

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**  
**MATHEMATICS C (GRADUATED ASSESSMENT)**  
**MODULE M10 (SECTION A)**
**B280A**
**Tuesday 21 June 2011**  
**Afternoon**
**Duration:** 30 minutes

Candidates answer on the question paper.

**OCR supplied materials:**

None

**Other materials required:**

- Geometrical instruments
- Tracing paper (optional)



Candidate forename						Candidate surname					
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Centre number						Candidate number				
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**INSTRUCTIONS TO CANDIDATES**

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Show your working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Answer **all** the questions.
- Do **not** write in the bar codes.

**INFORMATION FOR CANDIDATES**

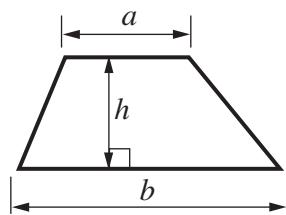
- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this Section is **25**.
- This document consists of **8** pages. Any blank pages are indicated.

**WARNING**

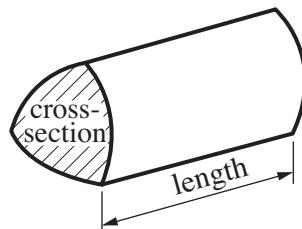
No calculator can be  
used for Section A of  
this paper

## Formulae Sheet

$$\text{Area of trapezium} = \frac{1}{2}(a + b)h$$



$$\text{Volume of prism} = (\text{area of cross-section}) \times \text{length}$$

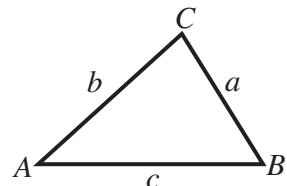


In any triangle  $ABC$

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

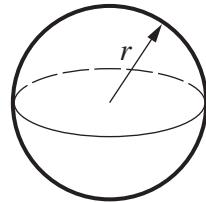
$$\text{Cosine rule} \quad a^2 = b^2 + c^2 - 2bc \cos A$$

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



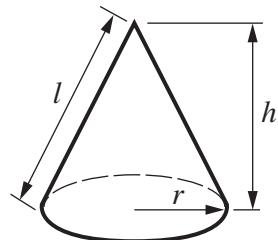
$$\text{Volume of sphere} = \frac{4}{3} \pi r^3$$

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



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

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



### The Quadratic Equation

The solutions of  $ax^2 + bx + c = 0$ , where  $a \neq 0$ , are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

**PLEASE DO NOT WRITE ON THIS PAGE**

1 (a) Express each of these decimals as fractions.

(i)  $0.\dot{6}$

(a)(i) ..... [1]

(ii)  $0.0\dot{6}$

(ii) ..... [1]

(b) Hence, or otherwise, express  $0.\dot{7}\dot{6}$  as a fraction in its simplest form.

(b) ..... [2]

2 (a) Simplify.

$$\frac{6x^2 + 2x}{4x}$$

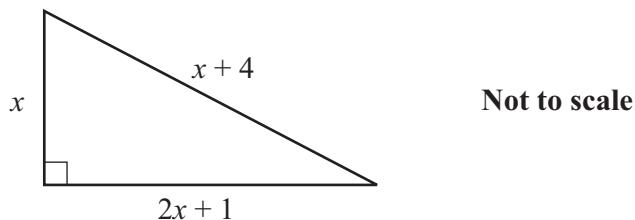
(a) ..... [2]

(b) Write as a single fraction.  
Simplify your answer.

$$\frac{3}{x} + \frac{7}{x+2}$$

(b) ..... [2]

- 3 The diagram shows a right-angled triangle.  
All lengths are in centimetres.



(a) Use Pythagoras' theorem to show that  $4x^2 - 4x - 15 = 0$ . [2]

(b) Hence find the length of the shortest side of the triangle.

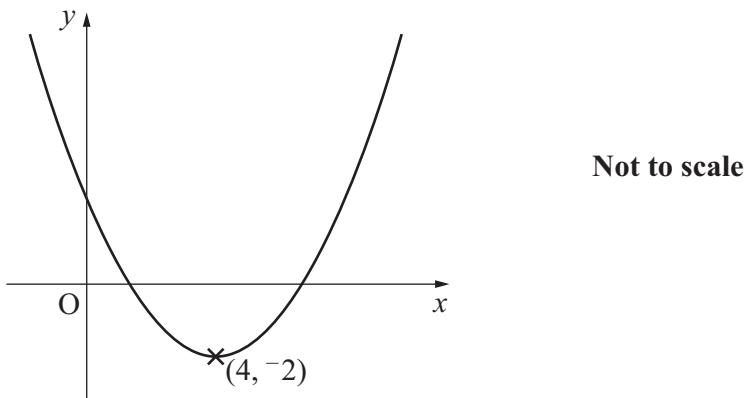
(b) ..... cm [3]

- 4 Simplify, giving your answer in the form  $a + b\sqrt{3}$ .

$$\frac{12 + \sqrt{3}}{\sqrt{3}}$$

..... [2]

- 5 This is a sketch of  $y = f(x)$ .



The minimum point of the graph is  $(4, -2)$ .

Write down the coordinates of the minimum point for each of the following graphs.

(a)  $y = f(x + 3)$

(a) ( ..... , ..... ) [1]

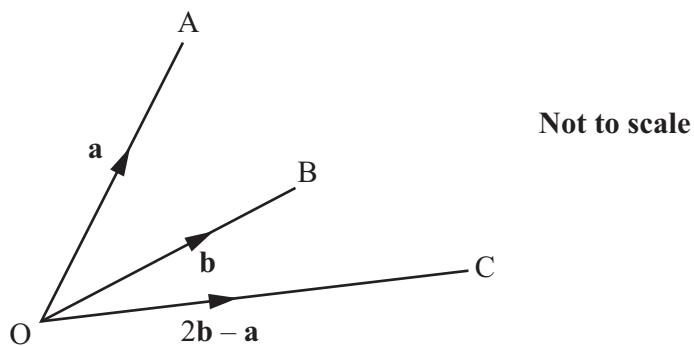
(b)  $y = f(x) + 3$

(b) ( ..... , ..... ) [1]

(c)  $y = 3f(x)$

(c) ( ..... , ..... ) [1]

6



In the diagram,

$$\overrightarrow{OA} = \mathbf{a}, \quad \overrightarrow{OB} = \mathbf{b}, \quad \overrightarrow{OC} = 2\mathbf{b} - \mathbf{a}.$$

(a) Find the following vectors in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .

(i)  $\overrightarrow{AB}$

(a)(i) ..... [1]

(ii)  $\overrightarrow{AC}$

(ii) ..... [1]

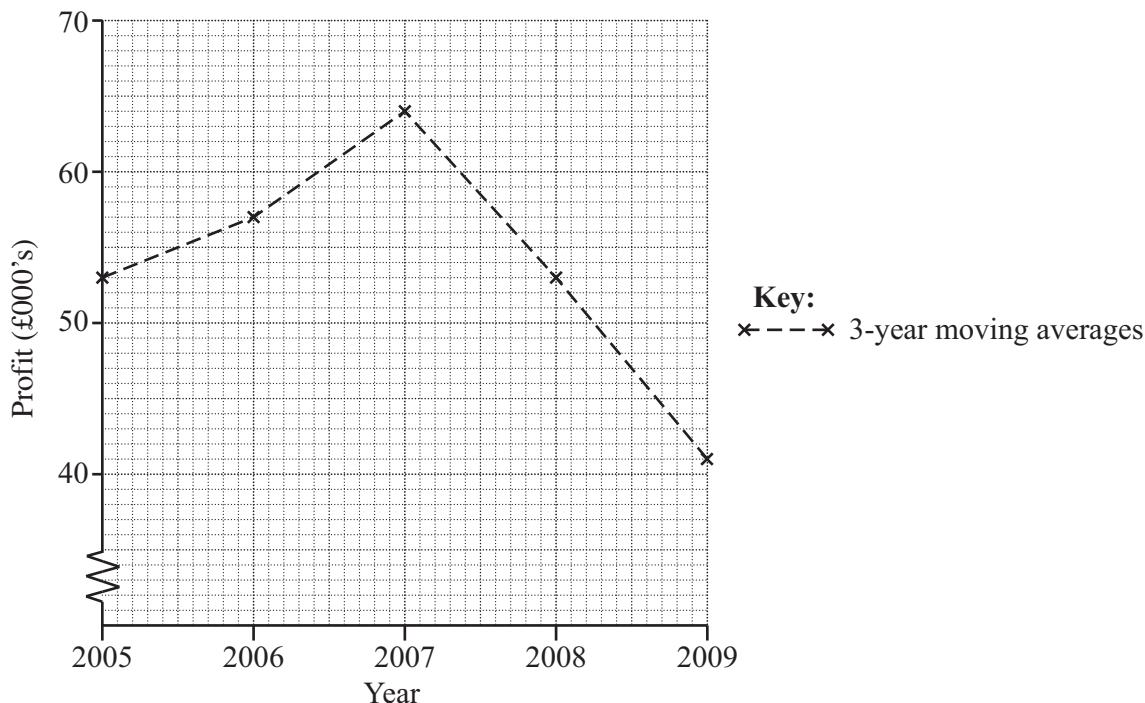
(b) What can you deduce about the points A, B and C?

.....  
.....  
.....  
..... [2]

**TURN OVER FOR QUESTION 7**

- 7 A company sells garden furniture.

The graph shows the 3-year moving averages for the company's profits.



In 2009 the company made a profit of £29 000.

In 2010 the company made a profit of £36 000.

Use the graph to help you work out the profit the company made in 2008.

£ ..... [3]

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