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MATHEMATICS

0580/23

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 **20** pages. Any blank pages are indicated.

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 .

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

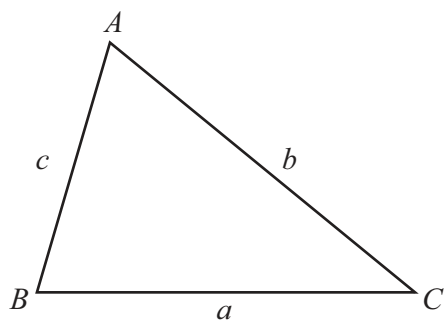
Volume, V , of sphere of radius r .

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

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,



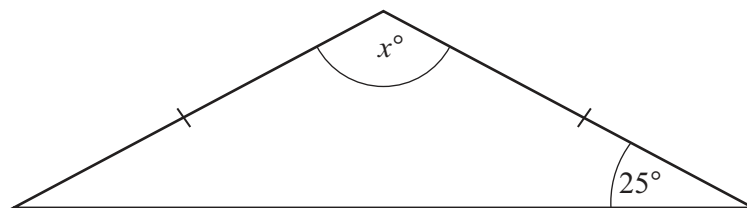
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

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

1



NOT TO
SCALE

The diagram shows an isosceles triangle.

Find the value of x .

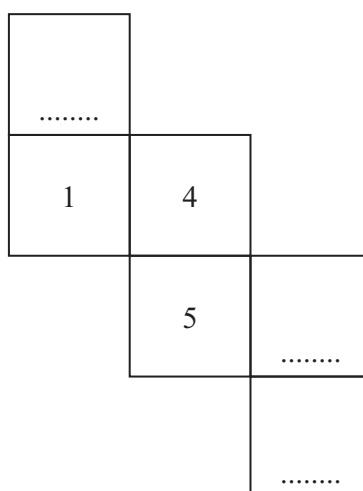
$$x = \dots\dots\dots [2]$$

- 2 Find the largest **odd** number that is a common factor of 90 and 120.

$$\dots\dots\dots [1]$$

- 3 The diagram shows a net for a dice.
The dice has six faces numbered 1 to 6.
The sum of each pair of opposite faces on the dice is 7.

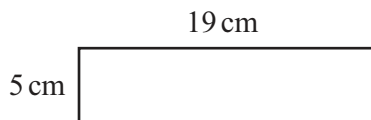
Write the missing numbers on the net.



[1]

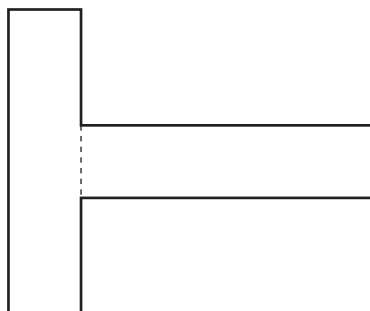


4 A rectangle measures 5 cm by 19 cm.



NOT TO
SCALE

Two of these rectangles are joined to make a shape.

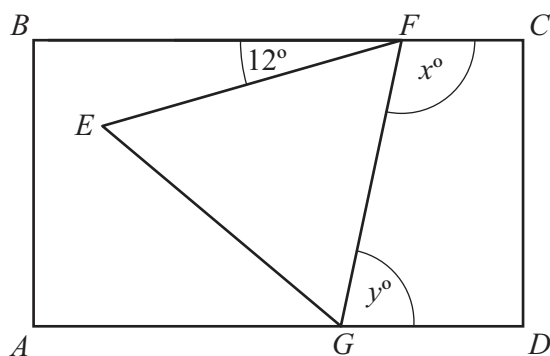


NOT TO
SCALE

Work out the perimeter of the shape.

..... cm [2]

5



NOT TO
SCALE

The diagram shows a rectangle $ABCD$.

EFG is an equilateral triangle that touches the rectangle at F and G .

Find the value of x and the value of y .

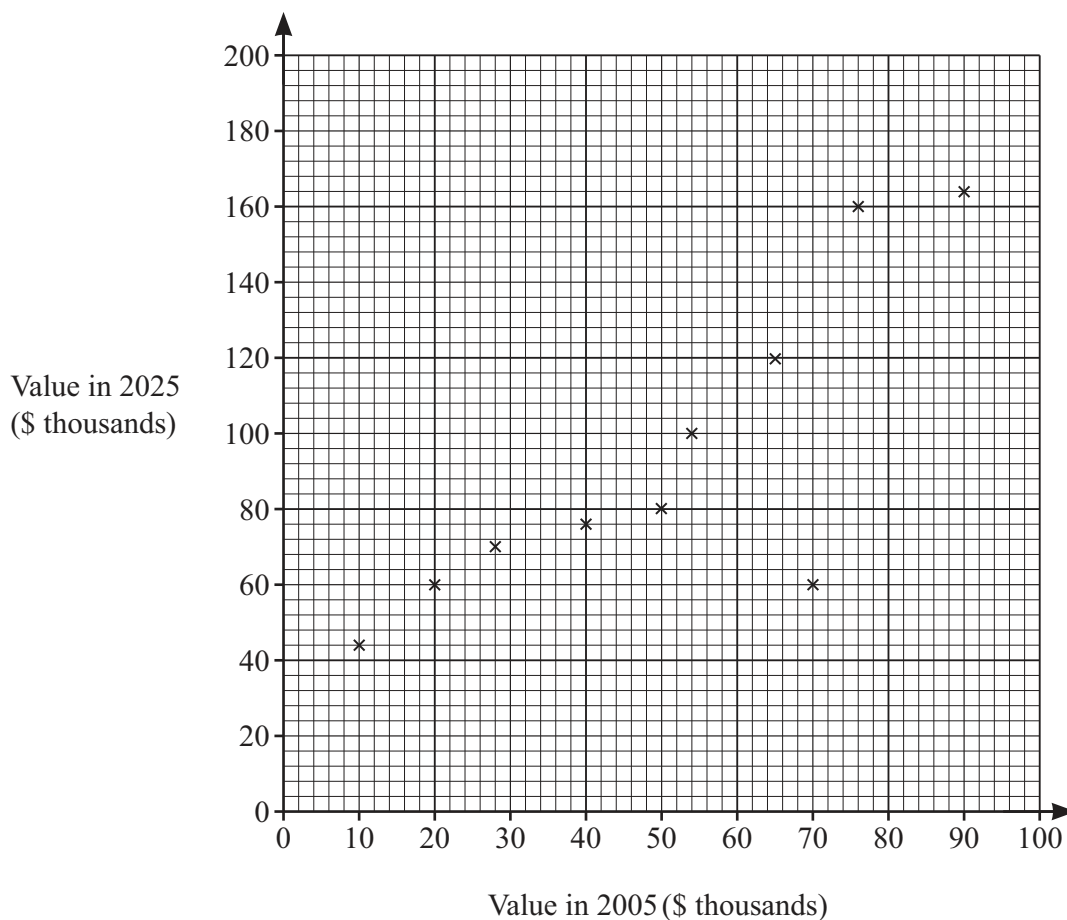
$x =$

$y =$

[2]



- 6 The scatter diagram shows the value, in thousands of dollars, of ten paintings in 2005 and the value of the same paintings in 2025.



- (a) The value of one of the paintings in 2025 is less than expected.

Draw a circle around the point that represents this painting.

[1]

- (b) Another painting had a value of \$75 000 in 2005 and \$140 000 in 2025.

On the scatter diagram, plot this point.

[1]

- (c) Write down the number of paintings with a value of less than \$53 000 in 2005.

..... [1]

- (d) What type of correlation is shown on the scatter diagram?

..... [1]



- 7 (a) The sum of all the prime numbers less than 10 is equal to 17.

Find the sum of all the prime numbers less than 16.

..... [2]

- (b) x is an integer.

The sum of the prime numbers greater than 6 and less than x is equal to 18.

Find a possible value for x .

$x =$ [1]

8 $\overrightarrow{DE} = \begin{pmatrix} 3 \\ -4 \end{pmatrix}$

- (a) Find $5\overrightarrow{DE}$.

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

- (b) Find $|\overrightarrow{DE}|$.

..... [2]

- (c) D is the point $(-2, -3)$.

Find the coordinates of the point E .

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



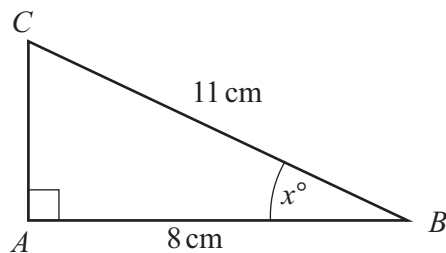
9

$$n^{15} \div n^x = n^5$$

Find the value of x .

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

10



NOT TO
SCALE

The diagram shows a right-angled triangle ABC .

(a) Work out the exact length of AC .

$$\dots\dots\dots \text{ cm } [3]$$

(b) $\cos x = k$

Write down the value of k .

$$k = \dots\dots\dots [1]$$



- 11 Sarah rolls a fair 6-sided dice twice.

Find the probability she rolls a number greater than 4 both times.

..... [2]

- 12 (a) Write down the value of 73^0 .

..... [1]

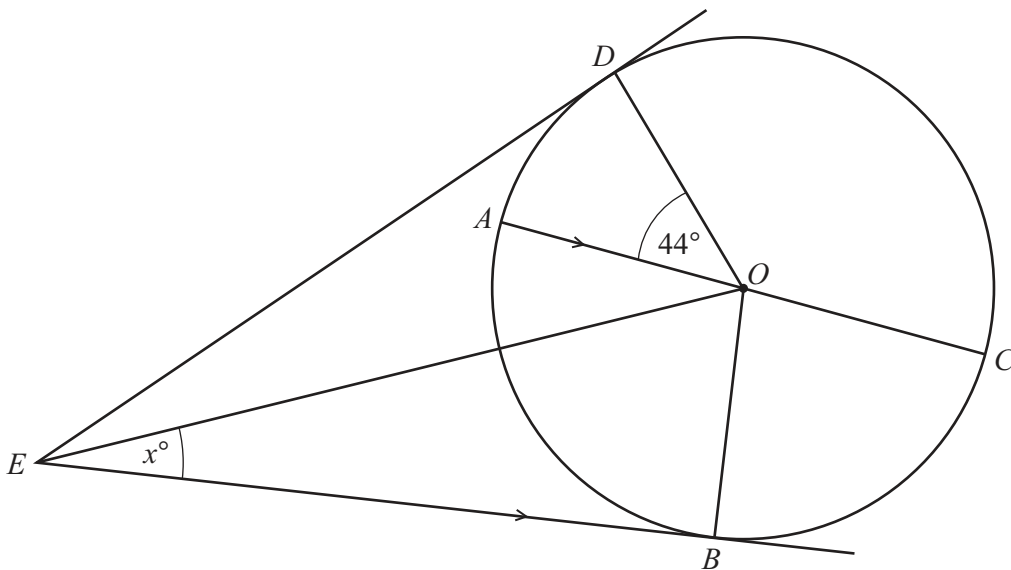
- (b) Find the value of $\frac{7}{3^{-2}}$.

..... [2]

- (c) Write 27×81^2 in the form 3^n .

..... [2]





NOT TO SCALE

A, B, C and D are points on the circumference of a circle with centre O .
 ED and EB are tangents to the circle.
 AC is parallel to EB .
 Angle $AOD = 44^\circ$.

Find the value of x .

$x = \dots\dots\dots$ [4]

14 The minimum point on a quadratic curve is $(-3, -5)$.

(a) Find the equation of the line of symmetry of the curve.

$\dots\dots\dots$ [1]

(b) Write the equation of the curve in the form $y = (x + a)^2 + b$.

$y = \dots\dots\dots$ [1]



15 Factorise.

(a) $x^2 - 7x + 12$

..... [2]

(b) $5x + 10y + 6ny + 3nx$

..... [2]

16 The table shows three sequences.

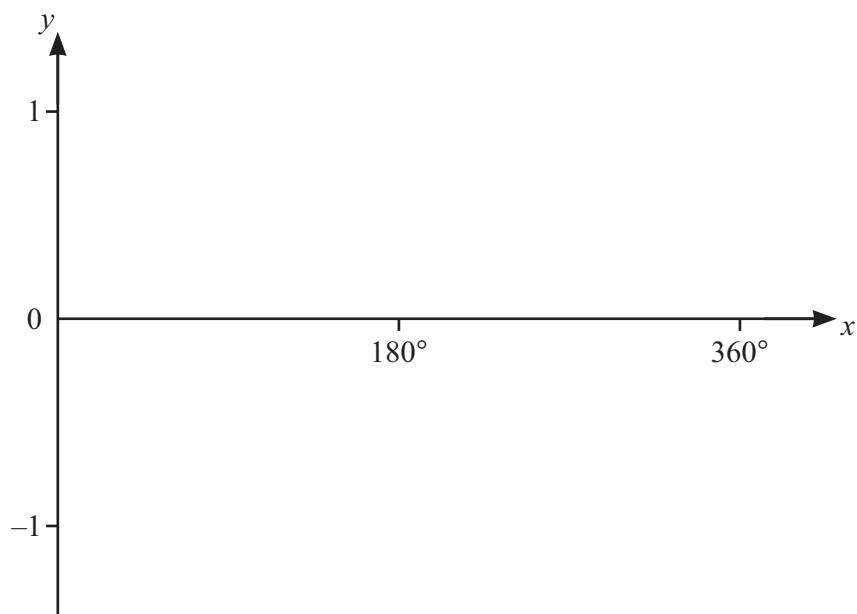
	1st term	2nd term	3rd term	4th term	5th term	n th term
Sequence A	8	13	18	23	28	
Sequence B	$\frac{3}{2}$	$\frac{4}{3}$	$\frac{5}{4}$	$\frac{6}{5}$	$\frac{7}{6}$	
Sequence C	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	

Complete the table to show the n th term of each sequence.

[5]



- 17 (a) Sketch the graph of $y = \cos x$ for $0^\circ \leq x \leq 360^\circ$.



[2]

- (b) $\cos x^\circ = \frac{1}{\sqrt{2}}$ and x is a **reflex** angle.

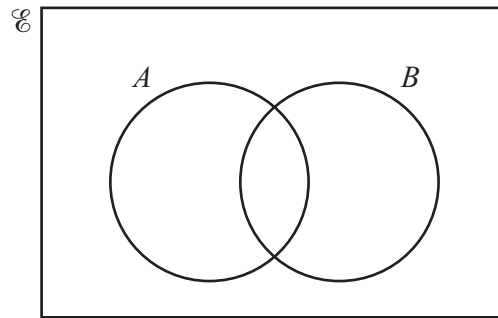
Find the value of x .

$x = \dots\dots\dots$ [2]



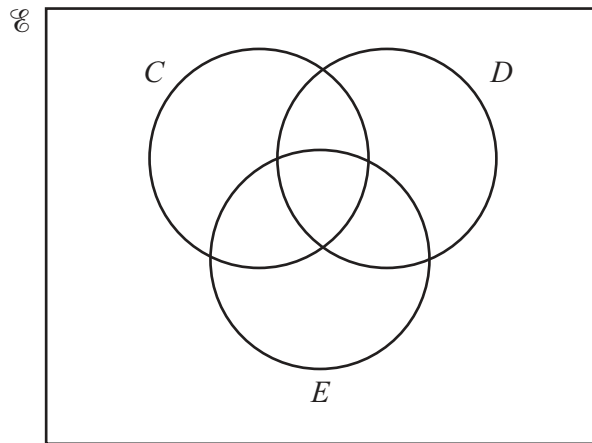
18 Shade the region in each Venn diagram.

(a) $(A \cap B)'$

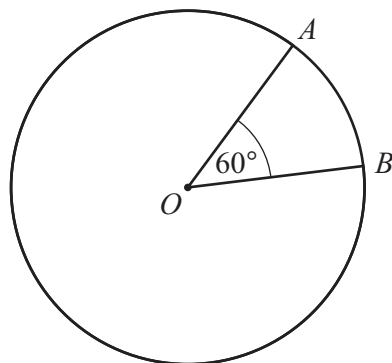


[1]

(b) $(C \cup D) \cap E'$



[1]



NOT TO
SCALE

The diagram shows a circle, centre O , radius 12 cm.

- (a) Work out the area of the **minor** sector AOB .
Give your answer in terms of π in its simplest form.

..... cm^2 [2]

- (b) Calculate the length of the **major** arc AB .
Give your answer in terms of π in its simplest form.

..... cm [3]

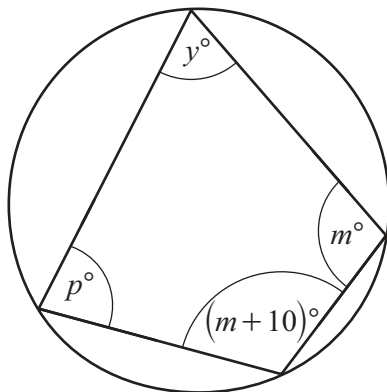




- 20 Work out $0.\dot{1}\dot{4} + 0.2$.
Give your answer as a fraction.

..... [3]

21



NOT TO
SCALE

The diagram shows a cyclic quadrilateral.
The ratio $p : m = 2 : 3$.

Find the value of y .

$y =$ [4]



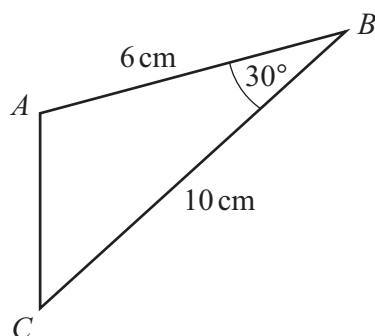


- 22 The equation of line L is $y = -\frac{1}{2}x + 7$.

Find an equation of the line perpendicular to line L that passes through the point $(3, 5)$.
Give your answer in the form $y = mx + c$.

$y = \dots\dots\dots$ [3]

- 23



NOT TO
SCALE

Work out the area of triangle ABC .

$\dots\dots\dots \text{cm}^2$ [3]



24 (a) Simplify.

$$\sqrt{125} - \sqrt{20}$$

..... [2]

(b)



$2\sqrt{2}$ cm

NOT TO
SCALE

$3\sqrt{8}$ cm

The area of this rectangle is $k \text{ cm}^2$.

Work out the value of k .

$k =$ [2]

(c) Rationalise the denominator.

$$\frac{1}{\sqrt{7} + 2}$$

..... [2]



- 25 Mahir picks one number at random from the numbers 5, 10 and 15. He then picks one number at random from the numbers 4, 5 and 6. He adds the two numbers.

The sample space diagram shows some of the possible outcomes.

		First number		
		5	10	15
Second number	+			
	4		14	19
	5		15	20
	6		16	21

- (a) Complete the sample space diagram. [1]
- (b) Given that the total of the two numbers is odd, find the probability that one of the numbers added is 15.

..... [2]

- 26 Write as a single fraction in its simplest form.

(a) $\frac{mp}{25y} \times \frac{15}{m}$

..... [2]

(b) $\frac{3}{2x-5} + \frac{4}{x-3}$

..... [3]



27 Solve the simultaneous equations.

$$y = x^2 - 8x + 22$$

$$y + 2 = 3x$$

$$x = \dots\dots\dots, y = \dots\dots\dots$$

$$x = \dots\dots\dots, y = \dots\dots\dots$$

[6]

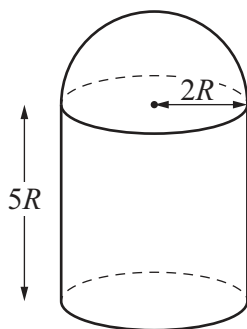
28 Simplify.

$$\frac{2x^2 - 11x - 21}{x^2 - 49}$$

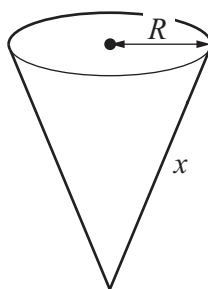


[4]

29 In this question all measurements are in centimetres.



Solid A



Solid B

NOT TO
SCALE

Solid A is made from a cylinder and a hemisphere, both of radius $2R$.

The cylinder has height $5R$.

Solid B is a cone of radius R and sloping edge x .

The **total** surface area of solid A is equal to the **total** surface area of solid B.

Find R in terms of x .

$$R = \dots\dots\dots [5]$$



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