

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	



Level 2 Certificate in Further Mathematics
June 2013

Further Mathematics

8360/1

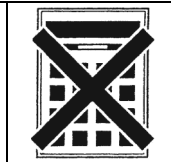
Level 2

Paper 1 Non-Calculator

Wednesday 19 June 2013 1.30 pm to 3.00 pm

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 spaces 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 book.

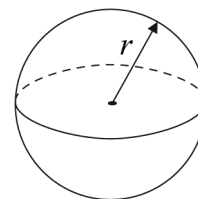


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Formulae Sheet

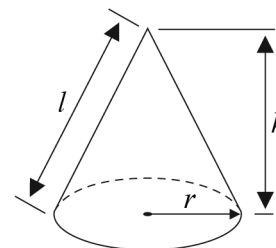
Volume of sphere $= \frac{4}{3}\pi r^3$

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



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

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



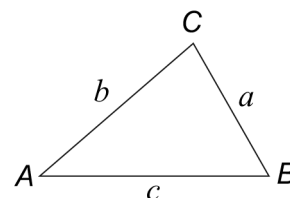
In any triangle ABC

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

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



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

1 A curve has gradient function $\frac{dy}{dx} = 9 - x^3$

1 (a) Work out the gradient of the curve when $x = -1$

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Answer..... (2 marks)

1 (b) Work out the value of x where the rate of change of y with respect to x is 1.

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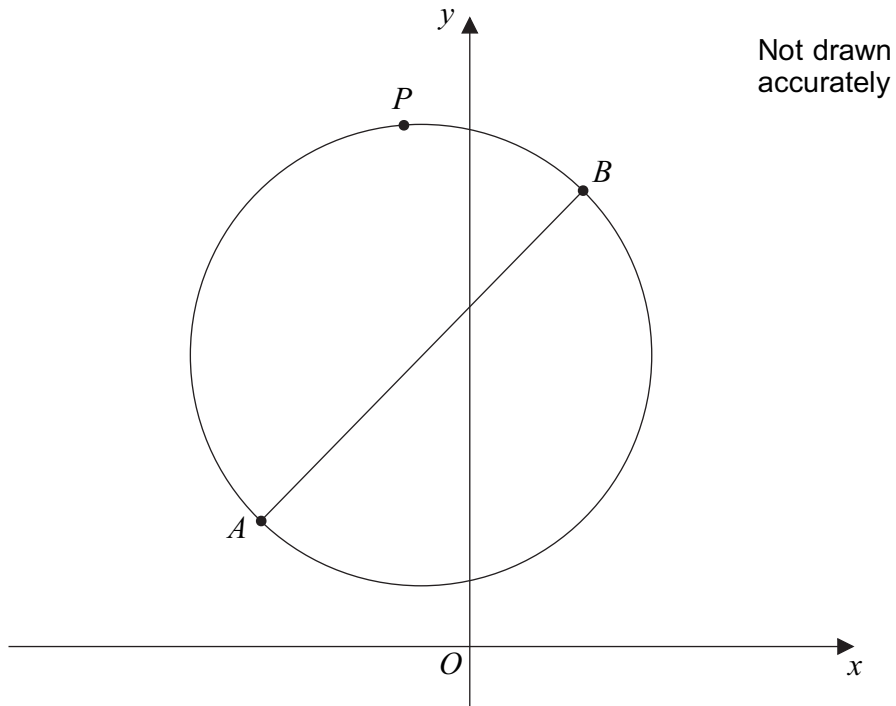
Answer..... (2 marks)

Turn over for the next question



2 A is $(-4, 3)$ and B is $(2, 11)$

AB is a diameter of the circle.



2 (a) Work out the coordinates of the centre of the circle.

Centre = (.....,) (2 marks)



2 (b) Work out the radius of the circle.

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Radius = (2 marks)

2 (c) Write down the equation of the circle.

Answer (1 mark)

2 (d) P is another point on the circle.
The gradient of the line AP is 2.

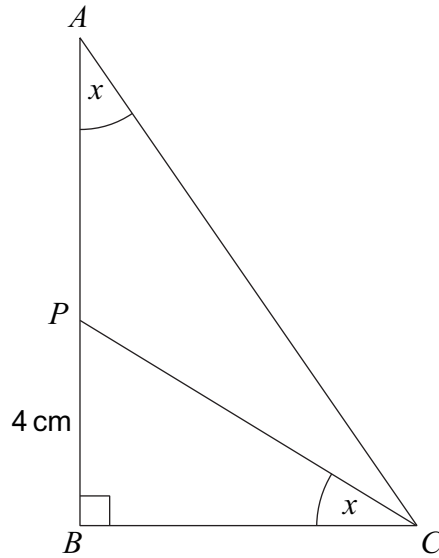
Write down the gradient of the line PB .

Answer..... (1 mark)

Turn over for the next question



- 3** ABC is a right-angled triangle.
 P is a point on AB .



Not drawn
accurately

$$BP = 4 \text{ cm} \quad \text{and} \quad \tan x = \frac{2}{3}$$

- 3 (a)** Work out the length of BC .

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Answer cm (2 marks)

- 3 (b)** Work out the length of AP .

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Answer cm (3 marks)



4 Solve $\sqrt{(33 + \sqrt{x})} = 6$

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$x =$ (3 marks)

5 (a) Show that $(x + 7)^2 - (x - 3)^2$ simplifies to $20(x + 2)$

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(3 marks)

5 (b) Hence, or otherwise, work out $107^2 - 97^2$

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Answer..... (2 marks)



6

Simplify $(3xy^5)^4$

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Answer..... (2 marks)

7

Expand and simplify $(y^2 - 5y + 2)(2y - 3)$

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Answer..... (3 marks)



9 Solve $x^2 + 6x + 7 = 0$

Give your answer in the form $a \pm \sqrt{b}$, where a and b are integers.

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Answer..... (4 marks)

10 Make x the subject of the formula $\frac{a + 2x}{a - x} = n$

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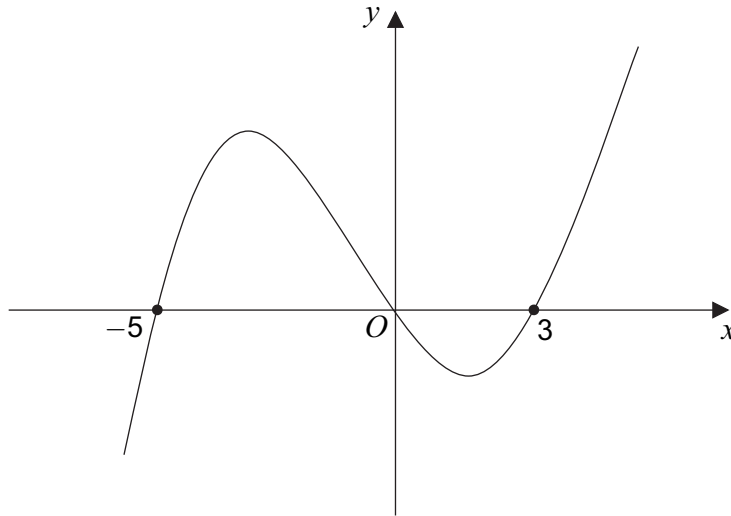
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Answer..... (4 marks)



11 Here is a sketch of a cubic function $y = f(x)$



11 (a) Use the sketch to write down the **three** linear factors of $f(x)$.

Answer.....,, (2 marks)

11 (b) You are given that $f(x) = x^3 + bx^2 + cx$

Work out the values of b and c .

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$b =$, $c =$ (2 marks)



12

Work out **all** solutions for x and y if

$$\begin{pmatrix} x & 3 \\ 1 & y \end{pmatrix} \begin{pmatrix} x \\ -4 \end{pmatrix} = \begin{pmatrix} 4x \\ 8 \end{pmatrix}$$

Answer..... (5 marks)



13 Solve $y(\sqrt{3} - 1) = 8$

Give your answer in the form $a + b\sqrt{3}$ where a and b are integers.

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$y =$ (4 marks)

Turn over for the next question



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(6 marks)

15

Express $2x^2 - 12x - 7$ in the form $a(x + b)^2 + c$

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Answer..... (4 marks)

Turn over for the next question

10

Turn over ►



16 Solve $x^{-\frac{2}{3}} = 7\frac{1}{9}$

Write your answer as a proper fraction.

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$x =$ (5 marks)

END OF QUESTIONS

