MOCK EXAM MODEL

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **0580/22**

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

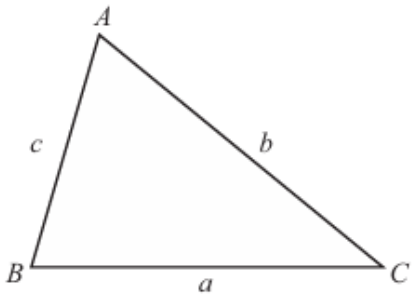
This document has **16** pages.

[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,



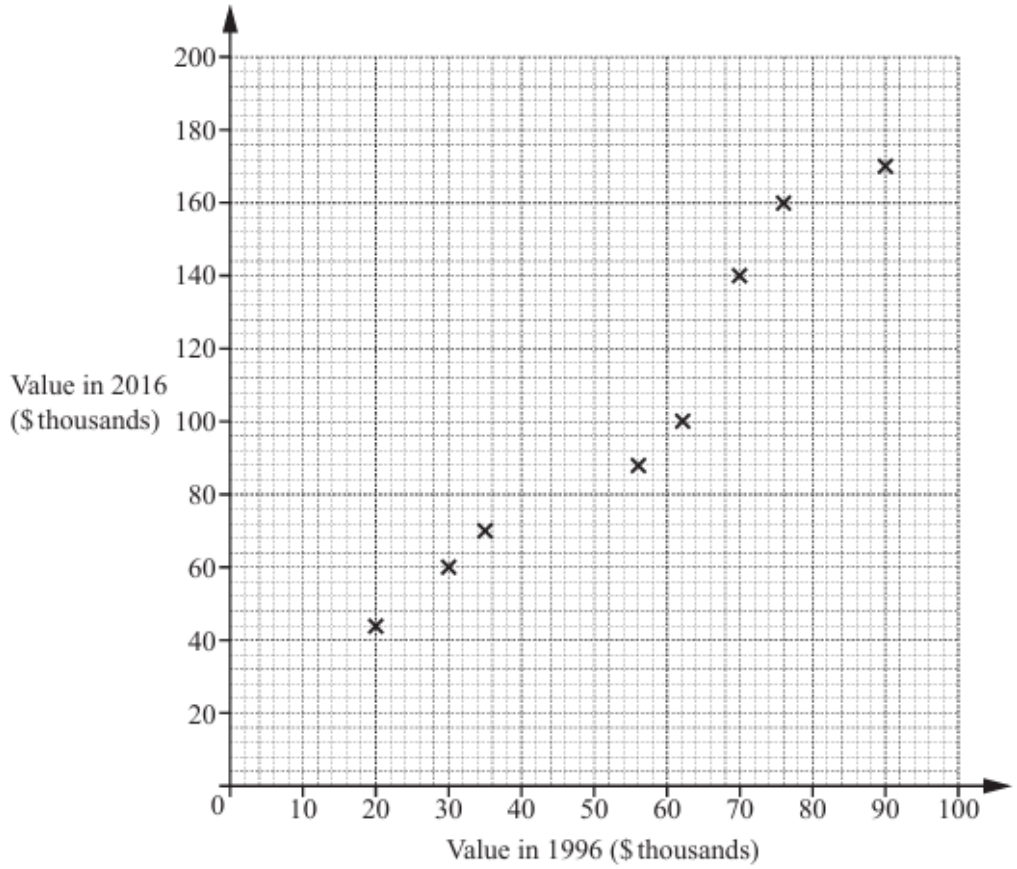
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

1.

The scatter diagram shows the value, in thousands of dollars, of eight houses in 1996 and the value of the same houses in 2016.



(a) One of these eight houses had a value of $70 000 in 1996.

Write down the value of this house in 2016.

$ ..... [1]

(b) The values of two more houses are shown in the table.

Value in 1996 ($ thousands)	40	80
Value in 2016 ($ thousands)	80	150

On the scatter diagram, plot these values. [1]

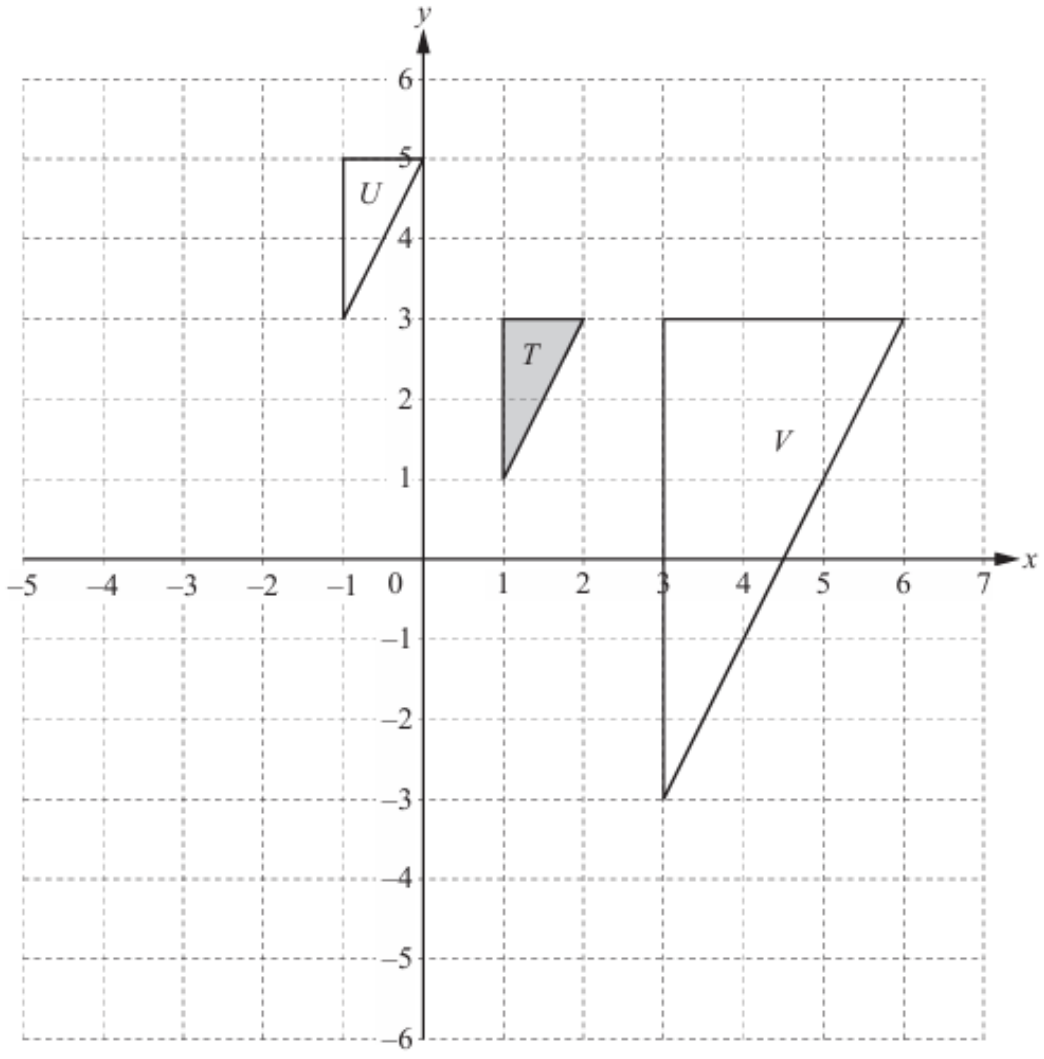
(c) On the scatter diagram, draw a line of best fit. [1]

(d) Another house had a value of $50 000 in 1996.

Find an estimate of the value of this house in 2016.

$ ..... [1]

2.



(a) On the grid, draw the image of

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

(ii) triangle T after a rotation through 180° about (0, 0). [2]

(b) Describe fully the **single** transformation that maps

(i) triangle T onto triangle U,

Answer(b)(i) .....

..... [2]

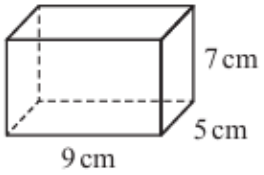
(ii) triangle T onto triangle V.

Answer(b)(ii) .....

..... [3]

3.

A cuboid measures 5 cm by 7 cm by 9 cm.



NOT TO SCALE

Work out the surface area of this cuboid.

..... cm^2 [3]

4.

$P = 2^5 \times 3^3 \times 7$ $\quad$ $Q = 540$

(i) Find the highest common factor (HCF) of P and Q.

..... [2]

(ii) Find the lowest common multiple (LCM) of P and Q.

..... [2]

(iii) $P \times R$ is a cube number, where R is an integer.

Find the smallest possible value of R.

..... [2]

5.

m varies inversely as the square of $(p-1)$.
When $p = 4$, $m = 5$.

Find m when $p = 2$.

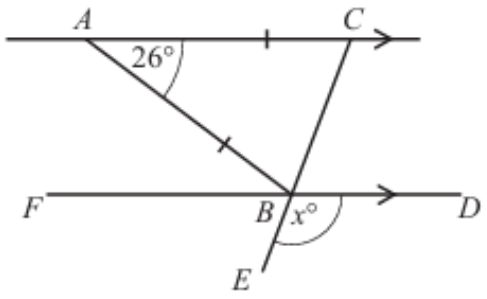
$m =$ ..... [3]

6.

Simplify. $\dfrac{x-8-ax+8a}{x^2-15x+56}$

..... [5]

7.



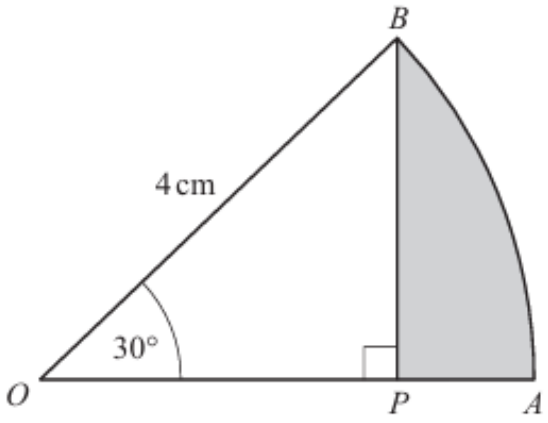
NOT TO SCALE

AC is parallel to FBD, ABC is an isosceles triangle and CBE is a straight line.

Find the value of x.

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

8.



NOT TO SCALE

OAB is the sector of a circle, center O.
$OB = 4$ cm and angle $AOB = 30°$.
BP is perpendicular to OA.

(a) $AP = a + b\sqrt{3}$

Find the value of a and the value of b.

$a =$ .....

$b =$ ..... [3]

(b) The area of the shaded region is $c\pi + d\sqrt{3}$.

Find the value of c and the value of d.

$c =$ .....

$d =$ ..... [3]

9.

(a) Simplify.

$$\sqrt{32} + \sqrt{98}$$

..... [2]

(b) Rationalise the denominator.

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

..... [2]

10.

$f(x) = 3 - 2x$ $g(x) = 2x + 3$ $h(x) = 2^x$

(a) (i) Find $f(-3)$.

..... [1]

(ii) Find $gf(-3)$.

..... [1]

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

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

(c) Find x when $gg(x) = 7$.

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

(d) Find x when $h^{-1}(x) = 5$.

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

11.

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

..... [2]

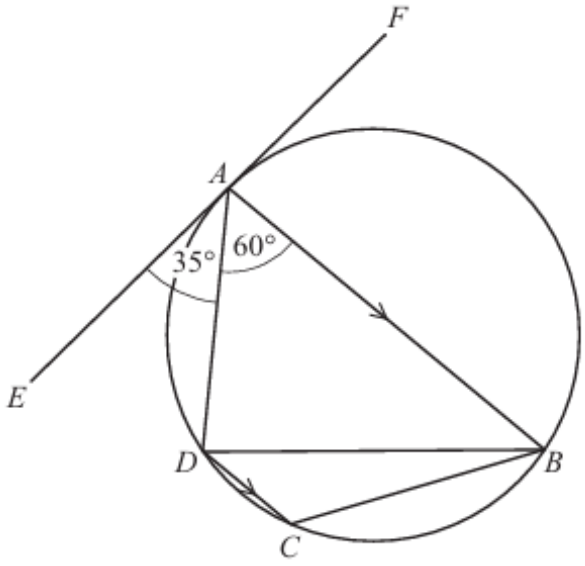
(b) Find the coordinates of the turning points of the graph of $y = x^3 - 3x^2 + 1$.

(..... , ...)

(..... , ...)

[4]

12.



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]

13.

A bag contains 3 blue buttons, 8 white buttons, and 5 red buttons.
Two buttons are picked at random from the bag, without replacement.

Work out the probability that the two buttons are either both red or both white.

[3]

14.

The mean of five numbers is 16.
When two extra numbers are included the mean of the seven numbers is 20.

Find the mean of the two extra numbers.

..... [2]

15.

Solve the simultaneous equations.
You must show all your working.

$$5x + 3y = -19$$
$$3x + 5y = -21$$

$x =$ .....

$y =$ ..... [4]

16.

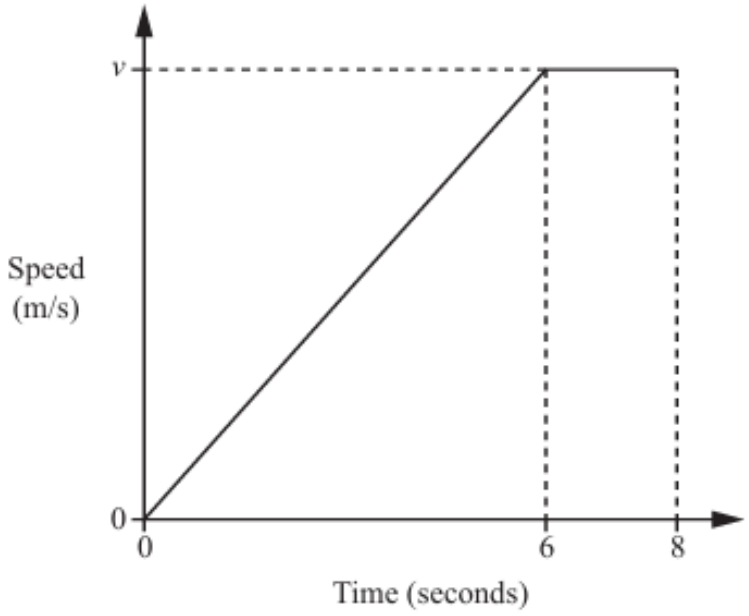
Make m the subject of the formula.

$$x = \frac{3m}{2-m}$$

$m =$ ..... [4]

17.

The diagram shows information about the first 8 seconds of a car journey.



NOT TO SCALE

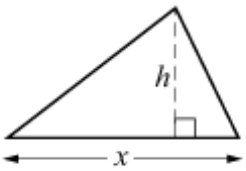
The car travels with constant acceleration reaching a speed of v m/s after 6 seconds.
The car then travels at a constant speed of v m/s for a further 2 seconds.
The car travels a total distance of 150 metres.

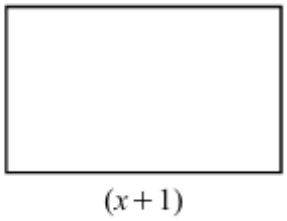
Work out the value of v.

[4]

18.

In this question, all measurements are in centimetres.





NOT TO SCALE

The height of the triangle is h and the height of the rectangle is $(h + 2)$.
The length of the base of the triangle is x and the length of the rectangle is $(x + 1)$.
The area of the triangle is $11\,\text{cm}^2$ and the area of the rectangle is $39\,\text{cm}^2$.

(a) Write down an expression, in terms of x, for the height of the rectangle.

..... [1]

(b) Show that $2x^2 - 15x + 22 = 0$.

[3]

(c) By factorising and solving $2x^2 - 15x + 22 = 0$, find the two possible heights of the triangle.

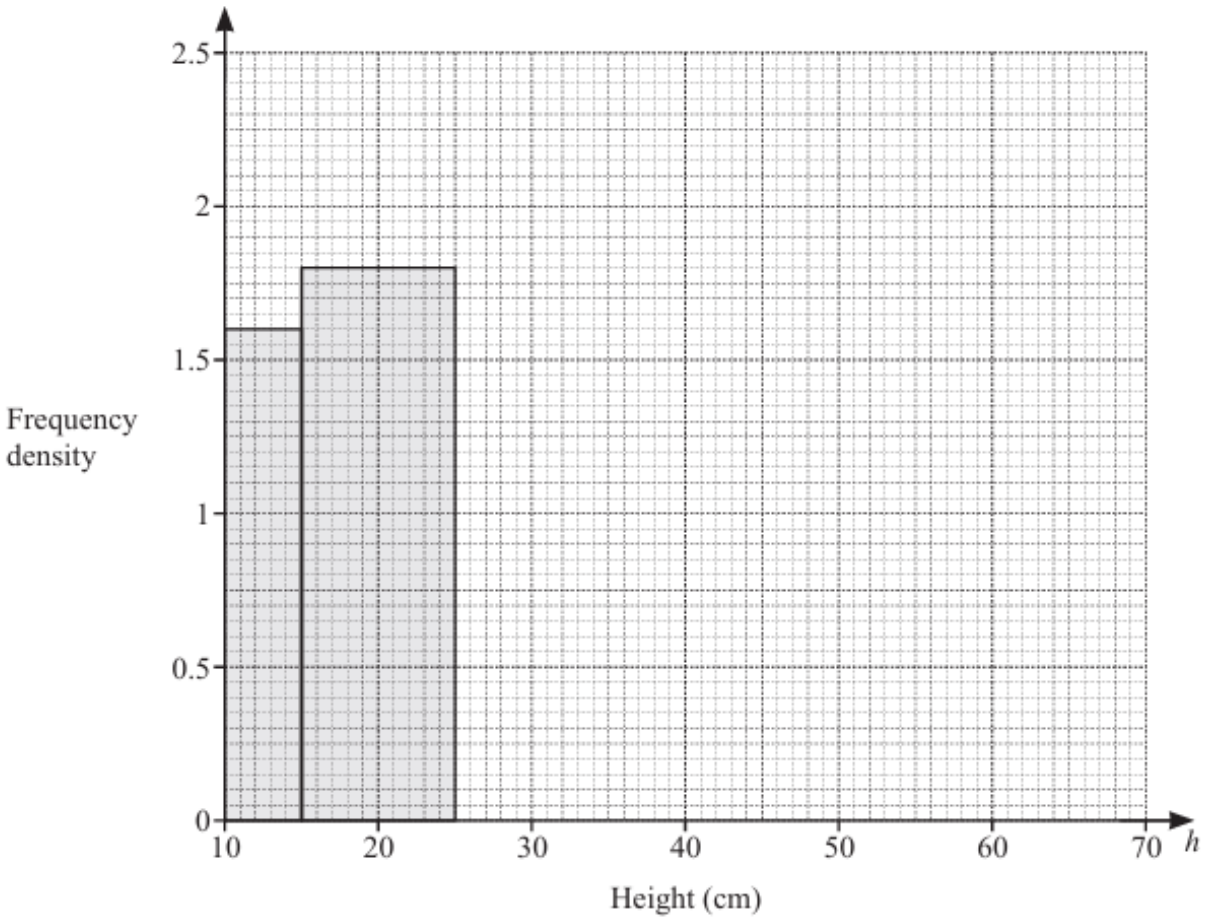
h = ... or h = ... [5]

19.

The height, h cm, of each of 100 plants is recorded.
The table shows information about the heights of these plants.

Height (h cm)	$10 < h \leqslant 15$	$15 < h \leqslant 25$	$25 < h \leqslant 40$	$40 < h \leqslant 60$	$60 < h \leqslant 70$
Frequency	8	18	28	33	13

(a) Complete the histogram to show this information.
The first two blocks have been drawn for you.



[3]

(b) Calculate an estimate of the mean height.

..... cm [4]

20.

Amir invests \$3000 in an account.
The account pays simple interest at a rate of r % per year.
At the end of 6 years the value of his investment is \$3360.

Find the value of r.

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

22.

$\mathbf{a} = \begin{pmatrix} -4 \\ -3 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$

(a) Find $\mathbf{a} - 3\mathbf{b}$.

( ) [2]

(b) Find the magnitude of $\begin{pmatrix} -4 \\ -3 \end{pmatrix}$.

..... [2]