

Centre Number					Candidate Number				
Surname									
Other Names									
Candidate Signature									

For Examiner's Use	
Examiner's Initials	
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TOTAL	



Level 2 Certificate in Further Mathematics  
June 2012

**Further Mathematics**

**8360/1**

**Level 2**

**Paper 1 Non-Calculator**

**Tuesday 29 May 2012 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 booklet.



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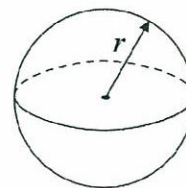
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**8360/1**

## Formulae Sheet

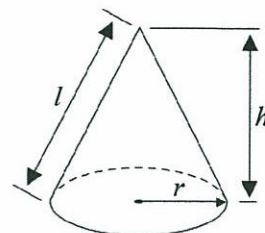
$$\text{Volume of sphere} = \frac{4}{3}\pi r^3$$

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



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

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



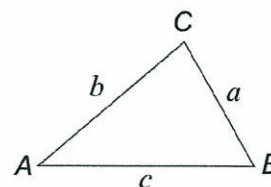
In any triangle  $ABC$

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

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

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

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



**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  $f(x) = 2x^2 + 7$  for all values of  $x$ .

1 (a) What is the value of  $f(-1)$ ?

Answer.....  $2(-1)^2 + 7 = 2(1) + 7 = 9$  (1 mark)

1 (b) What is the range of  $f(x)$ ?

Answer.....  $f(x) \geq 7$  (1 mark)

$x^2 \geq 0$  for all  $x$ , so  $2x^2 \geq 0$  and  $2x^2 + 7 \geq 7$

2  $A = \begin{pmatrix} 2 & 0 \\ 1 & 3 \end{pmatrix}$   $B = \begin{pmatrix} 5 \\ 4 \end{pmatrix}$

Work out the matrix **AB**.

$$AB = \begin{pmatrix} 2 & 0 \\ 1 & 3 \end{pmatrix} \begin{pmatrix} 5 \\ 4 \end{pmatrix} = \begin{pmatrix} 2(5) + 0(4) \\ 1(5) + 3(4) \end{pmatrix} = \begin{pmatrix} 10 \\ 17 \end{pmatrix}$$

**AB** =  $\begin{pmatrix} 10 \\ 17 \end{pmatrix}$  (2 marks)



- 3 Work out the greatest integer value of  $x$  that satisfies the inequality  $3x + 10 < 1$

$$x < \frac{1-10}{3} \Rightarrow x < -3$$

$$\therefore \text{Greatest integer value for } x = -4$$

Answer  $x = -4$  ..... (2 marks)

- 4 (a) Factorise fully  $2x^2 - 2x - 40$

$$(2x + 8)(x - 5) \equiv 2(x + 4)(x - 5)$$

Answer  $2(x + 4)(x - 5)$  ..... (3 marks)

- 4 (b) Factorise fully  $(x + y)^2 + (x + y)(2x + 5y)$

$$(x + y) [(x + y) + (2x + 5y)]$$

$$= (x + y)(3x + 6y)$$

$$= 3(x + y)(x + 2y)$$

Answer  $3(x + y)(x + 2y)$  ..... (3 marks)

