Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
3	
4 - 5	
6 - 7	
8 - 9	
10 - 11	
12 - 13	
14 - 15	
TOTAL	

Level 2 Certificate in Further Mathematics

Further Mathematics 8360/1
Level 2

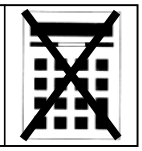
Practice Paper Set 3

Paper 1

Non-Calculator

For this paper you must have:
- mathematical instruments.

You may **not** use a calculator.



Time allowed
1 hour 30 minutes

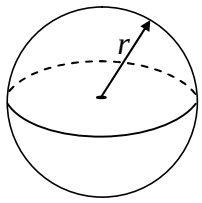
Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the space provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 70.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer booklet.

Formulae Sheet

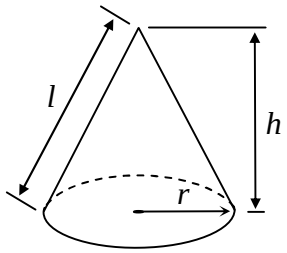
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



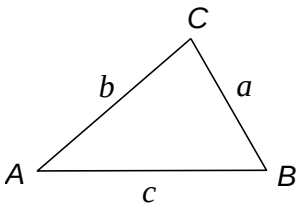
Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



In any triangle *ABC*

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



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

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

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

The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

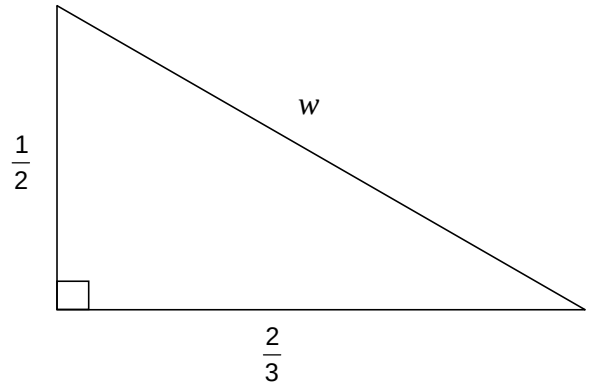
Trigonometric Identities

$\tan\theta \equiv \frac{\sin\theta}{\cos\theta}$ $\sin^2\theta + \cos^2\theta \equiv 1$

Answer **all** questions in the spaces provided.

1 Work out the exact value of w.

Not drawn accurately



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$w =$ ..... *(4 marks)*

2 $5(3x - 2) - 3(x - h) \equiv 4(kx + 2)$

Work out the values of h and k.

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$h =$ ....., $k =$ ..... *(4 marks)*

8

3 Solve $\frac{y-2}{5} + \frac{2y+1}{4} = 3$

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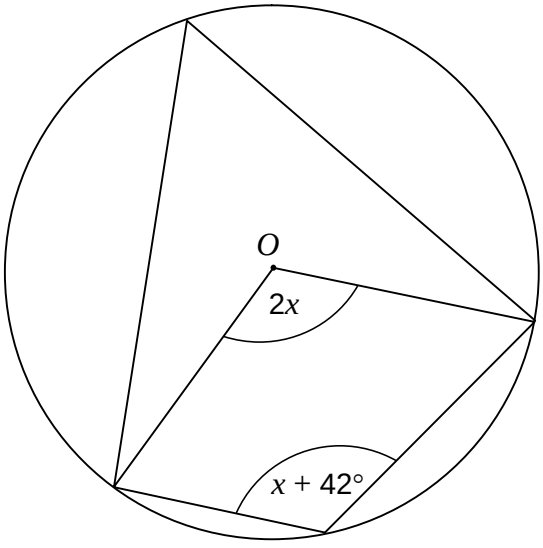
$y =$ ……..... *(4 marks)*

4 O is the centre of this circle.



Not drawn accurately

Work out the value of x.

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$x =$ ..... degrees *(3 marks)*

5 Simplify fully $20a^9b^6 \div 4a^3b^2$

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Answer ..... *(2 marks)*

6 The matrix $\begin{pmatrix} a & b \\ -a & 2b \end{pmatrix}$ maps the point (5, 4) onto the point (1, 17).

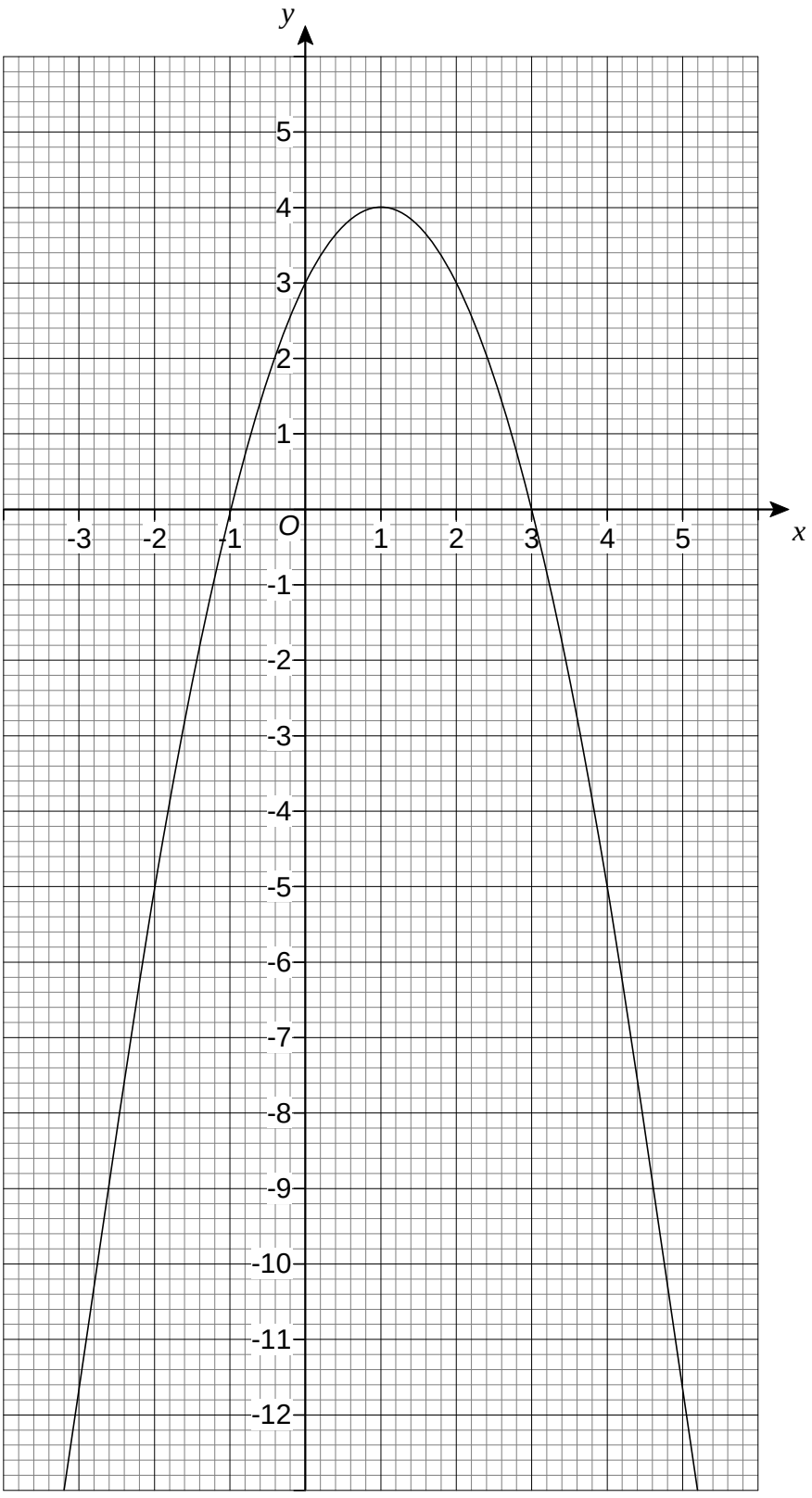
Work out the values of a and b.

a = ..., b = ... *(5 marks)*

14

7 f(x) is a quadratic function with domain all real values of x.

Part of the graph of $y = f(x)$ is shown.



7 (a) Write down the range of f(x).

Answer ..... *(1 mark)*

7 (b) Use the graph to find solutions of the equation f(x) = 1

Give your solutions to one decimal place.

Answer ..... *(2 marks)*

7 (c) Use the graph to solve f(x) < 0

Answer ..... *(2 marks)*

8 $x^{\frac{1}{2}} = 6$ and $y^{-3} = 64$

Work out the value of $\frac{x}{y}$

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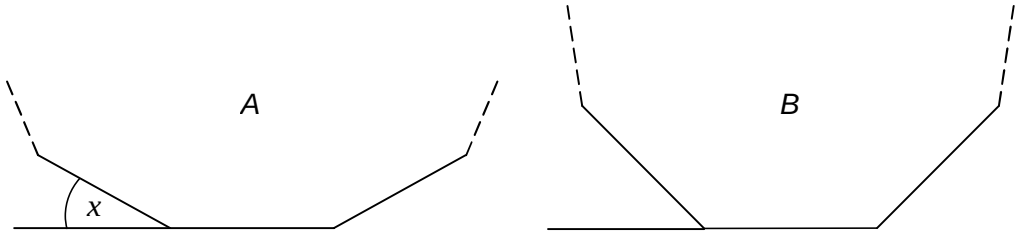
Answer ..... *(4 marks)*

9

9 *A* and *B* are regular polygons.

An exterior angle of *A* is x.

Not drawn accurately



Here is some information about them.

	A : ***B***
Ratio of exterior angles	1 : 3
Ratio of interior angles	7 : 6

9 (a) Write down an expression in x for an exterior angle of polygon *B*.

Answer ..... *(1 mark)*

9 (b) Prove that polygon *A* has 30 sides.

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(5 marks)

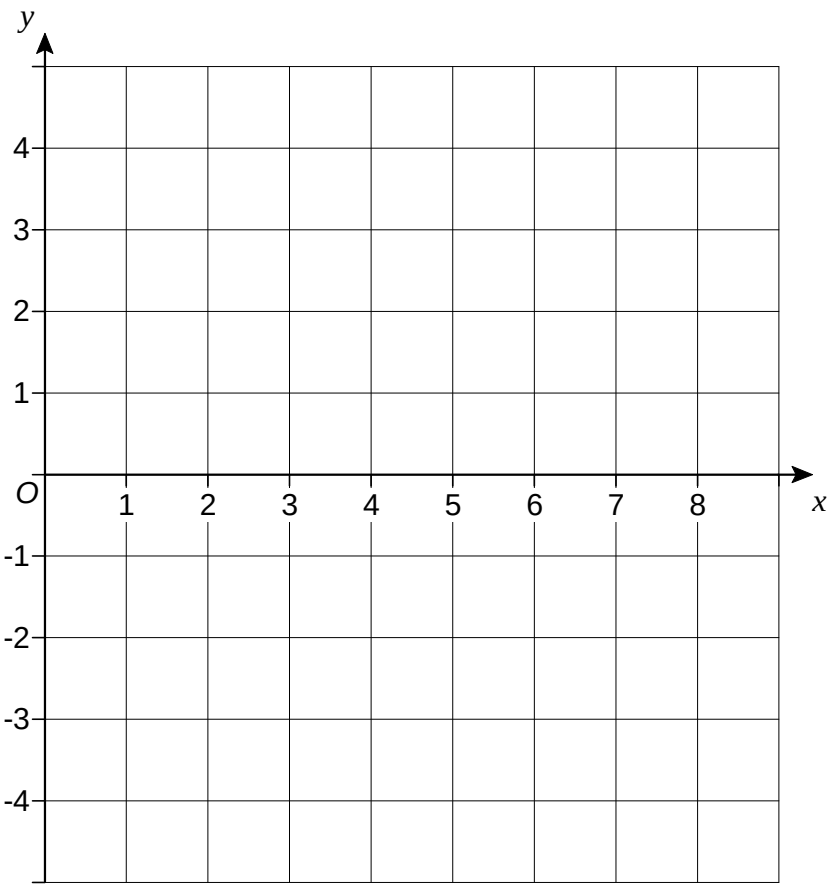
10 $y = f(x)$ is a continuous graph.

When $0 \leqslant x < 3$ $\frac{dy}{dx} = 2$ and this part of the graph passes through (2, 1).

When $3 \leqslant x < 5$ $\frac{dy}{dx} = 0$

When $5 \leqslant x \leqslant 8$ $\frac{dy}{dx} = -1$

Draw the graph of $y = f(x)$ for $0 \leqslant x \leqslant 8$



(3 marks)

Turn over for the next question

11 Angle θ is obtuse and $\sin\theta = \frac{\sqrt{5}}{3}$

Work out the values of $\cos\theta$.

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$\cos\theta$ = ... *(4 marks)*

12 (a) $(x + 3)$ is a factor of $x^3 + 6x^2 + ax - 12$

Show that the value of a is 5

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(2 marks)

12 (b) Hence, factorise fully $x^3 + 6x^2 + 5x - 12$

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$(x + 3)$ (……) (……) *(3 marks)*

Turn over for the next question

9

13 Expand and simplify $(\sqrt{5} + 3)(\sqrt{5} - 2)(\sqrt{5} + 1)$

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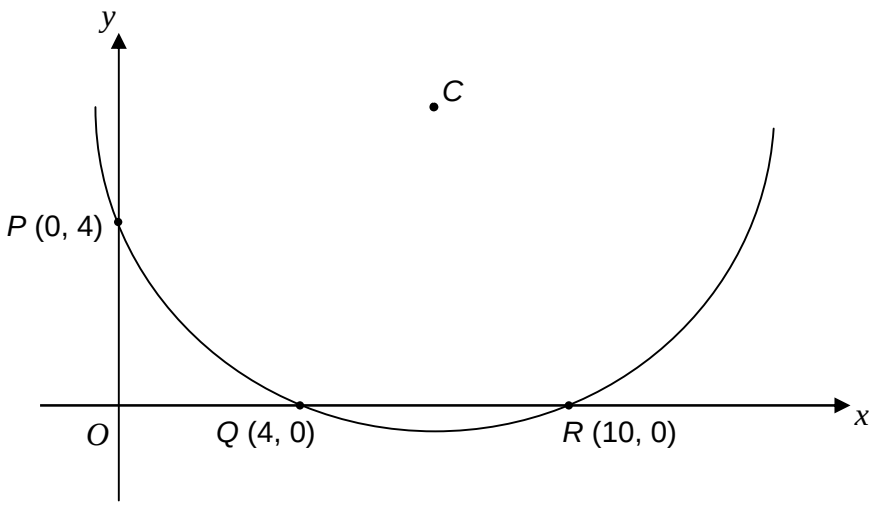
Answer ..... *(4 marks)*

14 The sketch shows part of a circle, centre *C*, that intersects the axes at points *P*, *Q* and *R*.



14 (a) Explain why the centre of the circle lies on the line $x = 7$.

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(1 mark)

14 (b) Show that the line $y = x$ is the perpendicular bisector of the line PQ.

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(2 marks)

14 (c) Work out the equation of the circle.

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Answer ..... *(4 marks)*

Turn over for the next question

11

Do not write outside the box

15 $2x^2 - 4x + 5 \equiv a(x + b)^2 + c$

Work out the values of a, b and c.

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a = ..., b = ..., c = ... *(4 marks)*

16 A curve has equation $y = 4x^3 + 6x^2 + 3x + 5$

Work out the coordinates of any stationary points on this curve and determine their nature.

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Answer ..... *(6 marks)*

10

END OF QUESTIONS

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED