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	
TOTAL	

Level 2 Certificate in Further Mathematics

Further Mathematics 8360/1
Level 2

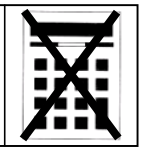
Practice Paper Set 2

Paper 1

Non-Calculator

For this paper you must have:
- mathematical instruments.

You may **not** use a calculator.



Time allowed
1 hour 30 minutes

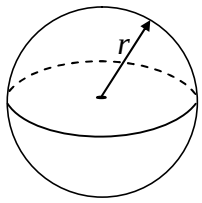
Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the space provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. 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

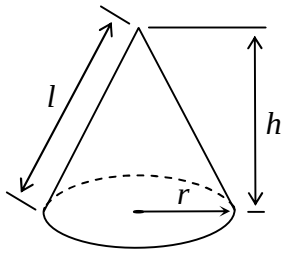
Volume of sphere = $\frac{4}{3}\pi r^3$

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



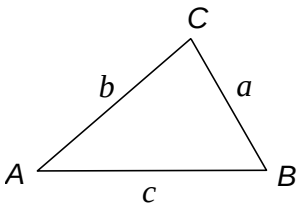
Volume of cone = $\frac{1}{3}\pi r^2 h$

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 $y = 2x^3 - 5x$

Work out $\frac{dy}{dx}$.

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

2 Here is a linear sequence.

4 11 18 25 ……

2 (a) Work out an expression for the nth term.

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Answer ……..... *(2 marks)*

2 (b) How many terms are less than 150?

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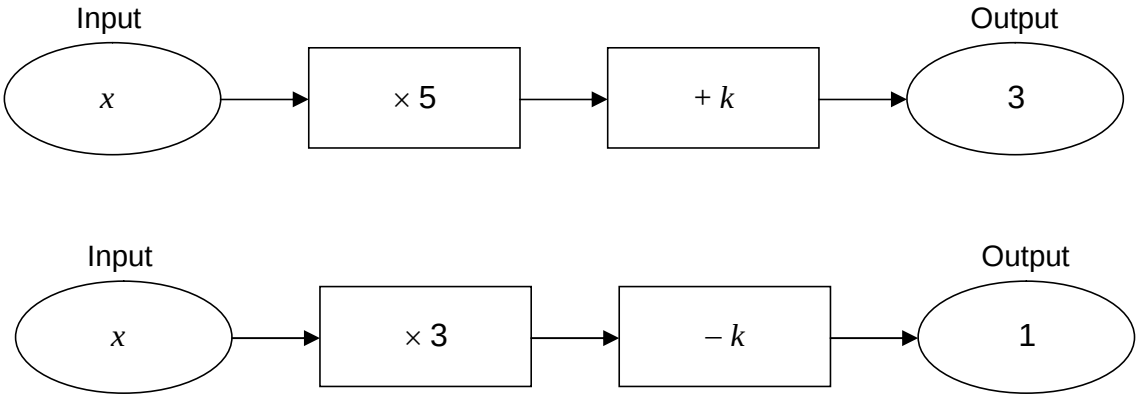
Answer ……..... *(2 marks)*

Turn over for the next question

6

3 Here are two number machines with the same input, x.



Work out the value of x.

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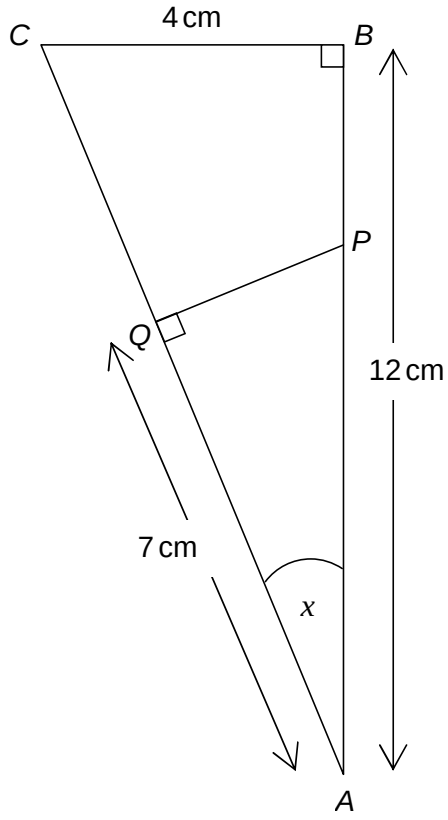
Answer x = ... *(4 marks)*

4 The transformation matrix $\begin{pmatrix} a & 2 \\ -1 & 1 \end{pmatrix}$ maps the point (3, 4) onto the point (2, b).

Work out the values of a and b.

Answer a = ..., b = ... *(3 marks)*

5 The diagram shows two right-angled triangles *ABC* and *APQ*.



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5 (a) Using triangle *ABC*, write down the value of tan x.

Answer tan x = ... *(1 mark)*

5 (b) Work out the length of *PQ*.

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

Turn over for the next question

10

6 Expand and simplify $(5x - 2y)(4x + 3y)$

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Answer ..... *(3 marks)*

7 $p \Delta t$ is defined as $3p^2 + p - t^2 - t$

For example $7 \Delta 2 = 3(7^2) + 7 - 2^2 - 2$
$= 147 + 7 - 4 - 2$
$= 148$

7 (a) Work out $4 \Delta -3$

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

7 (b) Work out all the solutions of the equation $x \Delta 5 = 0$

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

8 The equation of line L is $2x + y = 3$

8 (a) Line M is parallel to line L and passes through $(1, -6)$.

Work out the equation of line M.

Give your answer in the form $y = ax + b$

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Answer ..... *(3 marks)*

8 (b) Line N is perpendicular to line L and passes through $(-5, 4)$.

Work out the point of intersection of line N and the x-axis.

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

Turn over for the next question

16

9 Simplify fully $\dfrac{3x}{(x-3)(x+6)} - \dfrac{2}{(x+6)}$

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

10 Make y the subject of the formula $x = \sqrt{\dfrac{y+1}{y-2}}$

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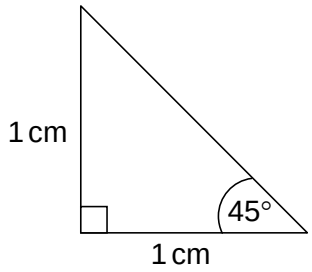
Answer ..... *(5 marks)*

11 (a) Here is a right-angled triangle.



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Show clearly that $\sin 45° = \frac{1}{\sqrt{2}}$

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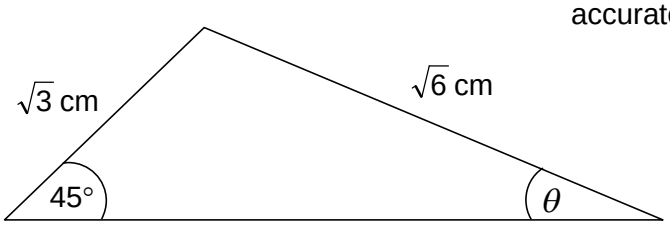
(1 mark)

11 (b) Here is a triangle.



Not drawn accurately

Work out the value of θ.

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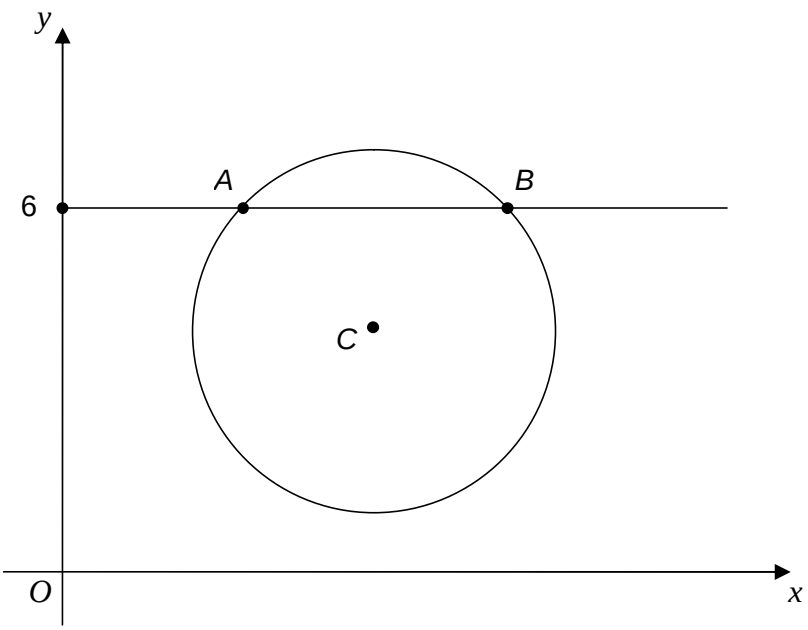
Answer ..... degrees *(5 marks)*

15

12 The diagram shows a sketch of the circle $(x - 7)^2 + (y - 4)^2 = 9$ with centre C.
The line $y = 6$ intersects the circle at A and B.

Show that $AB = 2\sqrt{5}$



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(5 marks)

Do not write outside the box

13 Work out the value of x if $\dfrac{\sqrt{x} \times \sqrt{8}}{\sqrt{3}} = 4\sqrt{5}$

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Answer x = ……..... *(4 marks)*

14 $(x - 5)$ is a factor of $x^3 - 6x^2 + ax - 20$

Work out the value of a.

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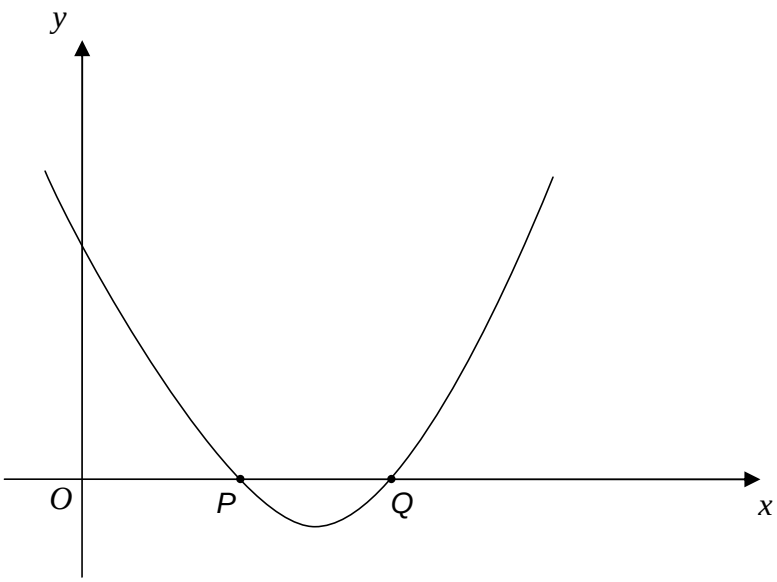
Answer a = ……..... *(3 marks)*

12

15 The graph shows a sketch of $y = (x - 2)(x - 3)$

The curve intersects the x-axis at P and Q.



Show that the tangents at P and Q are perpendicular.

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(5 marks)

Do not write outside the box

16 n is a positive integer.

Prove that $(n + 2)^2 + (n + 1)^2 - 1$ is **always** a multiple of 4.

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(6 marks)

11

END OF QUESTIONS

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED