OCR
RECOGNISING ACHIEVEMENT

GENERAL CERTIFICATE OF SECONDARY EDUCATION

MATHEMATICS C (Graduated Assessment)

M9 2339B

MODULE M9 – SECTION B

MONDAY 22 JANUARY 2007

Morning

Time: 30 minutes

Candidates answer on the question paper.
Additional materials: Geometrical instruments
Tracing paper (optional)
Scientific or graphical calculator

Candidate Name

Centre Number

Candidate Number

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre Number and Candidate Number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- In many questions marks will be given for a correct method even if the answer is incorrect.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- You are expected to use a calculator in Section B of this paper.
- 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.
- Section B starts with question 6.
- Use the π button on your calculator or take π to be 3·142 unless the question says otherwise.

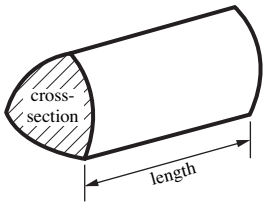
For Examiner's Use	
Section B	

This document consists of **8** printed pages.

[Turn over

Formulae Sheet

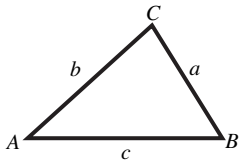
Volume of prism = (area of cross-section) × length



In any triangle *ABC*

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

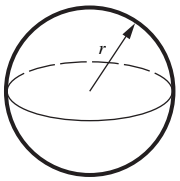
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$



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

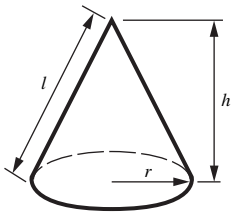
Volume of sphere = $\frac{4}{3}\pi r^3$

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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6 **(a)** Multiply out and simplify.

$$(2x - 5)(x + 1)$$

(a)..... [3]

(b) Factorise.

(i) $x^2 - 9$

(b)(i)..... [1]

(ii) $x^2 + 6x - 7$

(ii)..... [2]

(c) Simplify.

$$\frac{6x + 6}{x + 1}$$

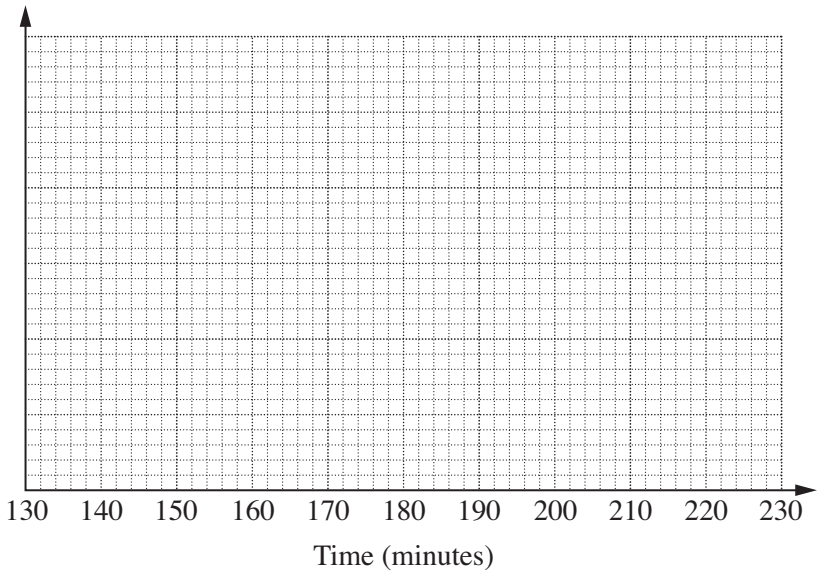
(c)..... [1]

7

7 In the women's marathon at the 2004 Olympics, 66 athletes finished the race.
The table summarises their times.

Time (t minutes)	Frequency
$145 \leqslant t < 150$	5
$150 \leqslant t < 160$	19
$160 \leqslant t < 170$	24
$170 \leqslant t < 180$	10
$180 \leqslant t < 230$	8

(a) On the grid, draw a histogram to represent these results.



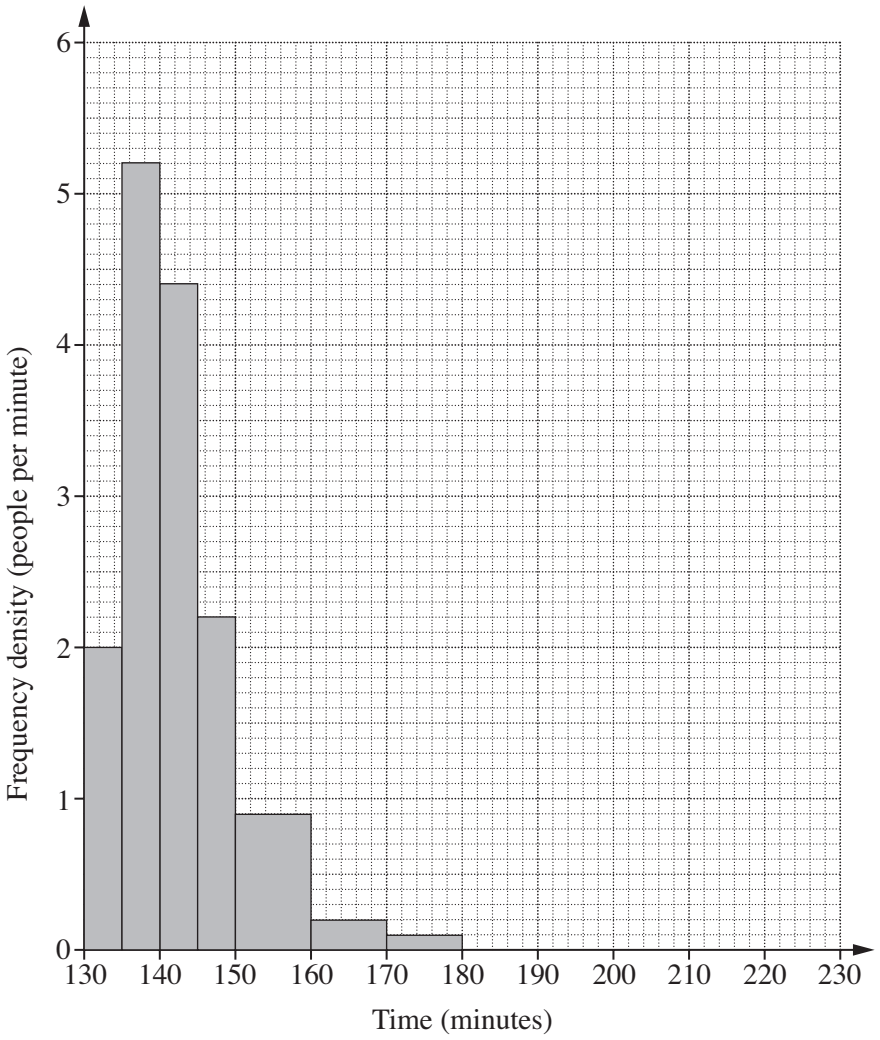
[3]

(b) One of these athletes is chosen at random.

Calculate the probability that she completed the marathon in less than 160 minutes.

(b) ..... [1]

(c) In the men's marathon, 81 athletes finished the race. This histogram summarises their times.



One of the athletes who finished the men's marathon and one of the athletes who finished the women's marathon are chosen at random.

Calculate the probability that they **both** completed their races in less than 160 minutes.

(c) ..... [3]

(d) In the men's 200 m race at the 2004 Olympics, Frankie Fredericks came fourth and Francis Obikwelu came fifth.
Both Frankie and Francis were given an official time of 20·14 s, correct to 0·01 s.

Calculate the upper bound of the difference in their times.

(d) .....s [1]

8

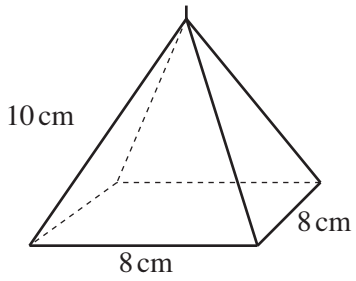
8 A rectangular room is measured as 5·2 m long by 3·8 m wide.
Both measurements are correct to 0·1 m.

Calculate the lower bound of the area of the room.

..... m^2 [2]

2

9 **(a)** A candle is in the shape of a square-based pyramid.
The length of each side of the base is 8 cm.
The length of each sloping edge is 10 cm.



(i) Show that the height of the pyramid is 8·2 cm, correct to 1 decimal place.

.....

.....

.....

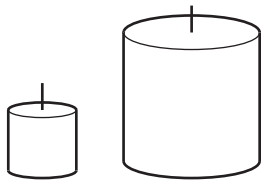
.....

..... [3]

(ii) Calculate the volume of wax in this candle.

(a)(ii) .....cm^3 [2]

(b) Two other candles are in the shape of cylinders.
They are mathematically similar to each other,
with one candle being twice as high as the other.



(i) State the ratio 'area of base of smaller candle : area of base of larger candle'.

(b)(i) 1 : ..... [1]

(ii) The smaller candle is made from 50 cm^3 of wax.

How much wax is needed to make the larger candle?

(ii).....cm^3 [2]

8

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