

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**  
**MATHEMATICS C (GRADUATED ASSESSMENT)**  
MODULE M10 – SECTION B

**B280B**

Candidates answer on the question paper

**OCR Supplied Materials:**  
None

**Other Materials Required:**

- Geometrical instruments
- Tracing paper (optional)
- Scientific or graphical calculator

**Monday 9 March 2009**  
**Morning**

**Duration: 30 minutes**



|                    |  |                   |  |
|--------------------|--|-------------------|--|
| Candidate Forename |  | Candidate Surname |  |
|--------------------|--|-------------------|--|

|               |  |  |  |  |  |  |                  |  |  |  |  |
|---------------|--|--|--|--|--|--|------------------|--|--|--|--|
| Centre Number |  |  |  |  |  |  | Candidate Number |  |  |  |  |
|---------------|--|--|--|--|--|--|------------------|--|--|--|--|

**INSTRUCTIONS TO CANDIDATES**

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that 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.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

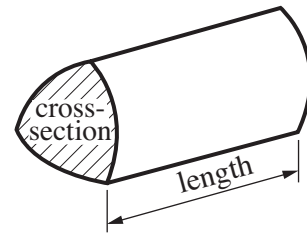
**INFORMATION FOR CANDIDATES**

- The number of marks is given in brackets [ ] at the end of each question or part question.
- Section B starts with question 7.
- You are expected to use a calculator in Section B of this paper.
- Use the  $\pi$  button on your calculator or take  $\pi$  to be 3.142 unless the question says otherwise.
- The total number of marks for this Section is **25**.
- This document consists of **8** pages. Any blank pages are indicated.

|                           |  |
|---------------------------|--|
| <b>FOR EXAMINER'S USE</b> |  |
| <b>SECTION B</b>          |  |

## Formulae Sheet

**Volume of prism** = (area of cross-section)  $\times$  length

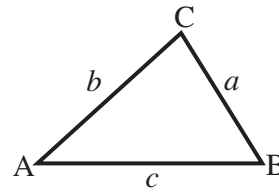


**In any triangle ABC**

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

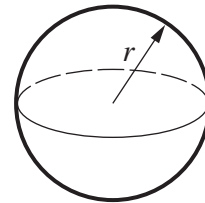
**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

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



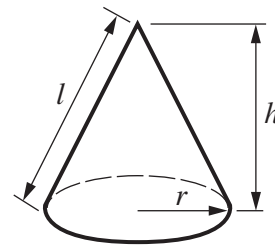
**Volume of sphere** =  $\frac{4}{3} \pi r^3$

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



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

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



**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**

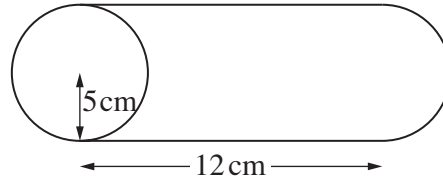
7 Solve.

$$2x^2 + 3x - 8 = 0$$

Give your answers correct to two decimal places.

..... [3]

- 8 Some plasticine is sold in the shape of a cylinder.  
The radius is 5 cm and the length is 12 cm.



All the plasticine is made into a sphere.

Calculate the radius of the sphere.

..... cm [4]

- 9 The population of Comma butterflies is decreasing.  
In 2006 the population in one area was 4000 butterflies.

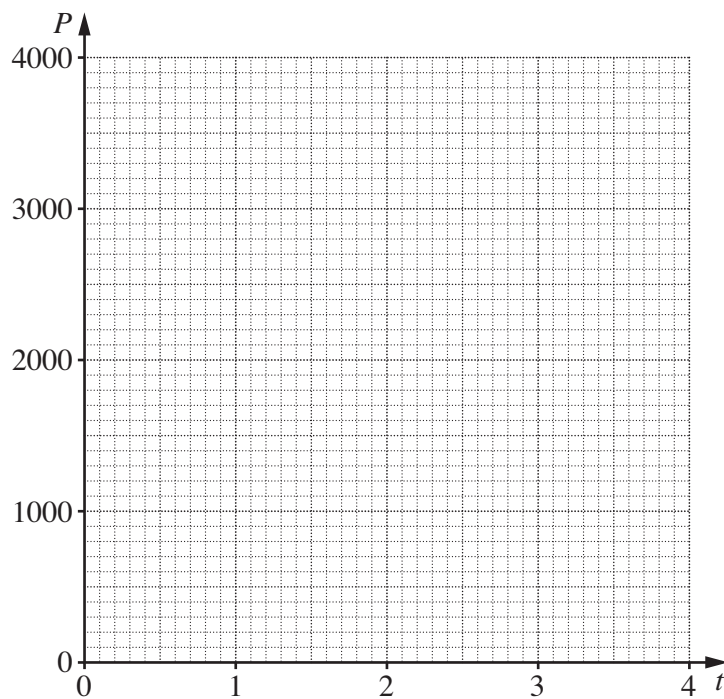
The population,  $P$ , of Comma butterflies,  $t$  years after 2006 is given by this formula.

$$P = 4000 \times 0.88^t$$

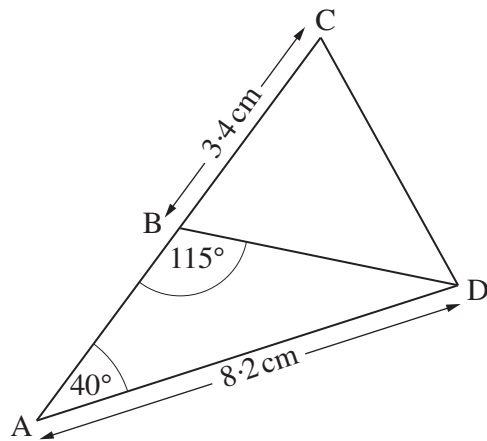
- (a) By what percentage is this population decreasing each year?

(a) ..... % [1]

- (b) Draw the graph of  $P = 4000 \times 0.88^t$  for  $0 \leq t \leq 4$ .



[3]



Not to scale

(a) Show that  $BD = 5.8$  cm correct to 2 significant figures.

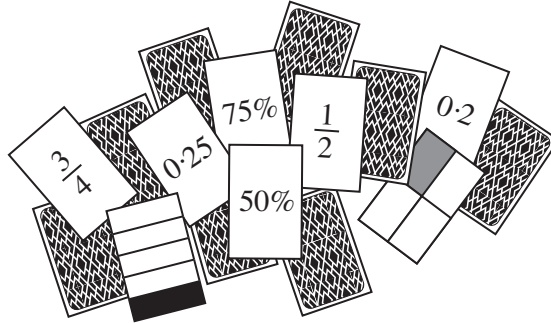
[2]

(b) Calculate CD.

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

11 In the game *Match* there are 16 cards.

- 4 cards are equivalent to a half.
- 4 cards are equivalent to a quarter.
- 4 cards are equivalent to a fifth.
- 4 cards are equivalent to three quarters.



The 16 cards are placed face down on a table.  
The aim of the game is to find matching pairs.

Heather picks two cards at random and turns them over.

(a) Work out the probability that she turns over a pair of cards equivalent to a half.

(a) ..... [2]

(b) Work out the probability that she **does not** turn over any pair of equivalent cards.

(b) ..... [3]

**TURN OVER FOR QUESTION 12**

12 Prove that  $\frac{a-2}{a-3} - \frac{a+2}{a+3} = \frac{2a}{a^2-9}$ .

[4]

**Copyright Information**

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations, is given to all schools that receive assessment material and is freely available to download from our public website ([www.ocr.org.uk](http://www.ocr.org.uk)) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1PB.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.