

**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 21 June 2010**  
**Afternoon**

**Duration: 30 minutes**



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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**INSTRUCTIONS TO CANDIDATES**

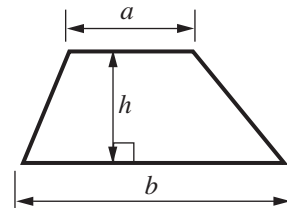
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Show your working. 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. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).

**INFORMATION FOR CANDIDATES**

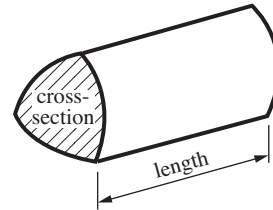
- The number of marks is given in brackets [ ] at the end of each question or part question.
- Section B starts with question 7.
- You are expected to use a calculator for this section of the paper.
- Use the  $\pi$  button on your calculator or take  $\pi$  to be 3.142 unless the question says otherwise.
- The total number of marks for this Section is **25**.
- This document consists of **12** pages. Any blank pages are indicated.

## Formulae Sheet

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



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

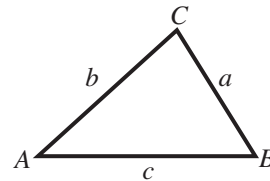


**In any triangle  $ABC$**

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

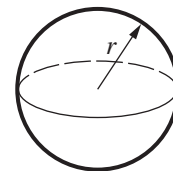
**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

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



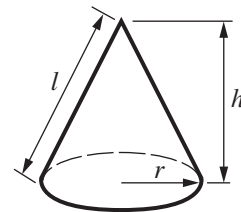
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

**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

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

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- 7 A scientist is experimenting with a radioactive substance. The mass,  $M$  grams, of the substance  $t$  minutes after the start of the experiment is given by this formula.

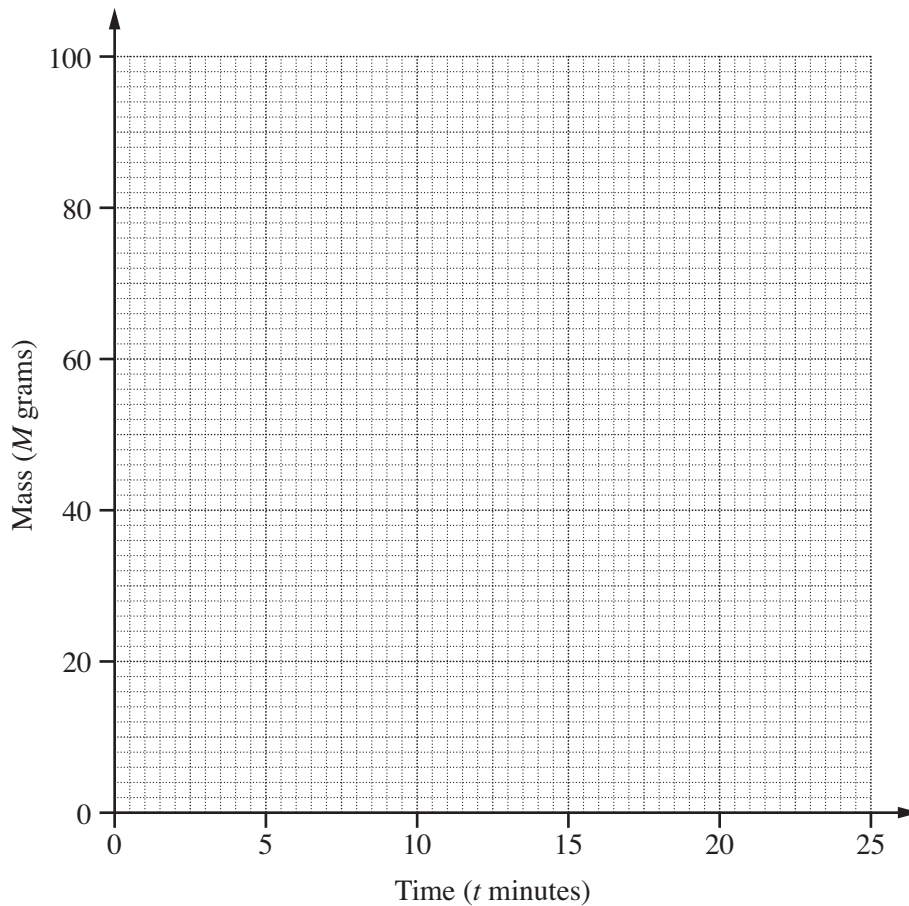
$$M = 100 \times 0.92^t$$

- (a) (i) Complete this table of values for  $M = 100 \times 0.92^t$ .

Time ( $t$ minutes)	0	5	10	15	20	25
Mass ( $M$ grams)	100	65.9	43.4	28.6		12.4

[1]

- (ii) Draw a graph to show this information.



[2]

- (b) The half-life of a radioactive substance is the time taken for the mass to reduce to half of its original value.

Use your graph to find the half-life of this radioactive substance.

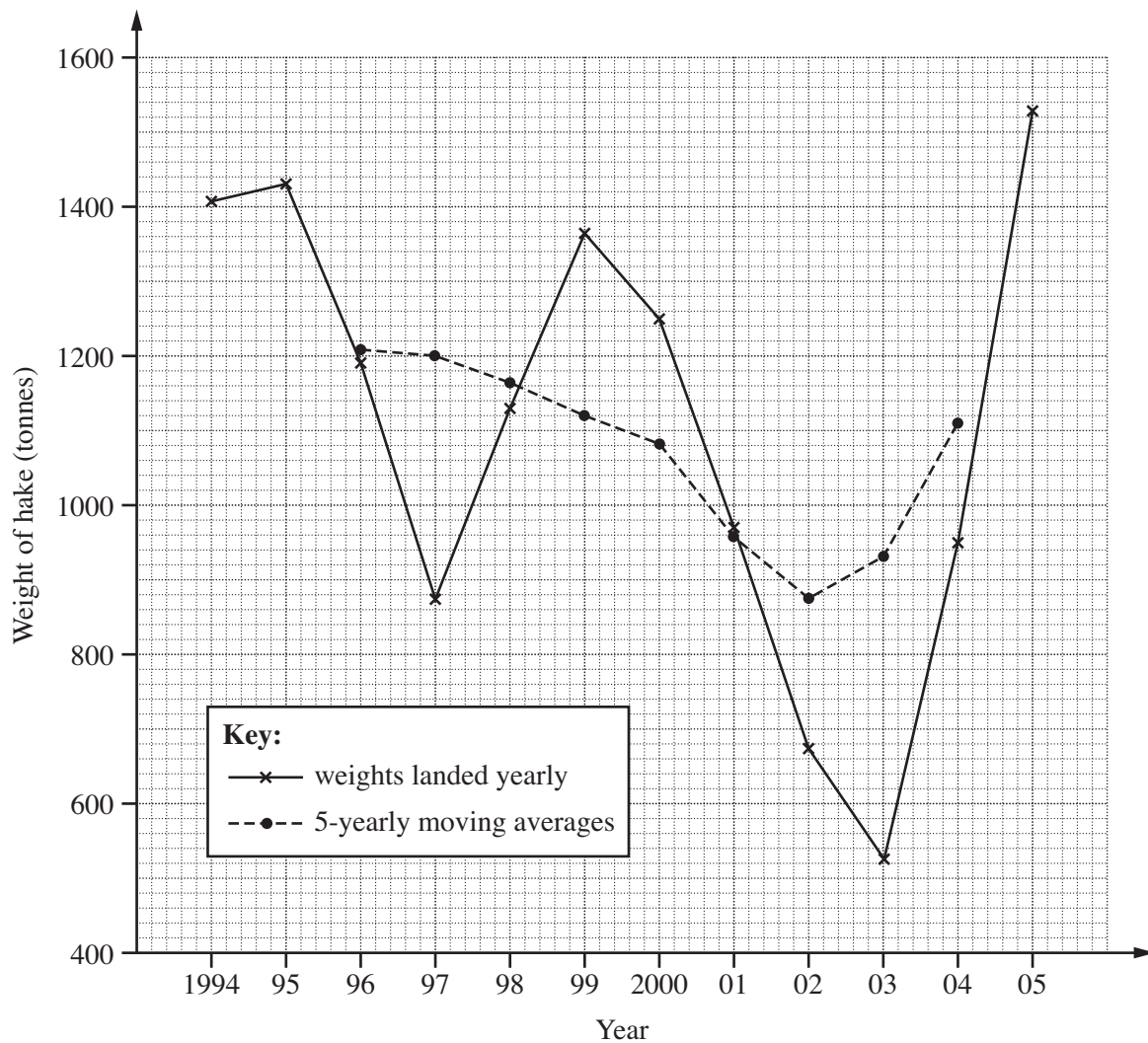
(b) ..... minutes [1]

- 8 The table shows the weight, to the nearest tonne, of hake landed at Scottish fishing ports from 1994 to 2005.

Year	1994	1995	1996	1997	1998	1999
Weight (tonnes)	1409	1437	1194	874	1137	1362

Year	2000	2001	2002	2003	2004	2005
Weight (tonnes)	1252	976	677	525	947	1530

These data have been plotted on the grid along with the 5-year moving averages.



- (a) Describe what the moving averages show about the weight of hake landed at Scottish fishing ports.

.....

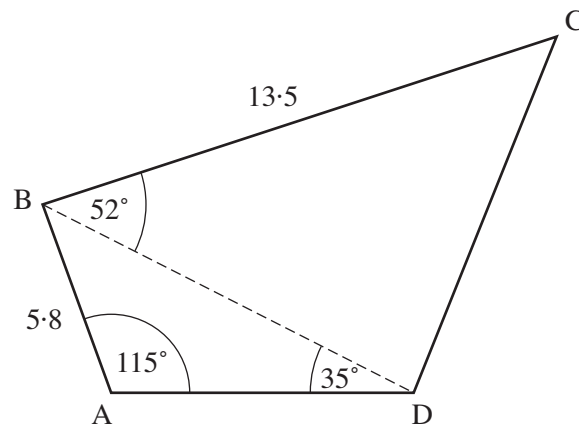
.....

..... [1]

- (b) Use the last moving average on the graph, and the table, to help you calculate the weight of hake landed in 2006. Show your method clearly.

(b) ..... tonnes [2]

- 9 ABCD is a quadrilateral.  
 $AB = 5.8$  cm and  $BC = 13.5$  cm.  
 Angle  $BAD = 115^\circ$ , angle  $DBC = 52^\circ$  and angle  $BDA = 35^\circ$ .



- (a) Calculate the length BD.

(a) ..... cm [3]

- (b) Calculate the area of triangle BCD.

(b) .....  $\text{cm}^2$  [2]

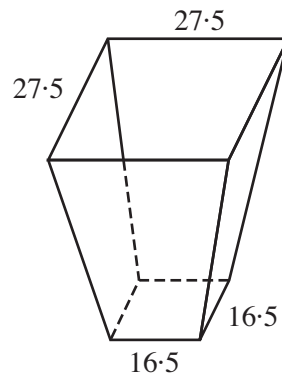
10 Solve algebraically.

$$\frac{3}{x+2} + \frac{4}{2x-1} = 2$$

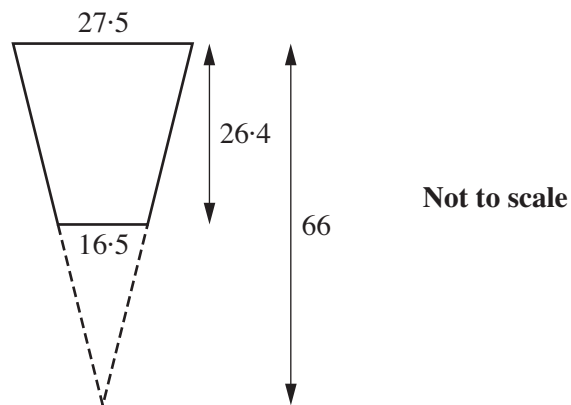
Write your answers correct to 2 decimal places.

..... and .....[7]

- 11 This diagram shows a planter with a square base and a square top. The sloping edges are all the same length. All measurements are in centimetres.



The diagram below shows a cross-section of the planter.

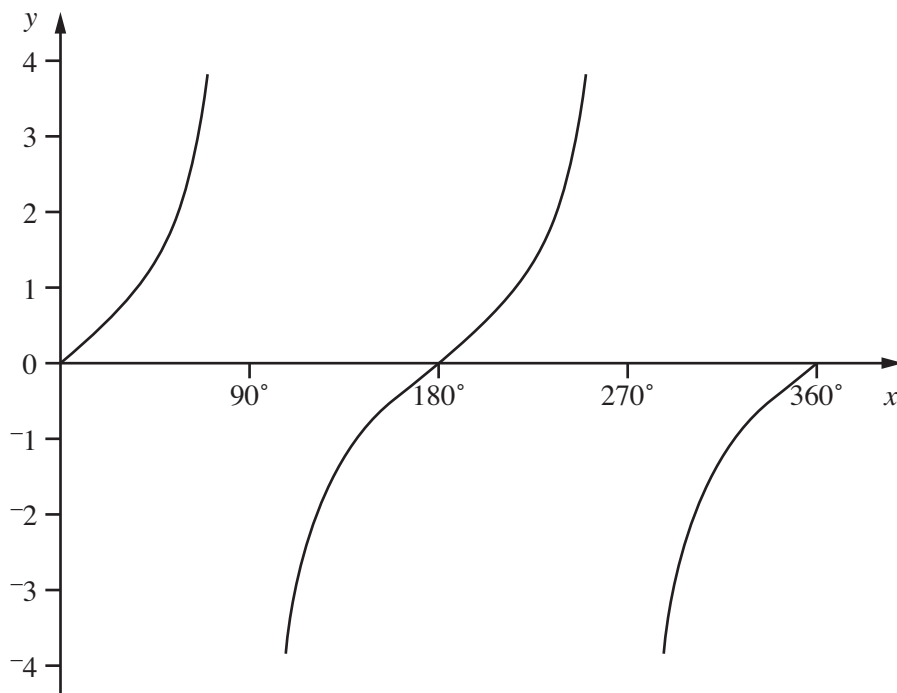


Calculate the volume of the planter.

.....  $\text{cm}^3$  [4]



12 This is the graph of  $y = \tan x$  for  $0^\circ \leq x \leq 360^\circ$ .



Solve the equation  $\tan x = -1.5$  for  $0^\circ \leq x \leq 360^\circ$ .  
Give your answers correct to one decimal place.

..... $^\circ$  and ..... $^\circ$  [2]

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