

Centre Number					Candidate Number				
Surname									
Other Names									
Candidate Signature									

For Examiner's Use	
Examiner's Initials	
Pages	Mark
3	
4 – 5	
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TOTAL	



Level 2 Certificate in Further Mathematics
June 2012

Further Mathematics Level 2

8360/2

Paper 2 Calculator

Friday 1 June 2012 1.30 pm to 3.30 pm

<p>For this paper you must have:</p> <ul style="list-style-type: none"> • a calculator • mathematical instruments. 	
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Time allowed

- 2 hours

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 105.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer booklet.
- The use of a calculator is expected but calculators with a facility for symbolic algebra must **not** be used.

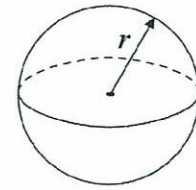


J U N 1 2 8 3 6 0 2 0 1

Formulae Sheet

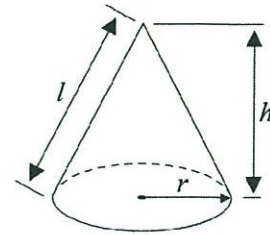
$$\text{Volume of sphere} = \frac{4}{3}\pi r^3$$

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



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

$$\text{Curved surface area of cone} = \pi r l$$



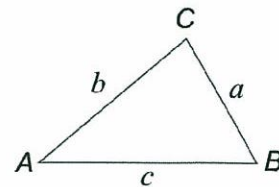
In any triangle ABC

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

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

$$\text{Cosine rule} \quad a^2 = b^2 + c^2 - 2bc \cos A$$

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



The Quadratic Equation

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

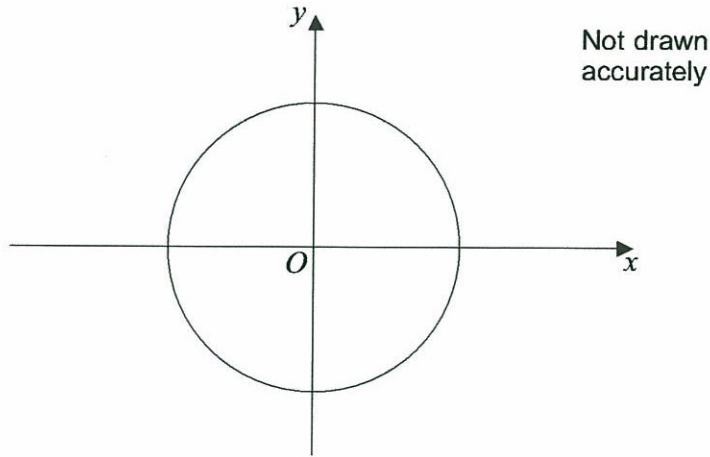
Trigonometric Identities

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



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

- 1 Here is a sketch of the circle $x^2 + y^2 = 36$



Work out the circumference of the circle.

$x^2 + y^2 = 6^2$ is the equation of a circle centred at $(0,0)$ with radius 6. \therefore Circumference of circle
 $= 2\pi r = 2\pi(6) = 12\pi = 37.7$ (3 s.f.).

Answer... 12π or 37.7 (3 s.f.). (3 marks)

Turn over for the next question



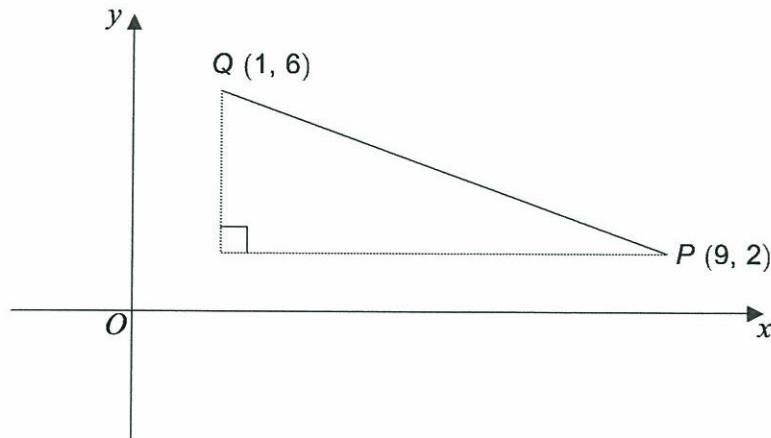
2

$$y = 5x^3 - 4x^2$$

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

$$\frac{dy}{dx} = \dots\dots\dots 15x^2 - 8x \dots\dots\dots \text{ (2 marks)}$$

3



Not drawn
accurately

Work out the length of PQ .
Give your answer to 3 significant figures.

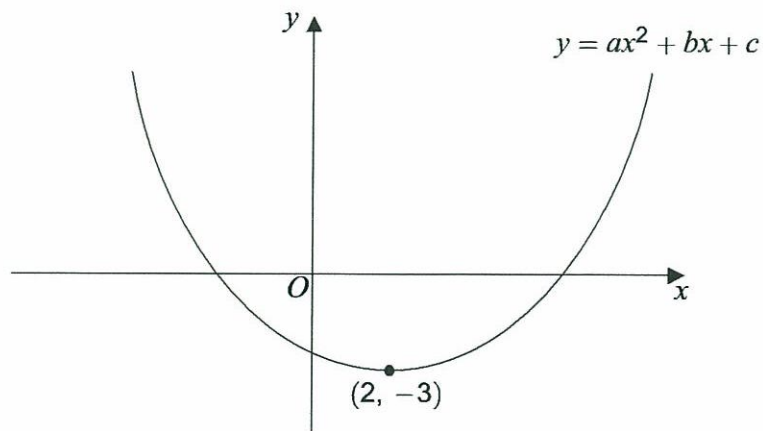
$$PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(9-1)^2 + (2-6)^2}$$

$$= \sqrt{8^2 + (-4)^2} = \sqrt{80} = 8.94 \text{ (3 s. f.)}$$

$$PQ = \dots\dots\dots 8.94 \text{ (3 s. f.)} \dots\dots\dots \text{ (4 marks)}$$



- 4 A sketch of $y = ax^2 + bx + c$ is shown.
The minimum point is $(2, -3)$.



For the sketch shown, circle the correct answer in each of the following.

- 4 (a) The value of a is
 zero positive negative (1 mark)
- 4 (b) The value of c is
 zero positive negative (1 mark)
- 4 (c) The solutions of $ax^2 + bx + c = 0$ are
 both zero both positive both negative one positive and one negative (1 mark)
- 4 (d) The **number** of solutions of $ax^2 + bx + c = -6$ is
0 1 2 3 (1 mark)
- 4 (e) The equation of the tangent to $y = ax^2 + bx + c$ at $(2, -3)$ is
 $x = 2$ $y = 2$ $x = -3$ $y = -3$ (1 mark)

