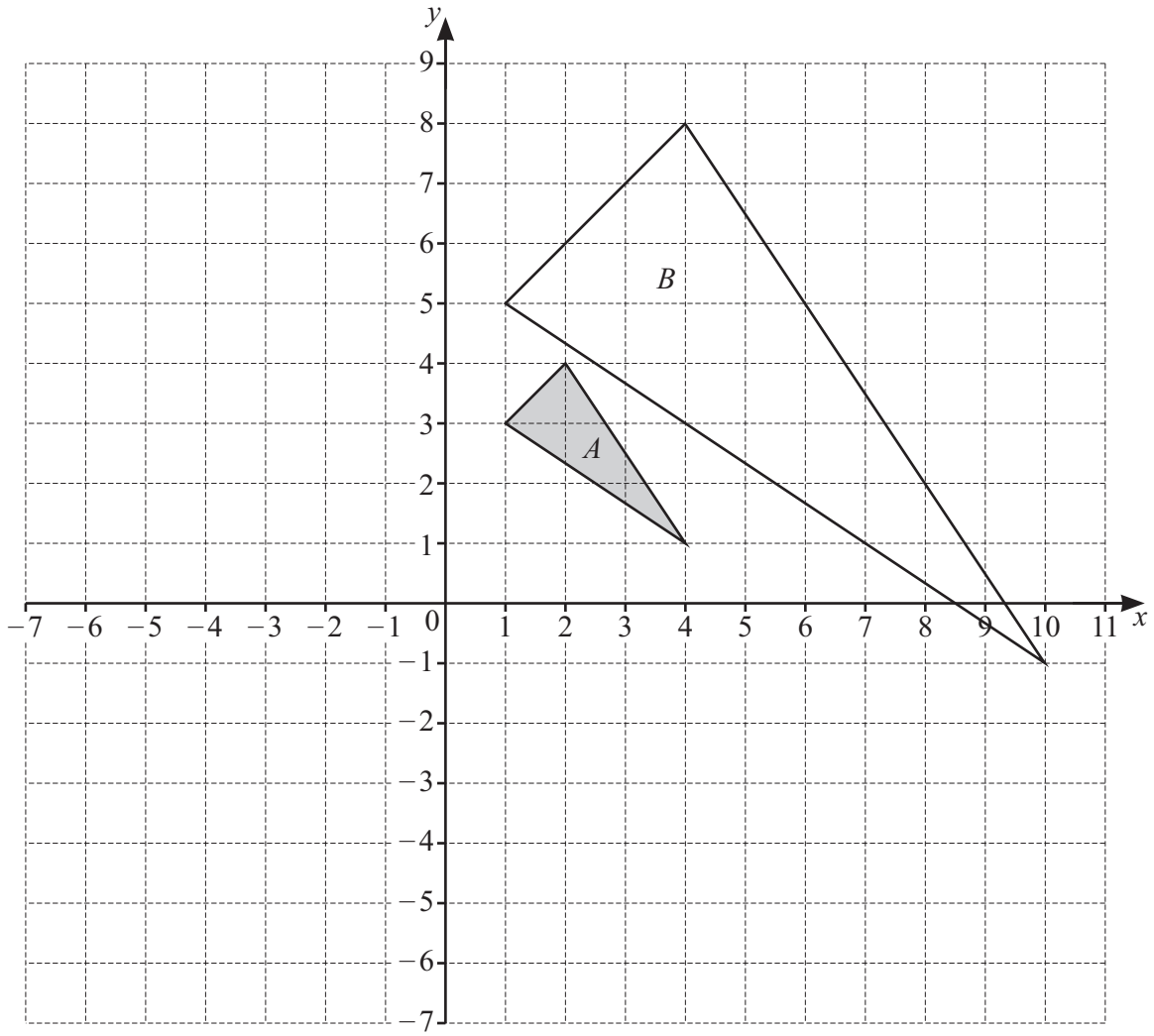
The axis of rotational symmetry passes through the points ..... and ..... [1]

4 The number of ice creams sold increases as the temperature rises.

What type of correlation does this statement describe?

..... [1]

5



(a) Describe fully the **single** transformation that maps triangle A onto triangle B.

.....

..... [3]

(b) On the grid, draw the image of

(i) triangle A after a reflection in the line $x = -1$ [2]

(ii) triangle A after a rotation 90° clockwise, centre $(1, -2)$. [2]

6 There are 15 giraffes in a group.
The table gives information about the heights of the 15 giraffes.

One giraffe has a height of 2.6 m
No giraffe is shorter than 2.5 m
The range of heights for the 15 giraffes is 2.3 m
More than 3 giraffes have the same height
The modal height for the giraffes is 3.9 m

The stem-and-leaf diagram shows information about the height of 9 of these giraffes.

2	5
3	2 7 7
4	1 1 4 5 7

Key: 4|1 represents a giraffe height of 4.1 m

Use the information in the table to complete the stem-and-leaf diagram for the group of 15 giraffes.

[3]

7 Work out.

(a) $\frac{5}{6} - \frac{7}{12}$

Give your answer as a fraction in its simplest form.

..... [2]

(b) $1\frac{1}{3} \div \frac{8}{15}$

Give your answer as a mixed number in its simplest form.

..... [3]

8 **(a)** Write 42 as a product of its prime factors.

..... [2]

(b) Find the highest common factor (HCF) of 84 and 70.

..... [2]

9 **(a)** Solve.

$$5x^2 = 12 - 17x$$

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

(b) $ax^2 + a = b$ where a and b are integers.

One solution of this equation is $x = 6$.

Write down the other solution.

$x =$ ..... [1]

10 Solve the simultaneous equations.

$$4x - 5y = 13$$
$$3x - 2y = 8$$

$x =$ .....

$y =$ .....

[4]

11 Angela picks a number at random from the numbers 1, 2 and 3.
She then picks a number at random from the numbers 4, 5 and 6.
She adds the two numbers to find the total.

(a) Complete the table to show the possible outcomes.

		First number		
	+	1	2	3
Second number	4	5	6	7
	5			
	6			

[2]

(b) Given that the total is odd, find the probability that one of the numbers Angela picks is 3.

..... [2]

12 **(a)** $\mathbf{v} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$

Find $5\mathbf{v}$.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

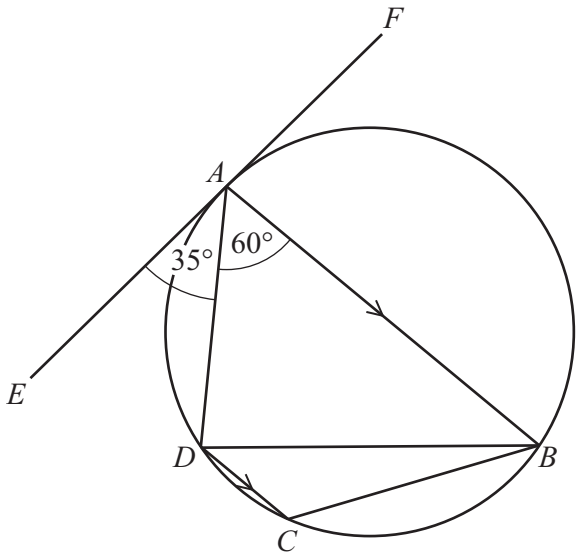
(b) H is the point $(-3, 8)$ and K is the point $(-4, 0)$.

$\overrightarrow{HJ} = \begin{pmatrix} 7 \\ -2 \end{pmatrix}$

Find $\left|\overrightarrow{JK}\right|$.

..... [4]

13



NOT TO SCALE

A, B, C and D are points on a circle.
EF is a tangent to the circle at A.
AB is parallel to DC.

(a) Find angle DCB, giving a geometrical reason.

Angle DCB = ... because .....

..... [2]

(b) Find angle DBC.

Angle DBC = ... [2]

14 Find the lowest common multiple (LCM) of $15xy^3$ and $18x^4y$.

..... [2]

15 **(a)** Simplify.

$$\sqrt{27} + \sqrt{12}$$

..... [2]

(b) $\dfrac{40\sqrt{8}}{5\sqrt{2}} = k$, where k is an integer.

Find the value of k.

$k =$ ..... [2]

(c) Rationalise the denominator.

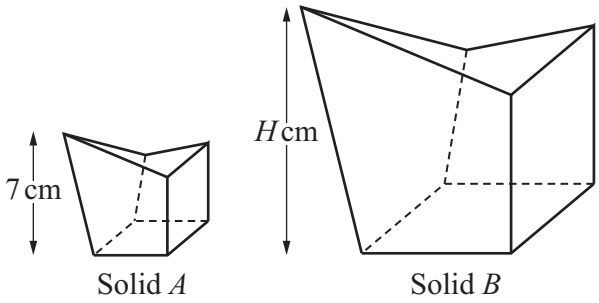
$$\frac{1}{3 - \sqrt{5}}$$

..... [2]

16 Write $0.3\dot{2}\dot{8}$ as a fraction in its simplest form.

..... [3]

17 Solid A is mathematically similar to solid B.



NOT TO SCALE

The height of solid A is 7 cm and its surface area is 60 cm^2.
The surface area of solid B is 540 cm^2.

Calculate the height of solid B.

..... cm [3]

18 Make t the subject of the formula.

$$2 = \frac{m(1-t)}{pt}$$

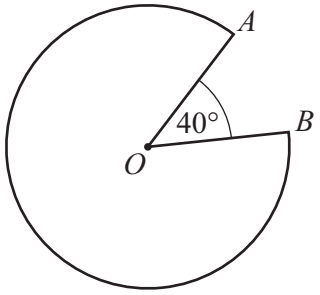
$t =$ ..... [4]

19 Simplify.

$$\frac{7x-x^2}{49-x^2}$$

..... [3]

20



NOT TO SCALE

The diagram shows a sector of a circle, centre O.
The radius of the circle is 6 cm.

Calculate the length of the major arc AB.
Give your answer in its simplest form in terms of π.

.....cm [3]

21 **(a)** Differentiate $x^3 - 3x^2 + 1$.

..... [2]

(b) Find the coordinates of the turning points of the graph of $y = x^3 - 3x^2 + 1$.

(..... , ...)

(..... , ...)

[4]

22 $f(x) = 2x + 5$ $g(x) = x - 4$ $h(x) = 5^x$

(a) Find $f(3)$.

..... [1]

(b) Find $f^{-1}(x)$.

$f^{-1}(x) =$ ..... [2]

(c) Solve $fg(x) = 25$.

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

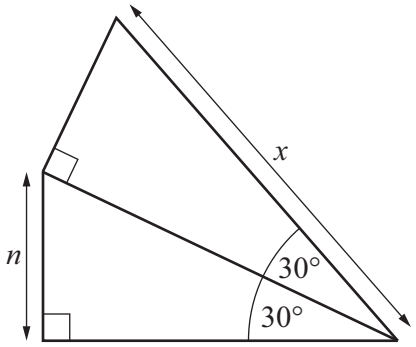
(d) Find x when $h^{-1}(x) = 2$.

$x =$ ..... [2]

23 **(a)** Write down the value of cos 90°.

..... [1]

(b)



NOT TO SCALE

The diagram shows two different right-angled triangles joined by a common side.

Find x in terms of n.

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

Question 24 is on the next page.

24 **(a)** A is the point $(a, 12)$ and B is the point $(b, 27)$.

(i) Find the y-coordinate of the midpoint of AB.

..... [1]

(ii) The line AB has gradient 3.

Find an expression for a in terms of b.

$a =$ ..... [3]

(b) D is the point $(22, 34)$ and E is the point $(23, 39)$.
D is the point on CE such that $2CE = 5DE$.

Find the coordinates of C.

(..... , ...) [3]