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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.

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 .

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

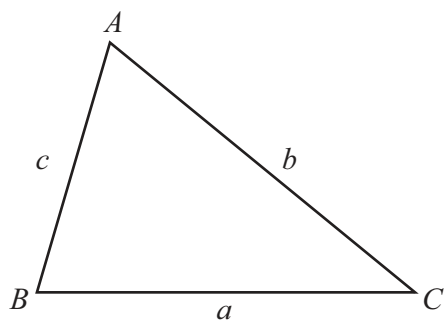
Volume, V , of sphere of radius r .

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

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,



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

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

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



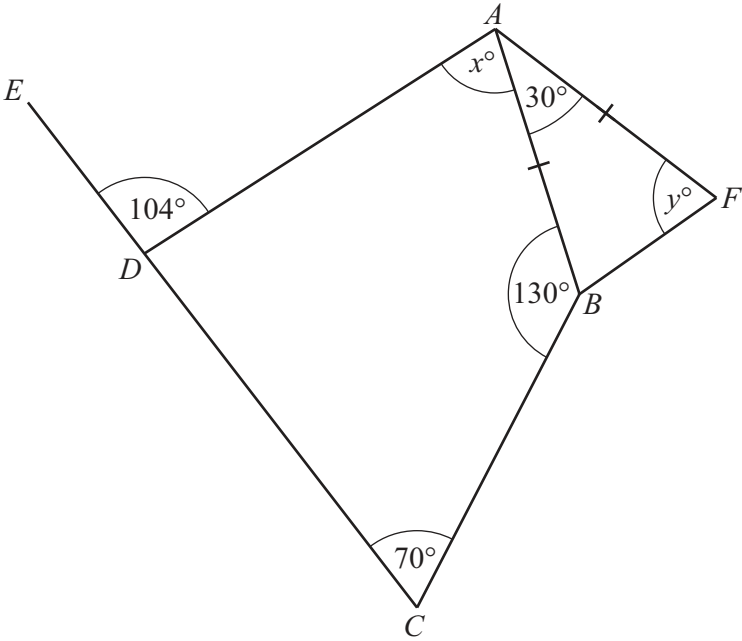
Calculators must **not** be used in this paper.

- 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



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 =

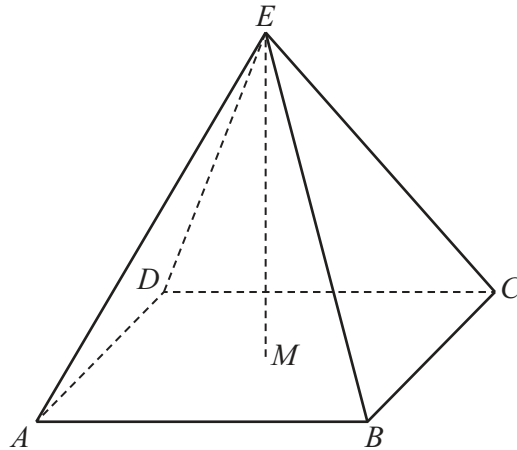
y =

[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.

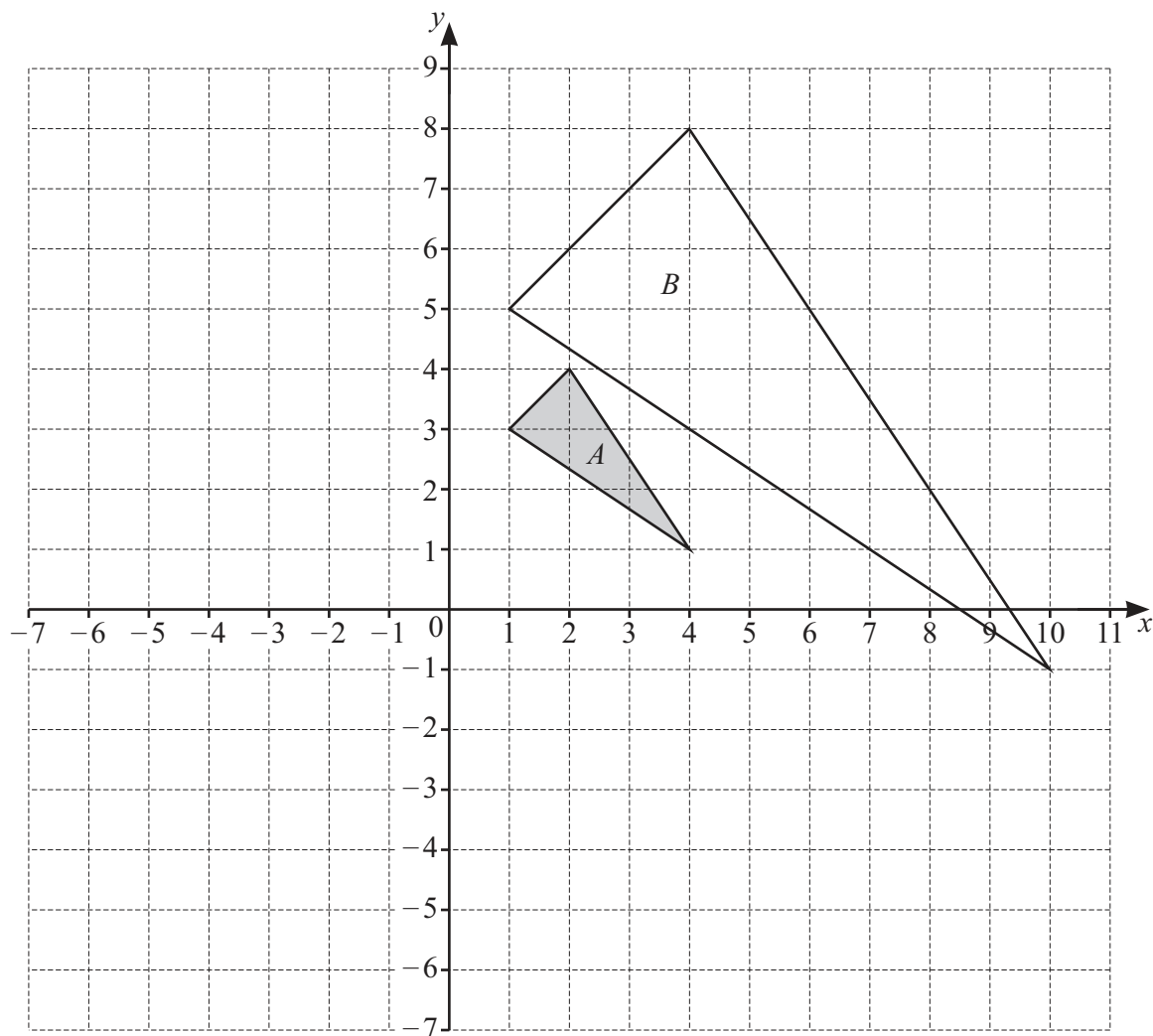
The axis of rotational symmetry passes through the points and [1]

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

What type of correlation does this statement describe?

..... [1]





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

$$x = \dots\dots\dots \text{ or } x = \dots\dots\dots [4]$$

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

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

Write down the other solution.

$$x = \dots\dots\dots [1]$$

- 10 Solve the simultaneous equations.

$$4x - 5y = 13$$

$$3x - 2y = 8$$

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

$$y = \dots\dots\dots$$

[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 $5\mathbf{v}$.

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

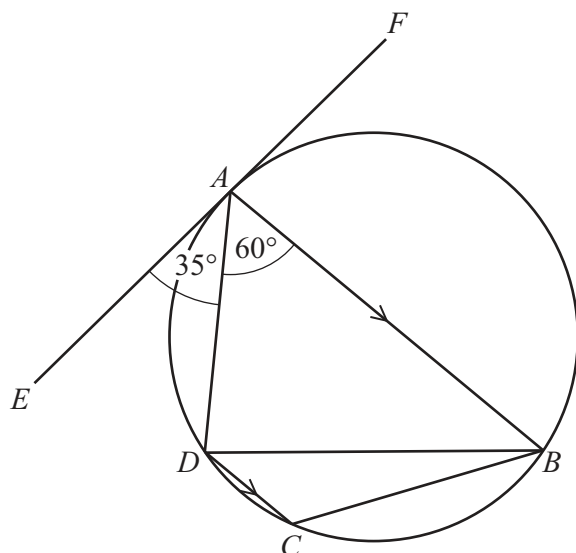
(b) H is the point $(-3, 8)$ and K is the point $(-4, 0)$.

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

Find $|\overrightarrow{JK}|$.

..... [4]





NOT TO
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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 $DCB = \dots\dots\dots$ because $\dots\dots\dots$
 $\dots\dots\dots$ [2]

(b) Find angle DBC .

Angle $DBC = \dots\dots\dots$ [2]

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

$\dots\dots\dots$ [2]





15 (a) Simplify.

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

..... [2]

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

Find the value of k .

$k =$ [2]

(c) Rationalise the denominator.

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

..... [2]

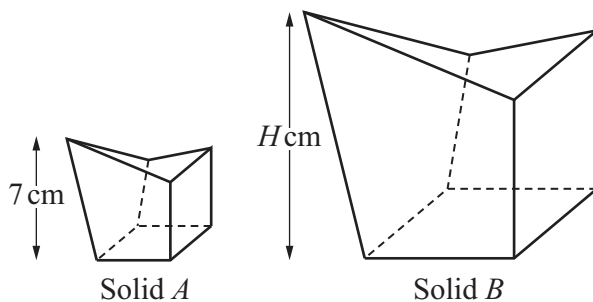
16 Write $0.3\dot{2}\dot{8}$ as a fraction in its simplest form.

..... [3]





17 Solid A is mathematically similar to solid B .



NOT TO
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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.

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

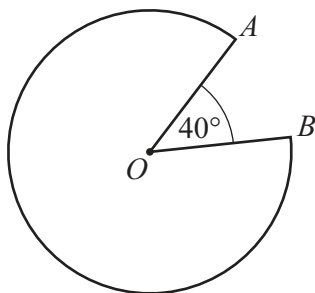
$t =$ [4]

19 Simplify.

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

..... [3]





NOT TO
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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]





14



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

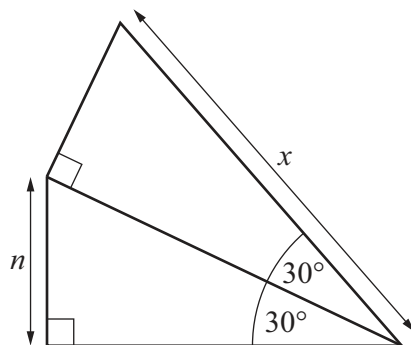
$x =$ [2]



23 (a) Write down the value of $\cos 90^\circ$.

..... [1]

(b)



NOT TO
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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]

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