0580/SP2/P42

IGCSE Extended Mathematics

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **0580/04**

Paper 4 Calculator (Extended) **For examination from 2025**

Sample paper 2

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.
- You should use a scientific calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use either your calculator value or 3.142.

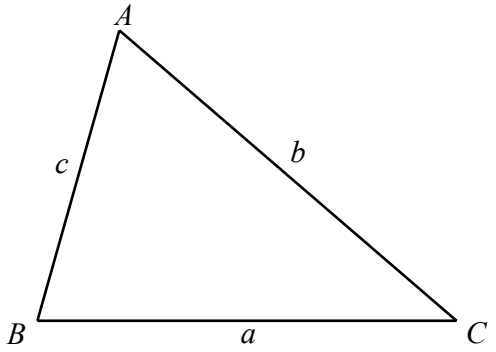
INFORMATION

- The total mark for this paper is 100.
- The number of marks for each question or part question is shown in brackets [ ].

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,



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

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

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

1. **(a)** Daisy records her 50 homework marks.
The table shows the results.

Homework mark	15	16	17	18	19	20
Frequency	1	3	19	11	10	6

(i) Write down the range.

..... [1]

(ii) Write down the mode.

..... [1]

(iii) Find the median.

..... [1]

(iv) Calculate the mean.

..... [3]

(b) 21 33 20 25 21 34 22 21 20 30 18

The list shows Ed's scores in 11 tests.

(i) Complete the stem-and-leaf diagram to show this information.

1	
2	
3	

Key: 2|5 represents 25

[2]

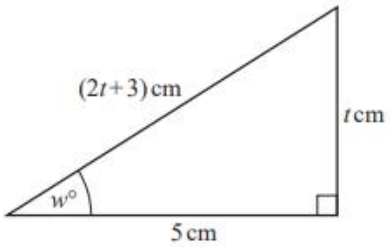
(ii) Find the median.

..... [1]

(iii) Find the interquartile range.

..... [2]

2.



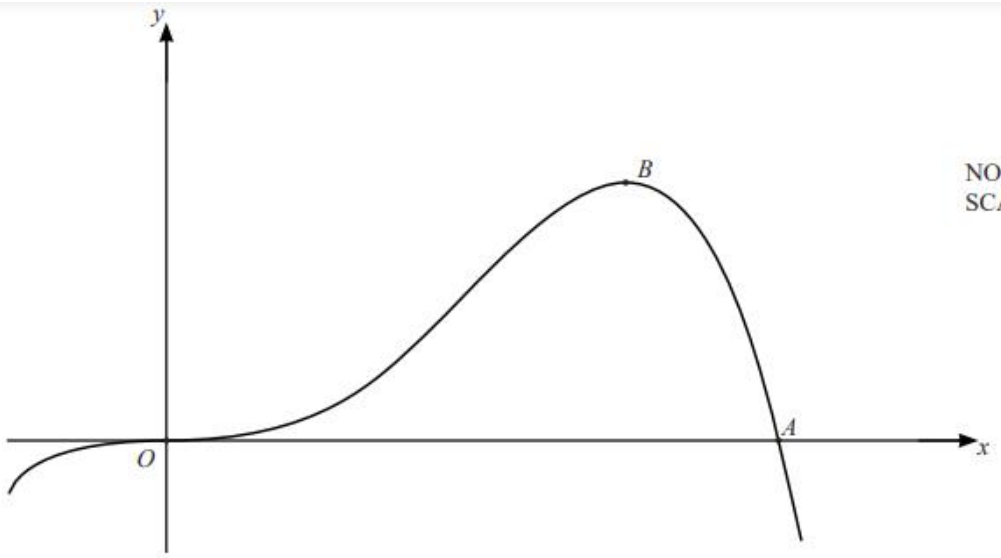
NOT TO SCALE

The diagram shows a right-angled triangle.

Find the value of w.

$w =$ ..... [7]

3.



The diagram shows a sketch of the graph of $y = 4x^3 - x^4$.
The graph crosses the x-axis at the origin O and at the point A.
The point B is a maximum point.

(a) Differentiate $4x^3 - x^4$.

..... [2]

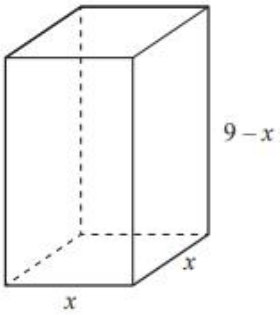
(b) Find the coordinates of B.

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

(c) Find the gradient of the graph at the point A.

..... [3]

4. All the lengths in this question are measured in centimetres.



NOT TO SCALE

The diagram shows a solid cuboid with a square base.

(a) The volume, $V\,\text{cm}^3$, of the cuboid is $V = x^2(9-x)$.
The table shows some values of V for $0 \leqslant x \leqslant 9$.

x	0	1	2	3	4	5	6	7	8	9
V	0	8		54	80	100	108	98	64	0

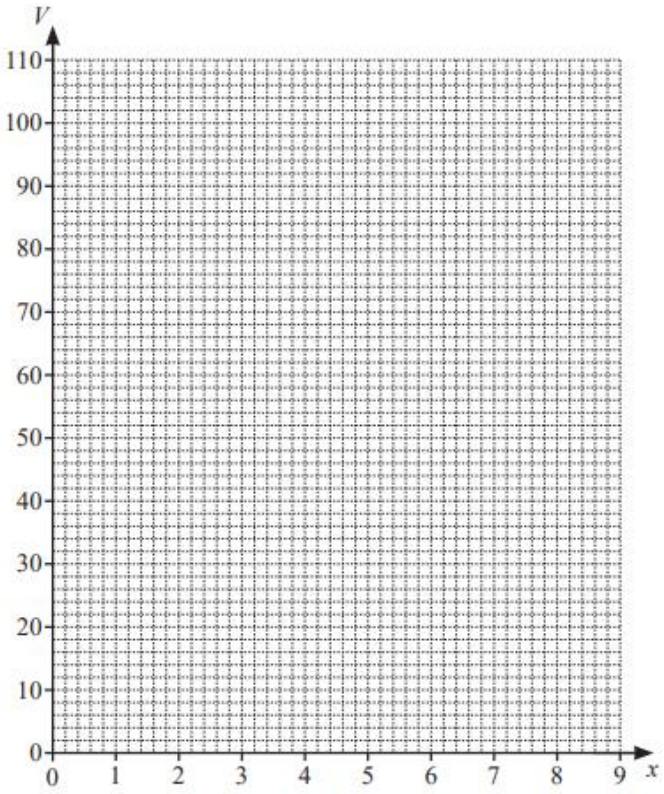
(i) Complete the table.

[1]

(ii) On the grid on the opposite page, draw the graph of $V = x^2(9-x)$ for $0 \leqslant x \leqslant 9$. [4]

(iii) Find the values of x when the volume of the cuboid is $44\,\text{cm}^3$.

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



(b) (i) Show that the total surface area of the cuboid is $(36x - 2x^2)\text{cm}^2$.

[2]

(ii) Find the surface area when the volume of the cuboid is a maximum.

..... cm^2 [3]

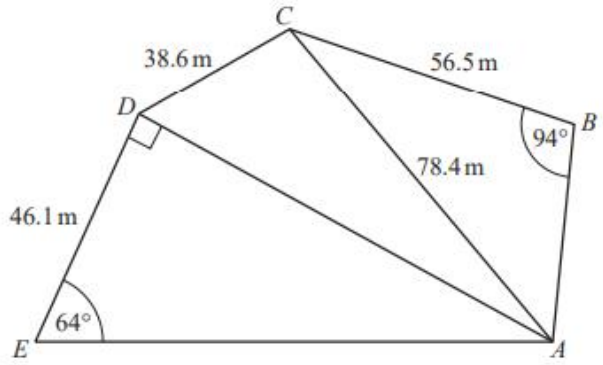
5.

(a) On the diagram, sketch the graph of $y = \sin x$ for $0° \leqslant x \leqslant 360°$. [2]

(b) Solve the equation $5\sin x + 4 = 0$ for $0° \leqslant x \leqslant 360°$.

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

6. **(a)**



NOT TO SCALE

ABCDE is a pentagon.

(i) Calculate *AD* and show that it rounds to 94.5 m, correct to 1 decimal place.

[2]

(ii) Calculate angle *BAC*.

Angle *BAC* = ... [3]

(iii) Calculate the largest angle in triangle *CAD*.

..... [4]

7. **(a)** Solve.

(i) $4(2x-3)=24$

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

(ii) $6x+14>6$

..... [2]

(b) Rearrange the formula $V=2x^3-3y^3$ to make y the subject.

$y =$ ..... [3]

(c) Show that $(2n-5)^2-13$ is a multiple of 4 for all integer values of n.

[3]

(d) The expression $5+12x-2x^2$ can be written in the form $q-2(x+p)^2$.

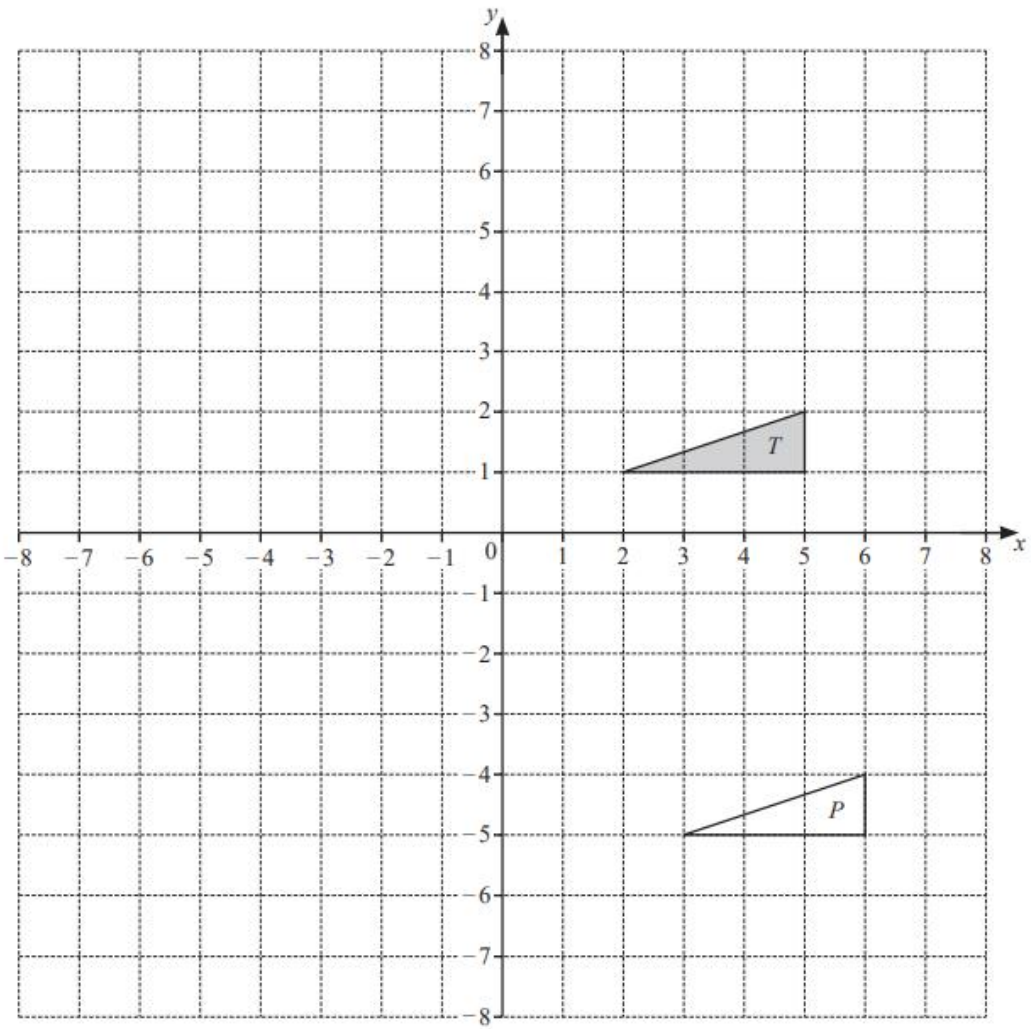
(i) Find the value of p and the value of q.

$p =$ ..... , $q =$ ..... [3]

(ii) Write down the coordinates of the maximum point of the curve $y = 5+12x-2x^2$.

(..... , ...) [1]

8.



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

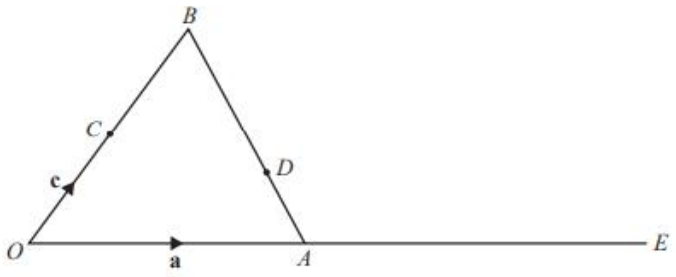
.....

..... [2]

(b) **(i)** Reflect triangle T in the line $x = 1$. [2]

(ii) Rotate triangle T through 90° anticlockwise about (6, 0). [2]

9.



NOT TO SCALE

OAB is a triangle and C is the mid-point of OB.
D is on AB such that $AD : DB = 3 : 5$.
OAE is a straight line such that $OA : AE = 2 : 3$.
$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OC} = \mathbf{c}$.

(i) Find, in terms of **a** and **c**, in its simplest form,

(a) $\overrightarrow{AB}$,

$\overrightarrow{AB} =$ ..... [1]

(b) $\overrightarrow{AD}$,

$\overrightarrow{AD} =$ ..... [1]

(c) $\overrightarrow{CE}$,

$\overrightarrow{CE} =$ ..... [1]

(d) $\overrightarrow{CD}$.

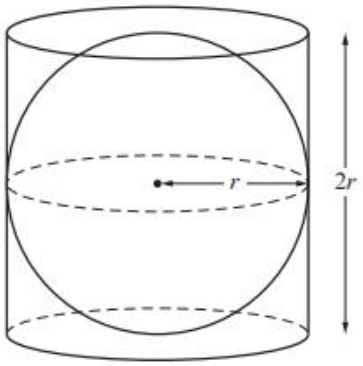
$\overrightarrow{CD} =$ ..... [2]

(ii) $\overrightarrow{CE} = k\overrightarrow{CD}$

Find the value of k.

$k =$ ..... [1]

10. **(a)**



NOT TO SCALE

A sphere of radius r is inside a closed cylinder of radius r and height $2r$.

[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

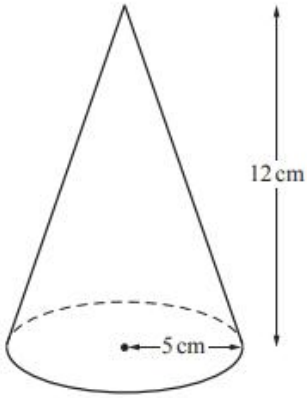
(i) When $r = 8$ cm, calculate the volume inside the cylinder which is **not** occupied by the sphere.

..... cm^3 [3]

(ii) Find r when the volume inside the cylinder **not** occupied by the sphere is $36\,cm^3$.

$r =$ ..... cm [3]

(b)



NOT TO SCALE

The diagram shows a solid cone with radius 5 cm and perpendicular height 12 cm.

(i) The **total** surface area is painted at a cost of \$0.015 per cm^2.

Calculate the cost of painting the cone.

[The curved surface area, A, of a cone with radius r and slant height l is $A = \pi rl$.]

\$ ..... [4]

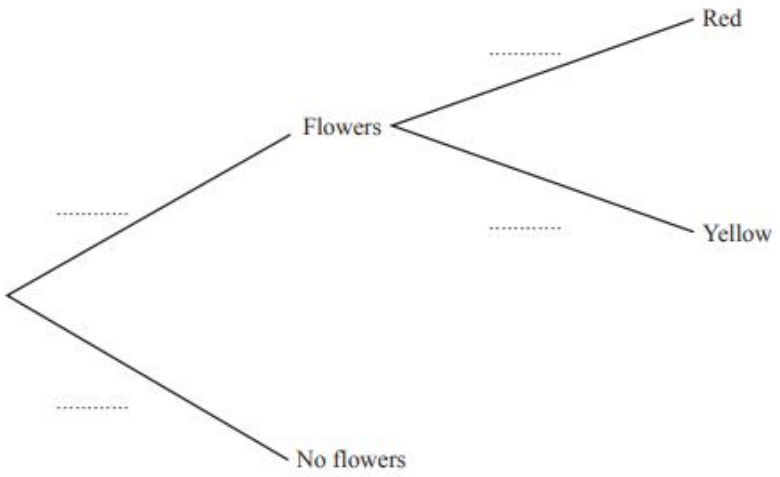
(ii) The cone is made of metal and is melted down and made into smaller solid cones with radius 1.25 cm and perpendicular height 3 cm.

Calculate the number of smaller cones that can be made.

..... [3]

11. The probability that a plant will produce flowers is $\frac{7}{8}$.
The flowers are either red or yellow.
If the plant produces flowers, the probability that the flowers are red is $\frac{3}{4}$.

(a) (i) Complete the tree diagram by writing a probability beside each branch.



[2]

(ii) Calculate the probability that a plant, chosen at random, will produce red flowers.

[2]

(iii) Two plants are chosen at random.

Calculate the probability that both will produce red flowers.

.....[2]

(b) Alphonse buys 200 of these plants.

Calculate the number of plants that are expected to produce flowers.

.....[2]