

GENERAL CERTIFICATE OF SECONDARY EDUCATION
MATHEMATICS C (GRADUATED ASSESSMENT)
Terminal Paper – Section B (Higher Tier)

B282B

Candidates answer on the Question Paper

OCR Supplied Materials:

None

Other Materials Required:

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

Monday 7 June 2010
Afternoon

Duration: 1 hour



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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MODIFIED LANGUAGE

INSTRUCTIONS TO CANDIDATES

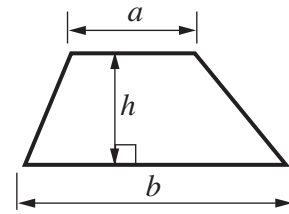
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Show your working.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

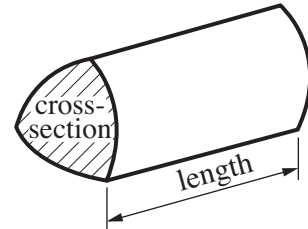
- The number of marks is given in brackets [] at the end of each question or part question.
- Section B starts with question 11.
- You are expected to use a calculator in Section B of this paper.
- Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.
- The total number of marks for this Section is **50**.
- This document consists of **16** pages. Any blank pages are indicated.

Formulae Sheet

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



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

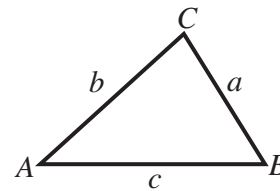


In any triangle ABC

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

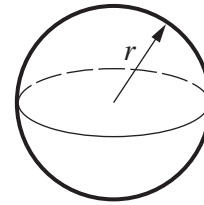
$$\text{Cosine rule} \quad a^2 = b^2 + c^2 - 2bc \cos A$$

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



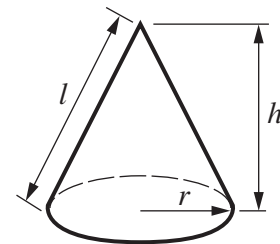
$$\text{Volume of sphere} = \frac{4}{3}\pi r^3$$

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



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

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



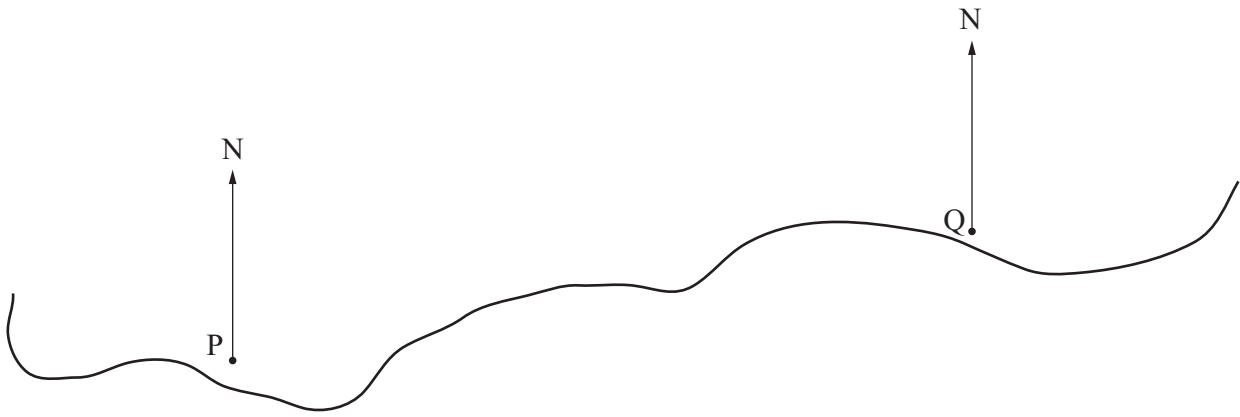
The Quadratic Equation

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

- 11 The map shows two viewpoints, P and Q, on an island.



A boat is seen on a bearing of 126° from P and 208° from Q.

Construct on the map the position of the boat.
Label it B.

[3]

- 12 Calculate.

$$\frac{54.1 - 30.98}{19 \times 0.4}$$

Give your answer correct to 2 decimal places.

..... [2]

13 (a) Multiply out.

$$5(x - 4)$$

(a) [1]

(b) Factorise.

$$x^2 + 3x$$

(b) [1]

(c) Rearrange $y = 5x - 2$ to make x the subject.

(c) [2]

14 This table gives information about three burgers.

	Total Weight (g)	Carbohydrate (g)
Bumper burger	274	47
Cheese burger	173	29
Veggie burger	252	54

Which of these burgers has the highest percentage of carbohydrate by weight?
Show your working clearly.

..... [3]

15 There are three businesses in an office block.

The three businesses share the cleaning costs in the ratio of the number of their employees.

- Ace Accountancy has 16 employees
- Basic Insurance has 12 employees
- Classic Finance has 20 employees

(a) Write the ratio 16 : 12 : 20 in its simplest form.

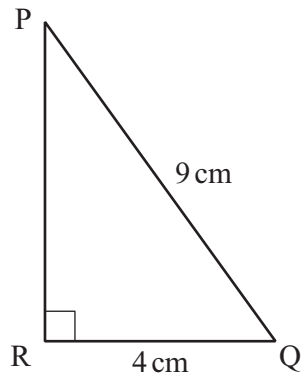
(a) : : [1]

(b) The cleaning cost is £42 000.

Work out how much of this cost Classic Finance pays.

(b) £ [2]

16



Not to scale

Calculate PR.

.....cm [3]

17 A firm records the distances that 50 employees travel to work. This table summarises the results.

Distance (d miles)	Frequency
$0 < d \leq 5$	22
$5 < d \leq 10$	13
$10 < d \leq 20$	8
$20 < d \leq 40$	7

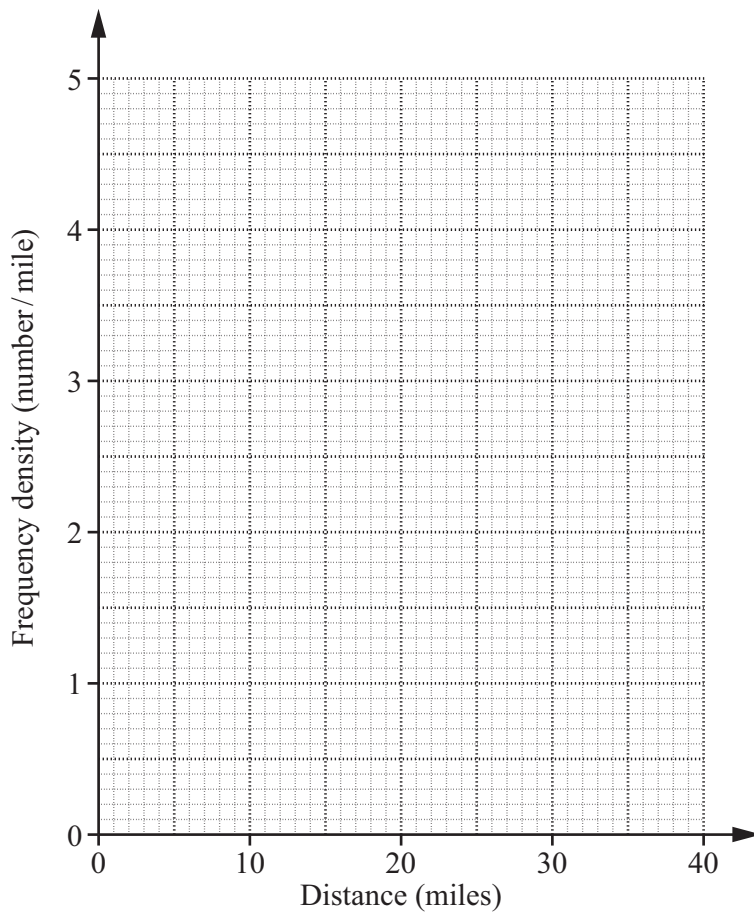
(a) Give a reason for choosing unequal class widths.

.....
 [1]

(b) Calculate an estimate of the mean distance travelled.

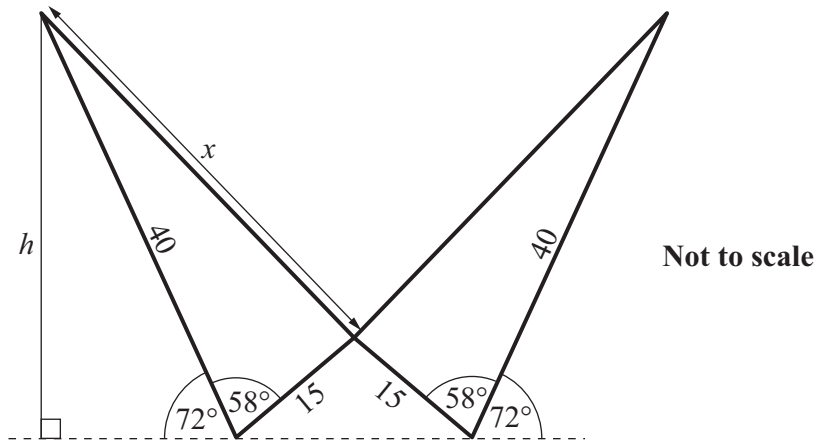
(b)miles [4]

(c) Draw a histogram to show the distribution of the distances that the employees travel to work.



[3]

- 18 This is a sketch of the logo for WV bikes.
All lengths are in millimetres.



- (a) Calculate the height, h , of the logo.

(a) mm [3]

- (b) Calculate the length marked x .

(b) mm [3]

19 In September 2005 the total area of ice in the Arctic was $5.3 \times 10^6 \text{ km}^2$.
The total land area of Germany is $3.5 \times 10^5 \text{ km}^2$.

(a) In September 2005, how many times was the area of ice in the Arctic bigger than Germany?

(a) [2]

(b) By September 2006, the area of ice had decreased by 12% of its September 2005 area.
By September 2007, the area of ice had decreased by 12% of its September 2006 area.

What was the area of ice in September 2007?

(b) km^2 [2]

(c) Assume that the area of ice in the Arctic continues to decrease at a rate of 12% each year.

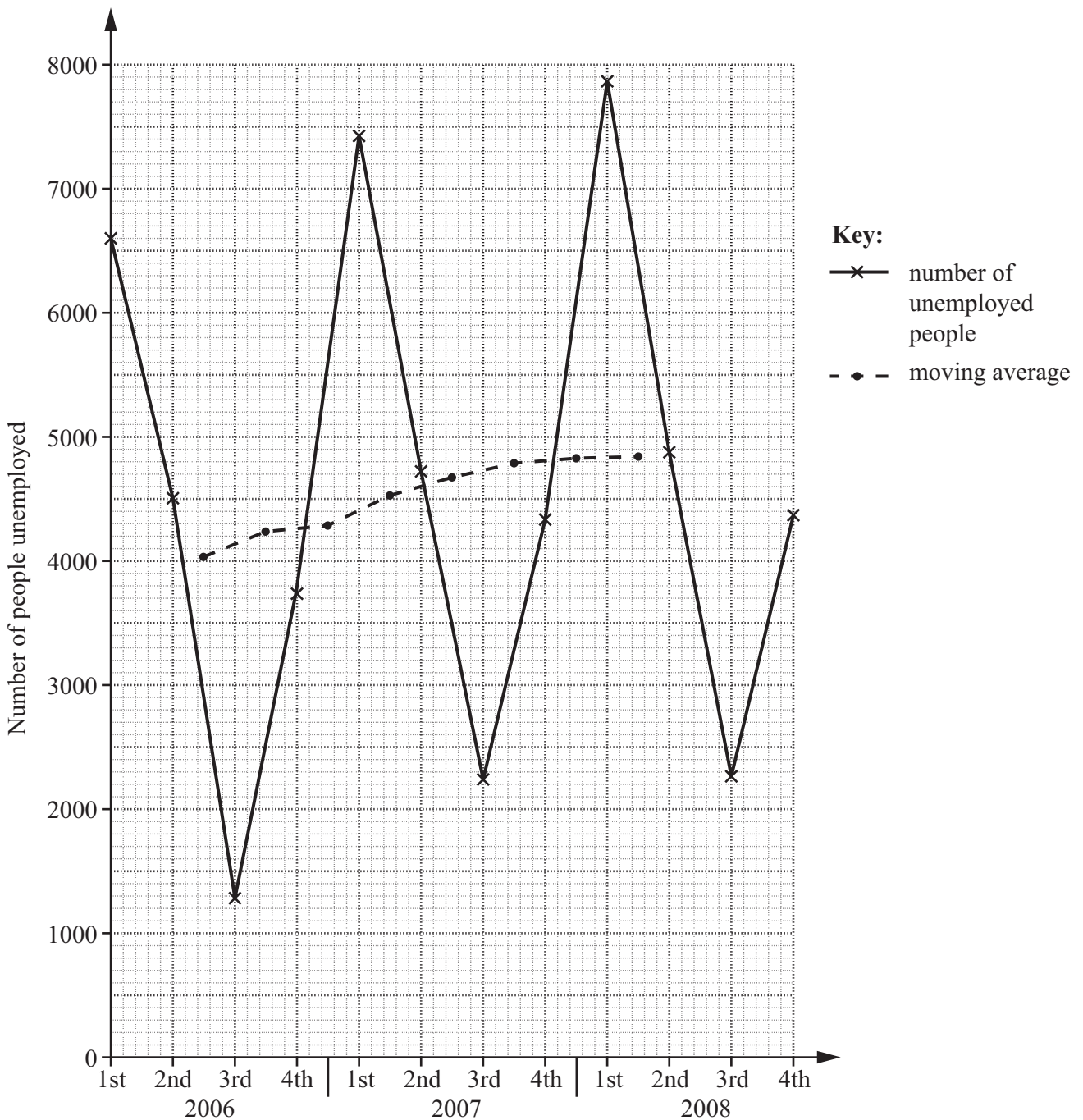
In the September of **which year** will the area of ice first be smaller than the land area of Germany?

(c) Year [2]

20 This table shows the quarterly unemployment figures for a seaside town. The four-quarter moving averages are also shown.

Year	2006				2007				2008			
Quarter	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Number of people unemployed	6600	4510	1280	3730	7420	4730	2240	4330	7860	4870	2260	4370
Four-quarter moving average	4030 4235 4290 4530 4680 4790 4825 4830											

The quarterly unemployment figures and the moving averages are plotted on the graph below.



- (a) Calculate the last moving average.
Write it in the table and plot it on the graph. [2]

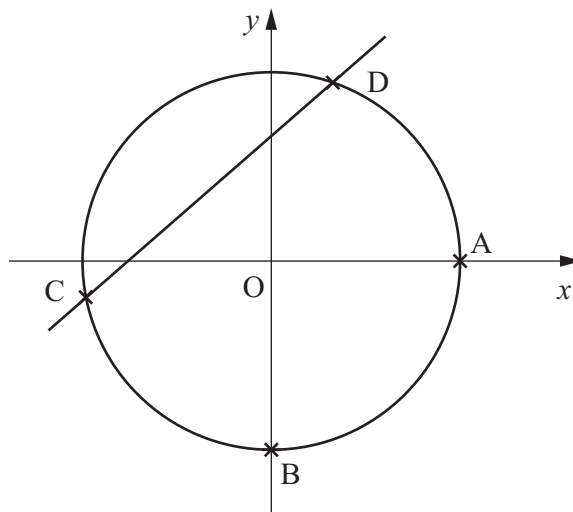
- (b) (i) Use the trend of the moving averages to predict the next moving average.

(b)(i) [1]

- (ii) Hence find an estimate for the number of people unemployed in the first quarter of 2009.
Show your working clearly.

(ii) [2]

- 21 This is a sketch of the graphs of $x^2 + y^2 = 18$ and $y = x + 3$.



Not to scale

- (a) The circle intersects the positive x -axis at A and the negative y -axis at B.

Find the coordinates of A and B, correct to 1 decimal place.

(a) A (..... ,)

B (..... ,) [2]

- (b) (i) Show that, where the two graphs intersect, $2x^2 + 6x - 9 = 0$.

[2]

(ii) The graphs intersect at C and D.

Find the coordinates of C, correct to 1 decimal place.

(b)(ii) C (..... ,) [3]

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