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	
16	
TOTAL	

AQA Level 2 Certificate in Further Mathematics

Further Mathematics 8360/1

Level 2

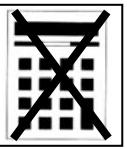
Practice Paper Set 4

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.

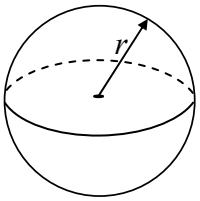
Information

- 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

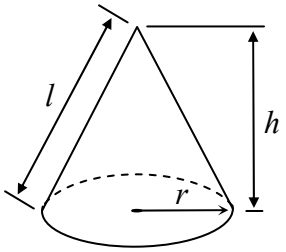
Volume of sphere = $\frac{4}{3}\pi r^3$

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



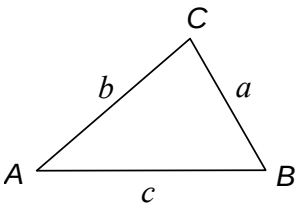
Volume of cone = $\frac{1}{3}\pi r^2 h$

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

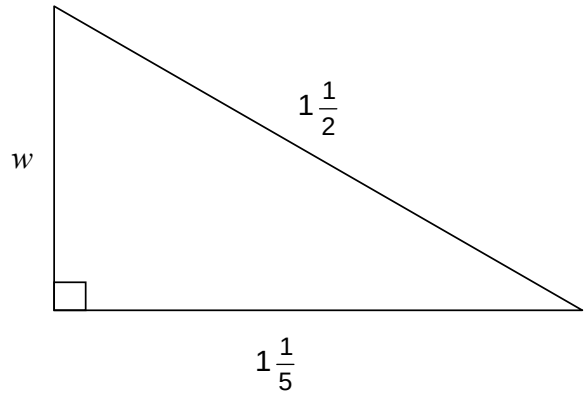
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

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 value of w.

w = ... *(4 marks)*

4

2 In this identity, h and k are integer constants.

$$4(hx - 1) - 3(x + h) \equiv 5(x + k)$$

Work out the values of h and k.

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

3 (a) $x : y = 3 : 2$

Write x in terms of y.

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

3 (b) Use your answer to part (a) to simplify $2x + y : 3x - 2y$

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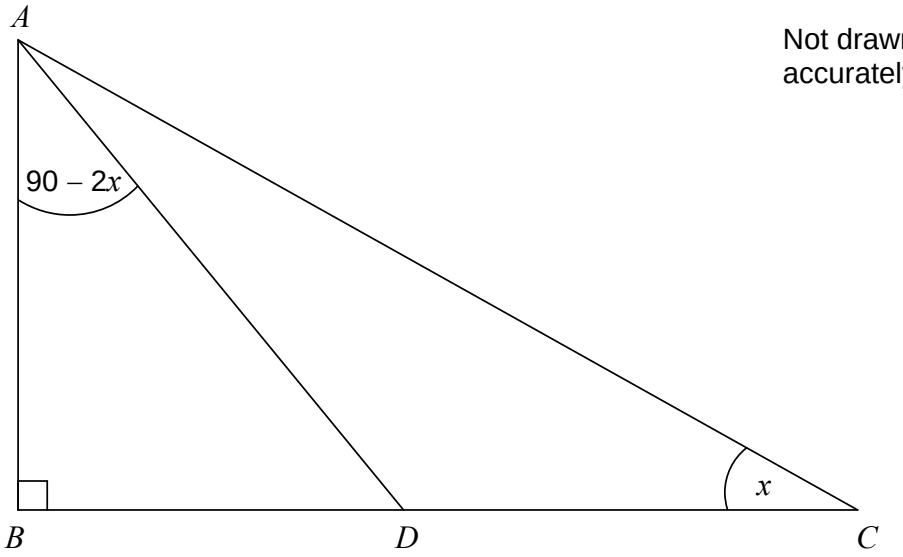
Answer ..... *(2 marks)*

4 ABC is a right-angled triangle.

Angle $ACB = x$

Angle $BAD = 90 - 2x$



Not drawn accurately

Prove that ACD is an isosceles triangle.

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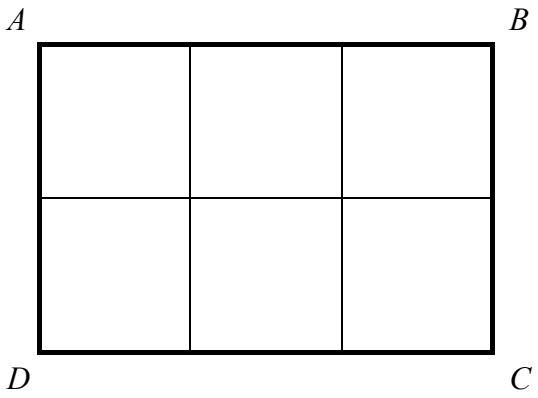
(3 marks)

Turn over for the next question

5 The rectangle $ABCD$ is divided into 6 identical squares.

The side of each square is x cm.



Not drawn accurately

When the perimeter and the area of $ABCD$ are given in cm and cm^3 respectively, they have the same numerical value.

Work out x.

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

6 $y = \dfrac{3x(2x^4 - 5x)}{x^2}$

Work out $\dfrac{\mathrm{d}y}{\mathrm{d}x}$

$\dfrac{\mathrm{d}y}{\mathrm{d}x}$ = ... *(3 marks)*

7 Given that $\dfrac{2}{h} - \dfrac{3}{k} = 4$

show that $h = \dfrac{2k}{4k + 3}$

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(3 marks)

10

8 Work out the gradient of the curve $y = (3x - 4)(x + 2)$ at the point (2, 8)

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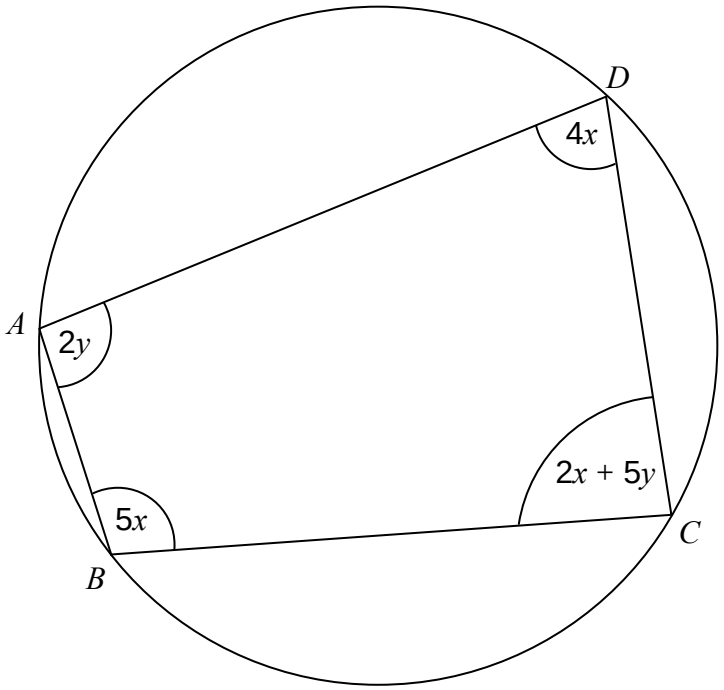
Answer ..... *(3 marks)*

9 $ABCD$ is a cyclic quadrilateral.

Not drawn accurately



Prove that $x = y$

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(4 marks)

7

10 $y = 10 - 8x - x^3$ for all values of x.

Show that y is a decreasing function for all values x.

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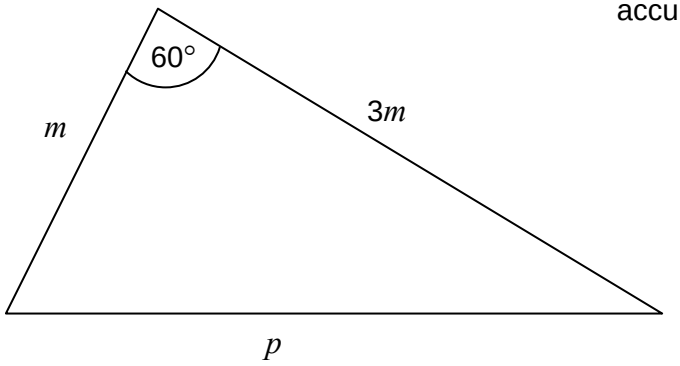
(3 marks)

11

Not drawn accurately



Use the cosine rule to show that $p = m\sqrt{7}$

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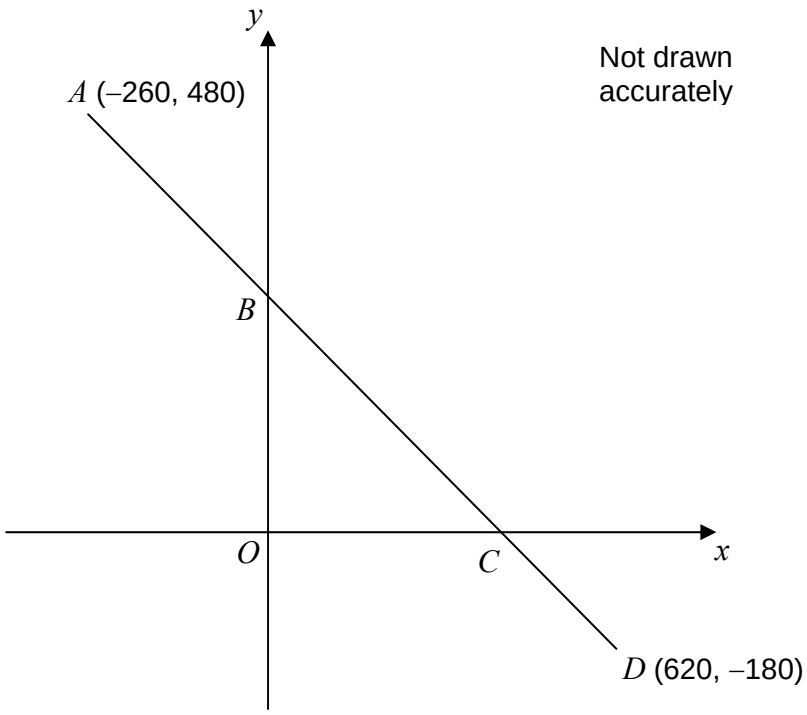
(3 marks)

12 The diagram shows a straight line $ABCD$.

A is the point (–260, 480)

D is the point (620, –180)

The line cuts the y-axis at B and the x-axis at C.



Not drawn accurately

Work out the coordinates of B and C.

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B = (……, ……) C = (……, ……) *(6 marks)*

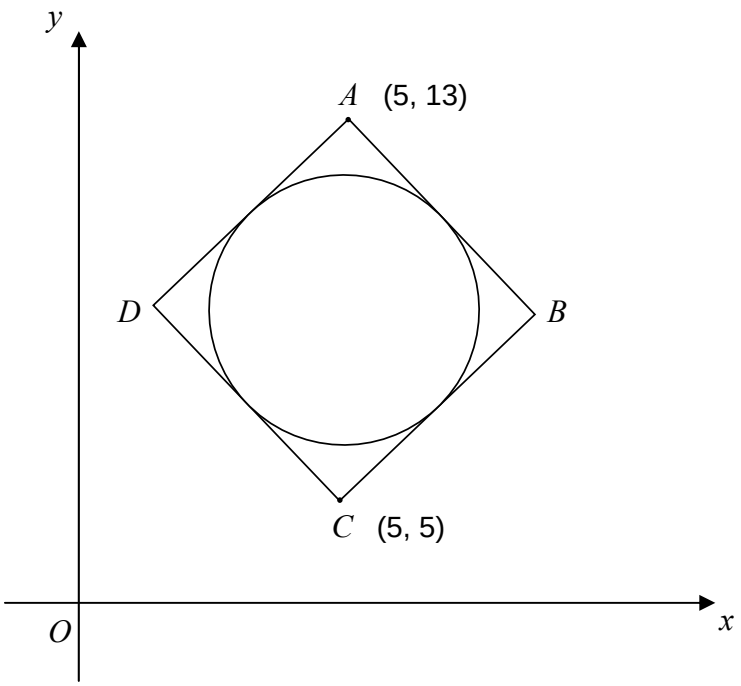
12

13 $ABCD$ is a square.

A is the point (5, 13)

C is the point (5, 5)

The circle touches the sides of the square.



Not drawn accurately

Work out the equation of the circle.

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

14 (a) Show that $(x - 2)$ is a factor of $x^3 + 8x^2 + x - 42$

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(2 marks)

14 (b) Hence, or otherwise, work out **all** solutions of $x^3 - 8x^2 + x - 42 = 0$

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

11

15 Rationalise the denominator and simplify $\dfrac{5\sqrt{5} - 2}{2\sqrt{5} - 3}$

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

Do not write outside the box

16 Prove that, for **all** values of x, $2x^2 - 8x + 9 > 0$

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(5 marks)

Turn over for the next question

9

17 $\begin{pmatrix} 2 & a \\ 1 & -3 \end{pmatrix}\begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$

Work out **all** possible pairs of values of a and b.

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

END OF QUESTIONS

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