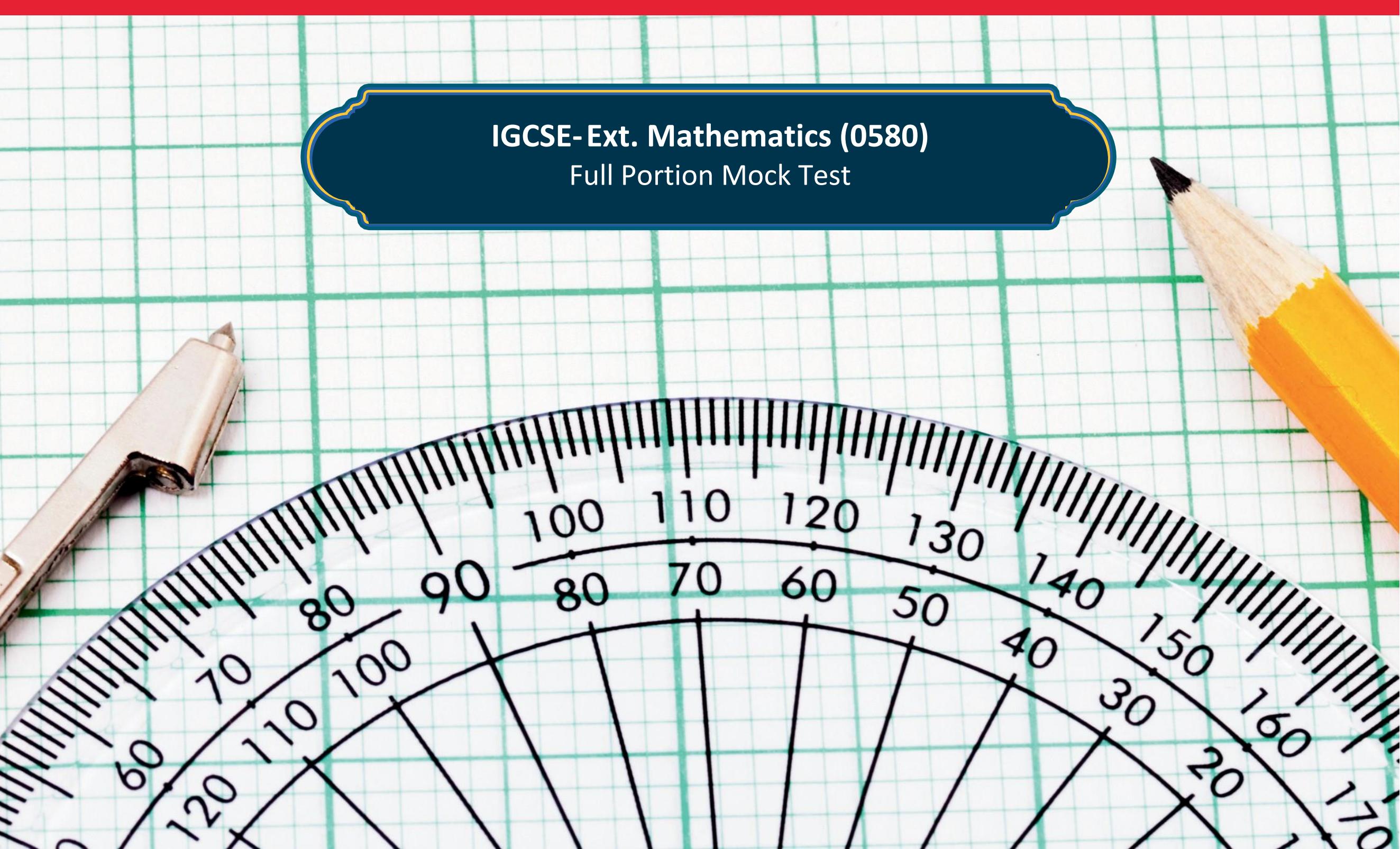# ELEVATE

MATH TOPICAL WORKSHEETS

IGCSE-Ext. Mathematics (0580)
Full Portion Mock Test

TEST-PAPER

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

MATHEMATICS **0580/04**

Paper 4 Calculator (Extended)

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 [ ].

[Turn over

1. Zahur made 250 cakes to sell at a cake sale.
   Of the cakes made by Zahur, 28% were chocolate cakes.

   (a) Calculate the number of chocolate cakes made by Zahur.

   (2)

   All the other cakes made by Zahur were either lemon cakes or vanilla cakes.
   The ratio of the number of lemon cakes to the number of vanilla cakes was 4 : 5

   (b) Calculate the number of lemon cakes made by Zahur.

   (2)

   Zahur put icing on each of the vanilla cakes he made.
   The icing for each vanilla cake needed 75 g of icing sugar.

   (c) Calculate the total amount, in kg, of icing sugar needed for all the vanilla cakes made by Zahur.

   (2)

At the start of the cake sale, the selling price of each of the cakes made by Zahur was $4 and he sold 204 cakes at this price.

Zahur then reduced the selling price of each cake by 30% and he sold all the remaining cakes.

(d) Calculate the total amount of money, in $, that Zahur received by selling all 250 cakes.

(3)

When Zahur had subtracted the cost of all the ingredients he needed to make his cakes from the total amount of money he received by selling all the cakes, he found that he had made a profit of 60%

(e) Calculate, in $, the cost of all the ingredients Zahur needed.

(3)

2.

$$X = \frac{a}{c - f}$$

$a = 40$ to the nearest whole number
$c = 2.2$ to 1 decimal place
$f = 0.6$ to 1 decimal place

Calculate the upper bound for the value of X
Show your working clearly.

(3)

3. Show that $\left(\dfrac{6}{x-2} + \dfrac{4}{x+3} \right) \times \dfrac{5x^2 - 15x + 10}{x^2 - 1}$ can be written

in the form $\dfrac{p}{x+q}$ where p and q are integers to be found.

(5)

5. (a) Complete the table of values for $y = 2x^3 - 3x + 4$

x	-2.5	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2	2.5
y	-19.75		1.75		5.25		2.75		6.25	14	27.75

(3)

(b) On the grid, plot the points from your completed table and join them to form a smooth curve.
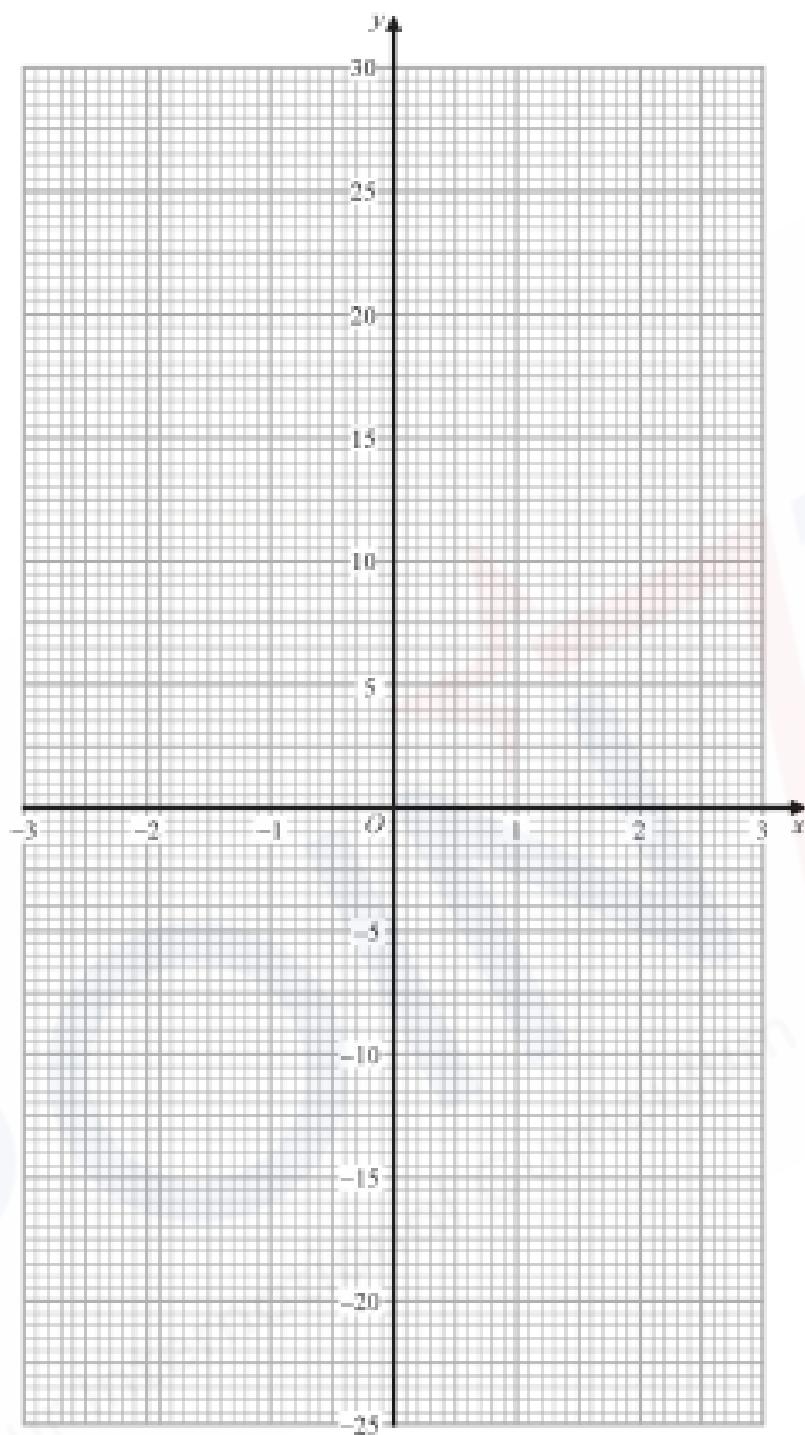
(3)

(c) By drawing on the grid a suitable tangent to the curve, find an estimate, to the nearest whole number, of the gradient of the curve at the point where $x = 2$

(2)

(d) Use your graph to find the range of values of x, in $-2.5 \leqslant x \leqslant 2.5$, for which $2x^3 - 3x + 4 > 5x$
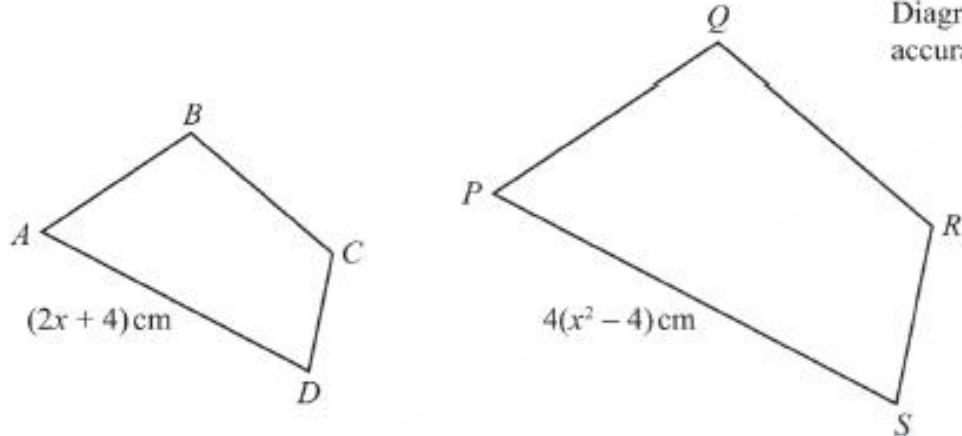
(2)

6.

Diagram **NOT** accurately drawn

ABCD and *PQRS* are two similar quadrilaterals.

The side *AD* of length $(2x + 4)$ cm is the longest side of quadrilateral *ABCD*.

The side *PS* of length $4(x^2 - 4)$ cm is the longest side of quadrilateral *PQRS*.

The area of the quadrilateral *ABCD* is $10\,\text{cm}^2$

Show that the area, in cm², of the quadrilateral *PQRS* is $a(x - b)^2$
where *a* and *b* are integers to be found.

[4]

7.

Q

Diagram **NOT**
accurately drawn

P

$160°$

O

R

$37°$

T

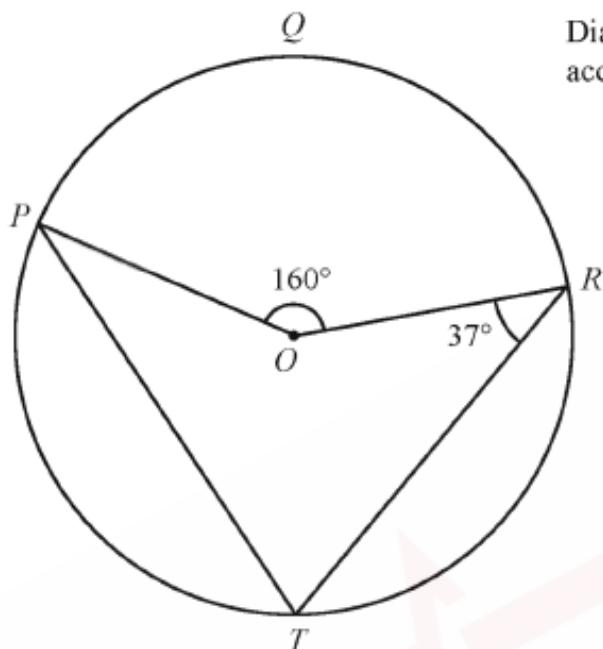**Figure 2**

Figure 2 shows the points P, Q, R and T on a circle centre O

$$\angle POR = 160° \qquad \angle ORT = 37°$$

(a) (i) Work out the size, in degrees, of $\angle PTR$

(1)

(ii) Give a reason for your answer.

(1)

(b) Work out the size, in degrees, of $\angle TPO$

(2)

The sector, *OPQR*, is cut out from the circle in Figure 2

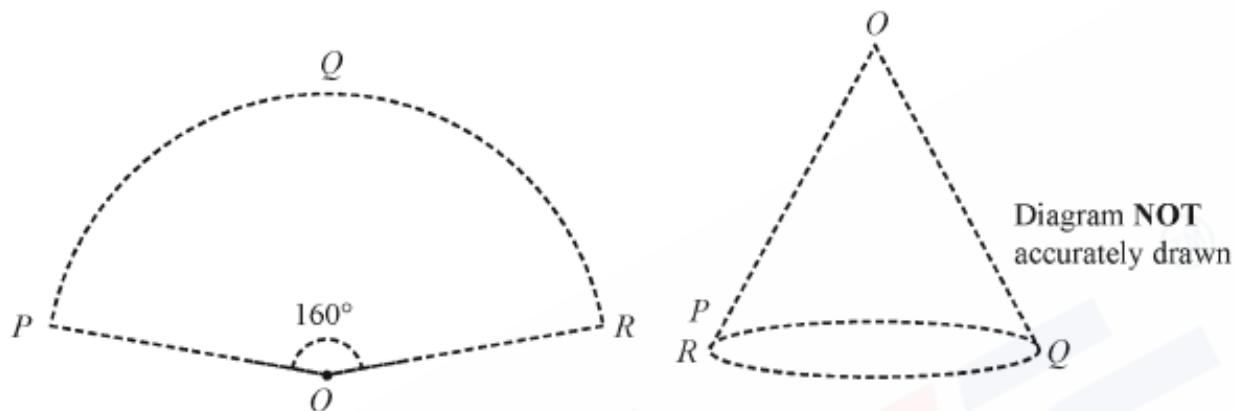A hollow right circular cone is formed by joining *OP* and *OR* together as shown in Figure 3
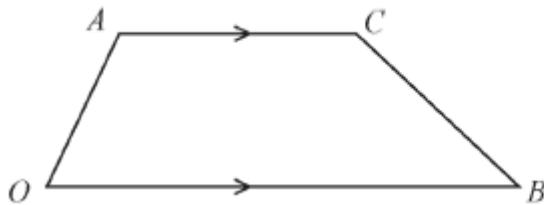
Diagram **NOT** accurately drawn

Figure 3

The curved surface area of the cone is $\dfrac{196}{25}\pi$ cm²

(c) Calculate the volume, in cm³ to 3 significant figures, of the cone.

(6)

$$\left(\begin{array}{l} \text{Volume of cone} = \dfrac{1}{3}\cdot\pi r^2 h \\ \text{Curved surface area of cone} = \pi r l \end{array} \right)$$

8.

Diagram **NOT** accurately drawn

The diagram shows a trapezium $OACB$ in which

$$\overrightarrow{OA} = \mathbf{a}, \overrightarrow{AC} = 3\mathbf{b}, \overrightarrow{OB} = 5\mathbf{b}$$

The point P lies on OC such that $OP:PC = 5:1$
D is the point such that OBD is a straight line and APD is a straight line.
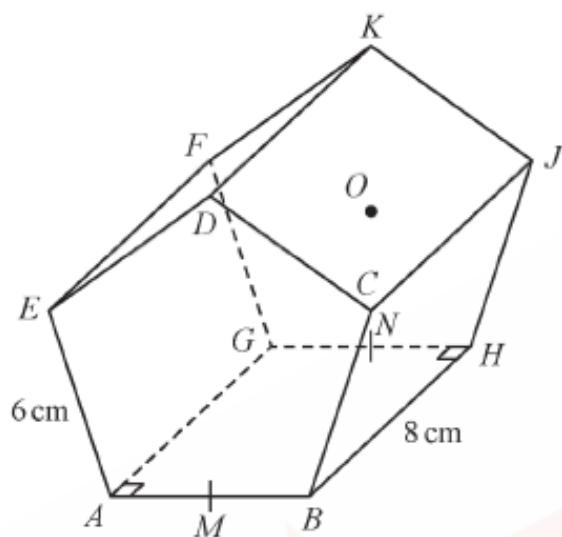Prove that $OB:OD = 1:3$

[4]

9.

Diagram **NOT** accurately drawn

Figure 5

Figure 5 shows a right prism *ABCDEFGHJK*.
A cross section of the prism is a regular pentagon with sides of length 6 cm.

BH = 8 cm.
M is the midpoint of *AB*.
N is the midpoint of *GH*.
O is the centre of pentagon *FGHJK*.

(a) Find, in cm to 3 significant figures, the length of *AO*.

(5)

(b) Calculate the size, in degrees to 1 decimal place, of the angle between *MK* and *MN*.
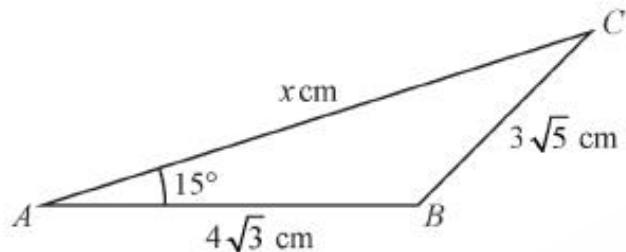
(5)

Working Space

10.

Diagram **NOT** accurately drawn

Figure 3

Figure 3 shows triangle ABC

$$AB = 4\sqrt{3} \text{ cm} \qquad BC = 3\sqrt{5} \text{ cm} \qquad AC = x \text{ cm} \qquad \angle BAC = 15°$$

Given that the exact value of $\cos 15° = \dfrac{\sqrt{6} + \sqrt{2}}{4}$

(a) show that x is a solution of the equation

$$x^2 - \left(6\sqrt{2} + 2\sqrt{6}\right)x + 3 = 0$$

(3)

(b) Write the equation given in part (a) in the form $(x - k)^2 = 21 + 12\sqrt{3}$ where k is a constant that should be stated as a simplified surd.

(2)

(c) Show that $\left(3 + 2\sqrt{3}\right)^2 = 21 + 12\sqrt{3}$

(2)

Given that $\angle ABC$ is obtuse

(d) use parts (b) and (c) to find the exact value of x
Give your answer in the form $a + b\sqrt{2} + c\sqrt{3} + \sqrt{d}$ where a, b, c and d are integers.

(3)

11. One Saturday, each of the 100 people who visited a library was asked how long they were in the library.
The table below shows information about the results.

Time (t mins)	Frequency
$0 < t \leqslant 10$	16
$10 < t \leqslant 30$	22
$30 < t \leqslant 35$	10
$35 < t \leqslant 60$	40
$60 < t \leqslant 100$	12

(a) Calculate an estimate for the mean length of time, in minutes to 3 significant figures, these people were in the library.

(4)

Two of the 100 people who visited the library that Saturday are picked at random.

(b) Find, to 3 decimal places, the probability that

   (i)   both people were in the library for more than 30 minutes,

  (ii)   one of the two people was in the library for more than 30 minutes and one was in the library for 30 minutes or less.
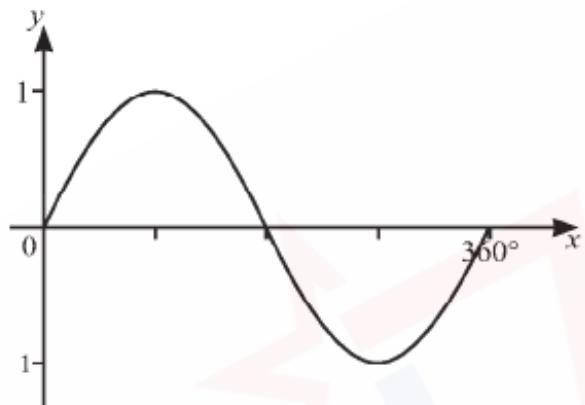
(5)

Working Space

12. **(a)** Solve $\tan x = \sqrt{3}$ for values of x between $0°$ and $360°$.

.... [2]

(b) This is a sketch of the graph of $y = \sin x$.

Solve $4\sin x + 3 = 1$ for values of x between $0°$ and $360°$.

.... [3]

13. Left-handed and right-handed people do a test. It is found that 80% of left-handed people pass the test and 90% of right-handed people pass the test.

On the island of Sinestra, three quarters of the population are left-handed and the remainder are right-handed.
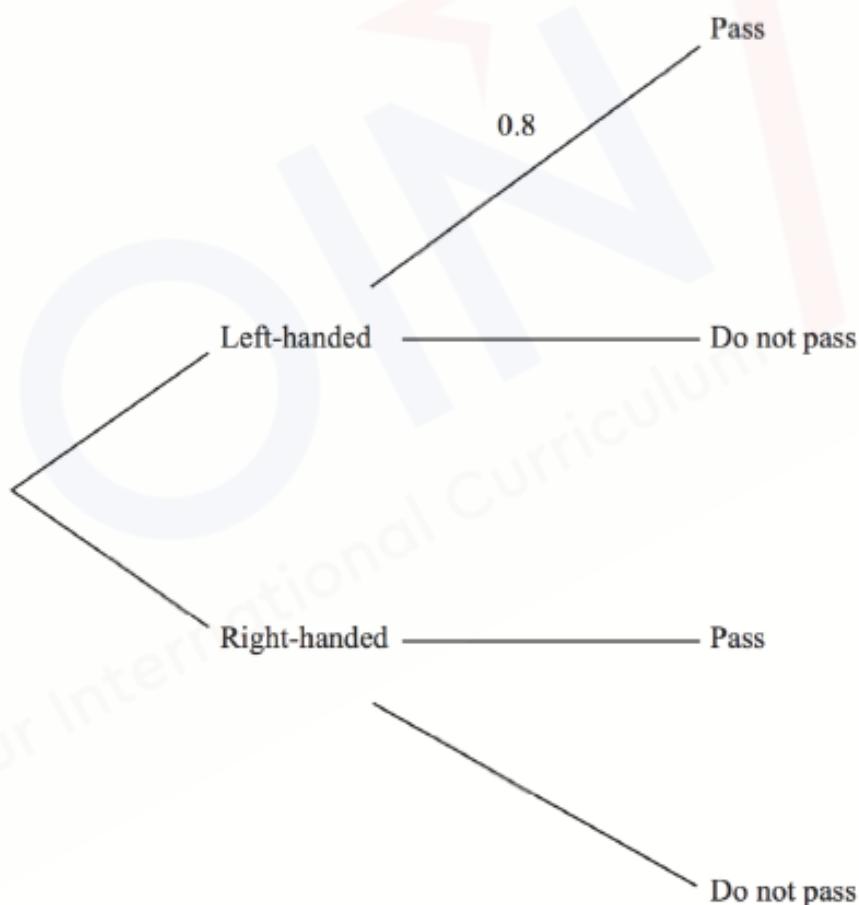
A person on Sinestra is to be chosen at random to take the test.

(a) Write down the probability that the person chosen is right-handed.

(1)

(b) Complete the tree diagram to show all the information.

(3)

(c) From your completed tree diagram, or otherwise, find the probability that the person chosen,
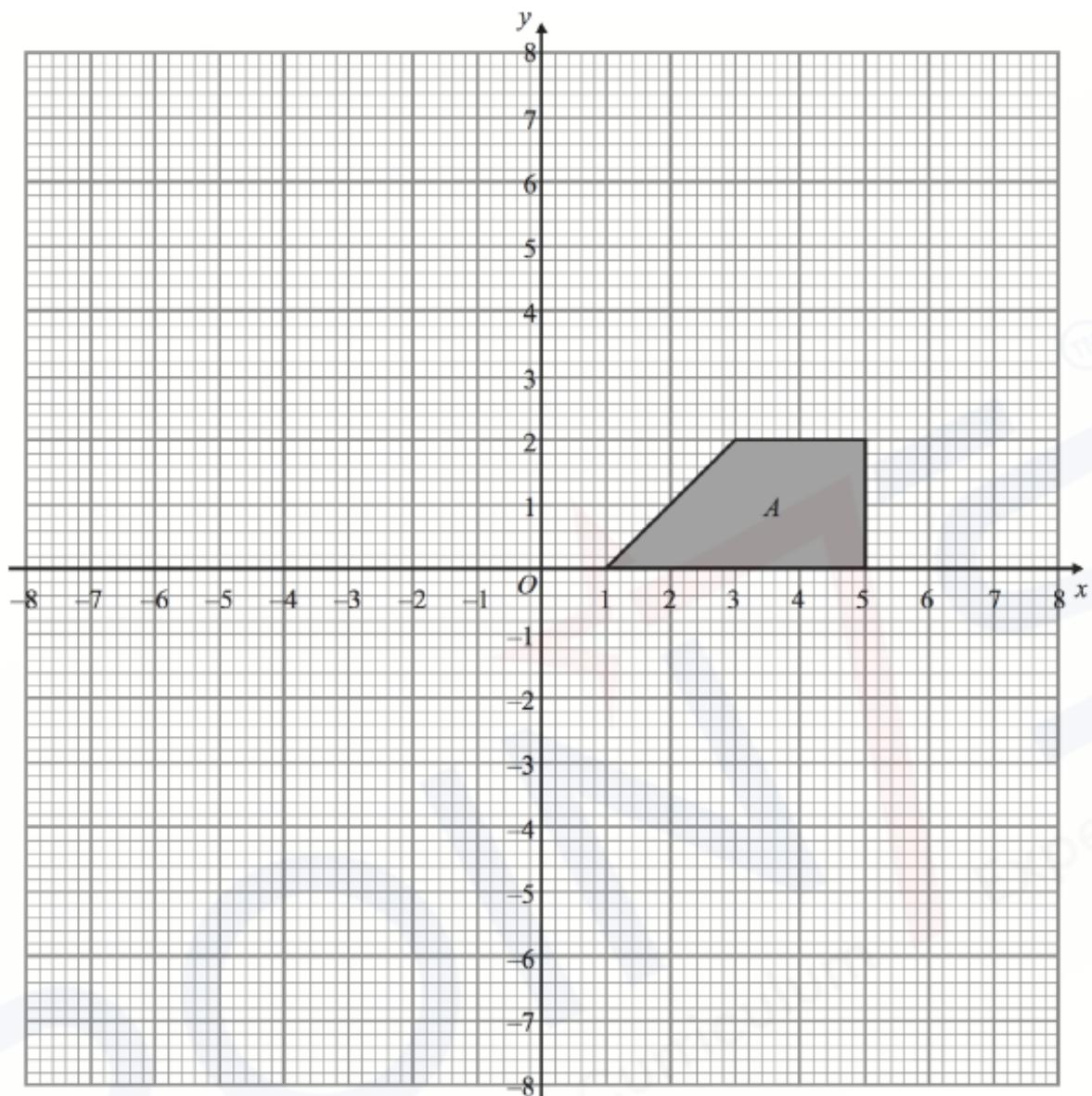
    (i)   is left-handed and will pass the test,

    (ii) will pass the test.

                              (5)

A person is selected at random from Sinestra. Given this person passed the test, use your answers to part (c) to

(d) determine the probability that this person is left-handed.

                              (3)

Trapezium B is the image of trapezium A following a reflection in the line $x = -1$

(a) Draw and label trapezium B.

(2)

Trapezium C is the image of trapezium B following a translation with vector $\begin{pmatrix} 0 \\ -8 \end{pmatrix}$.

(b) Draw and label trapezium C.

(2)

Trapezium D is the image of trapezium C following a rotation of $90°$ anticlockwise about the point $(-5, -3)$.

(c) Draw and label trapezium D.

(2)