M9

General Certificate of Secondary Education

MATHEMATICS C (GRADUATED ASSESSMENT)

MODULE M9 – SECTION B

B279B

Candidates answer on the Question Paper

OCR Supplied Materials:
None

Other Materials Required:
* Geometrical instruments
* Tracing paper (optional)
* Scientific or graphical calculator

Thursday 21 January 2010
Afternoon

Duration: 30 minutes

Candidate Forename		Candidate Surname	

| Centre Number						Candidate Number				

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, 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 5.
* 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 **25**.
* This document consists of **12** pages. Any blank pages are indicated.

OCR is an exempt Charity

Turn over

Formulae Sheet

Area of trapezium $= \frac{1}{2}(a + b)h$
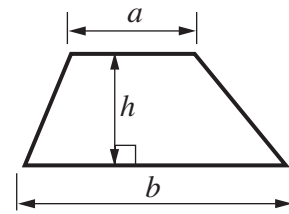
Volume of prism = (area of cross-section) $\times$ length
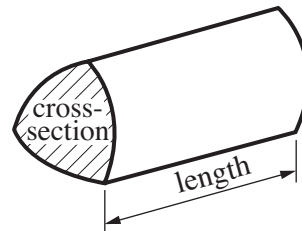
In any triangle *ABC*

Sine rule $\quad \dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$
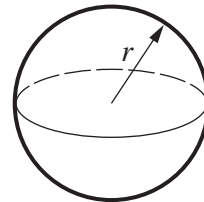
Cosine rule $\quad a^2 = b^2 + c^2 - 2bc\cos A$

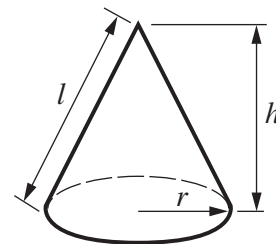**Area of triangle** $= \frac{1}{2}ab\sin C$
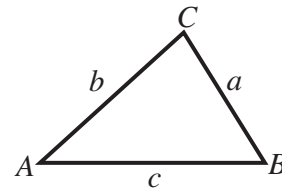
Volume of sphere $= \frac{4}{3}\pi r^3$

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

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

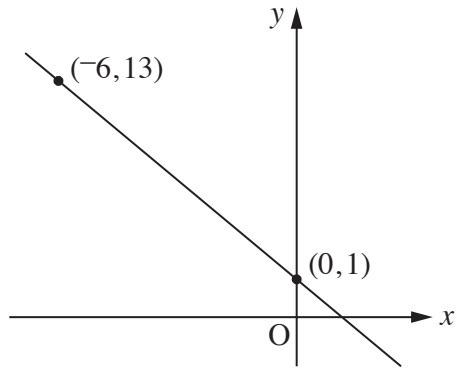**Curved surface area of cone** $= \pi r l$

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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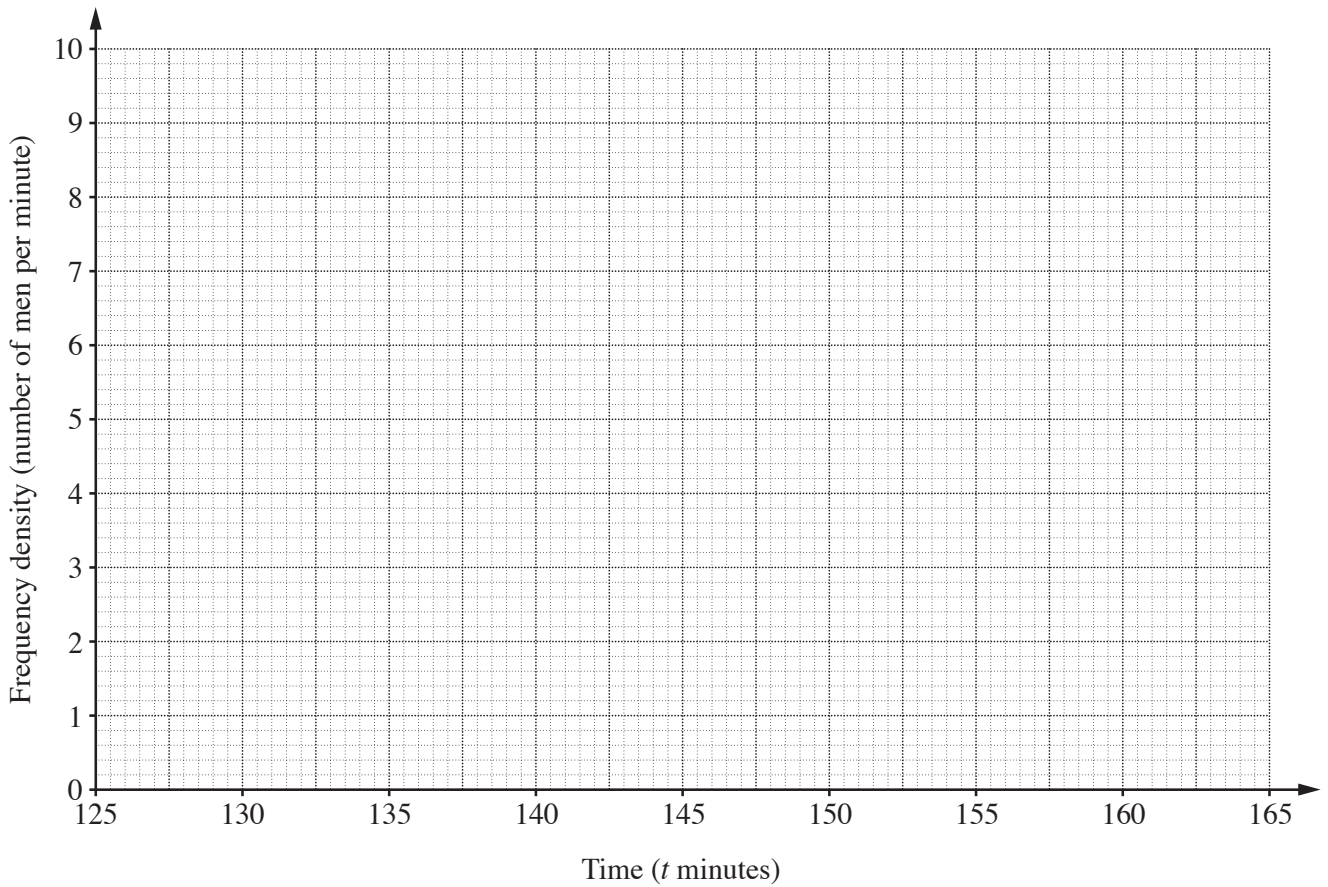**(a)** Find the gradient of the line that passes through the points (‾6, 13) and (0, 1).

(a) .... **[1]**

(b) Hence find the equation of the line.

(b) .... **[2]**

6 **(a)** The table shows the distribution of the times of the first hundred men in the Flora London Marathon in 2006.

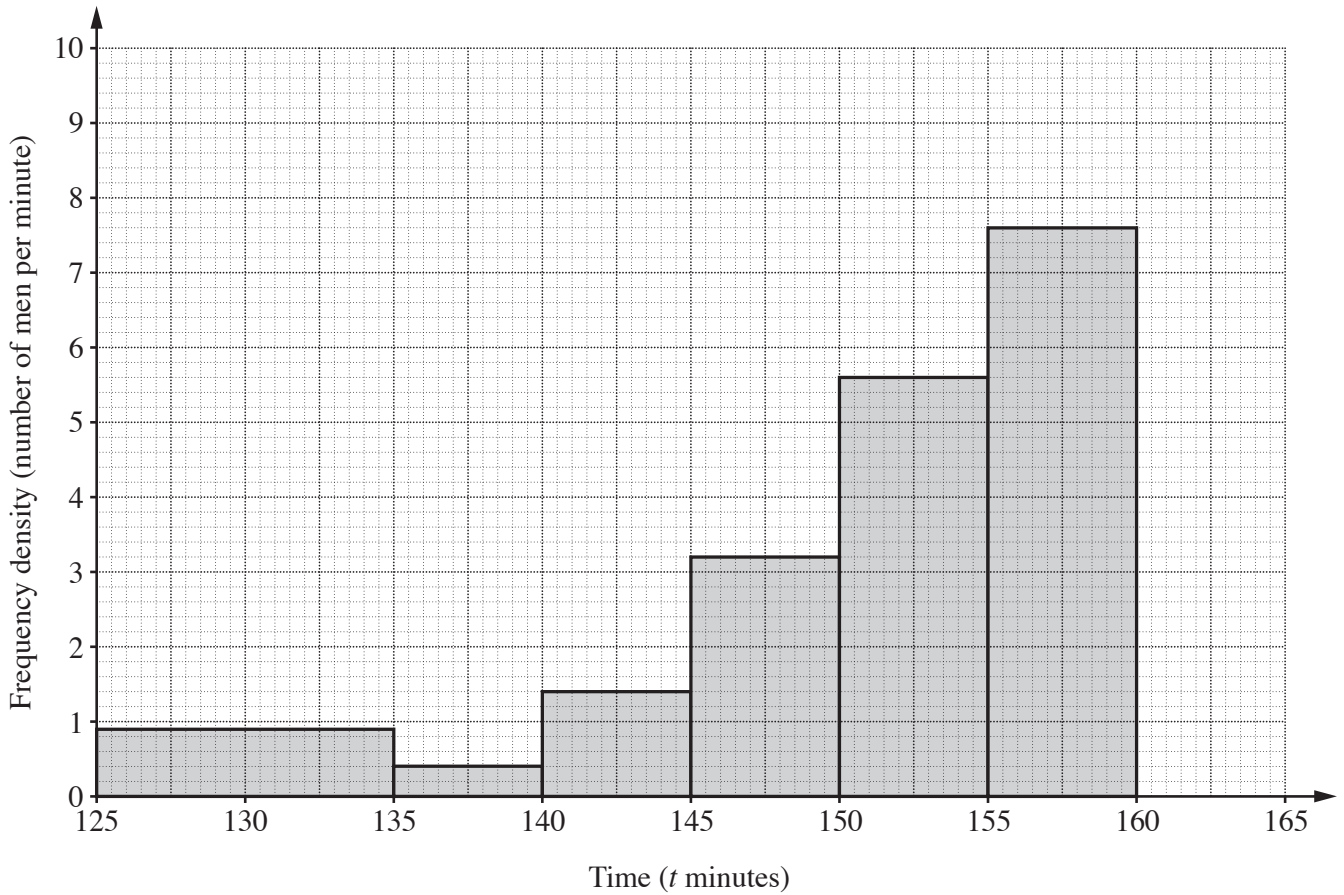| Time (*t* minutes)	Frequency
$125 < t \leqslant 135$	14
$135 < t \leqslant 140$	14
$140 < t \leqslant 145$	10
$145 < t \leqslant 150$	23
$150 < t \leqslant 155$	39

Draw a histogram to show this information.

[3]

(b) This histogram shows the distribution of the times of the first hundred men in the Flora London Marathon in 2007.

Use the histograms to make two comparisons between the distributions of the times in 2006 and in 2007.

1 ....

....

2 ....

.... **[2]**

7 **(a)** The volume, V, of a sphere, radius r, is given by this formula.

$$V = \frac{4\pi r^3}{3}$$

Rearrange the formula to make r the subject.

(a) .... **[3]**

(b) The radius of a sphere is $5{\cdot}2\,$cm, correct to one decimal place.

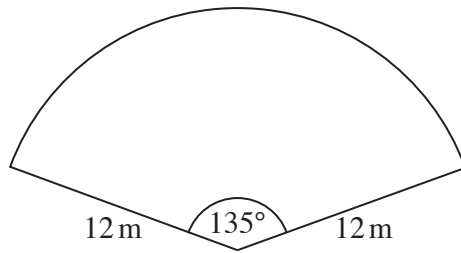Calculate the lower bound of the volume of the sphere.

(b) .... cm^3 **[2]**

8
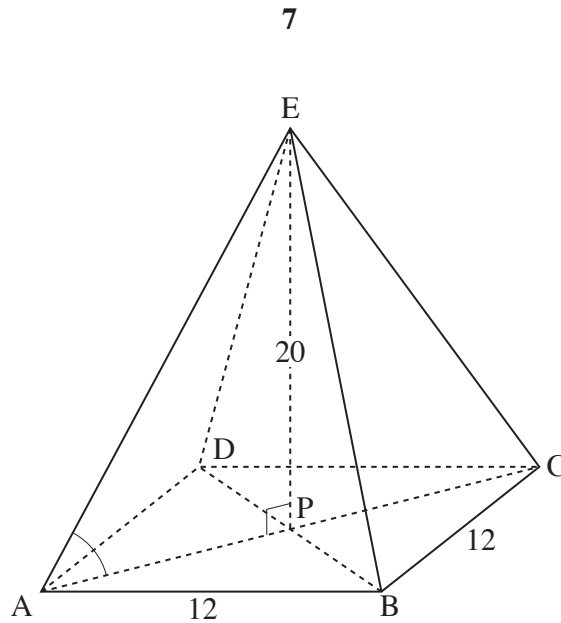
ABCDE is a square-based pyramid.
Its sloping edges are all equal.
P is the centre of the base.
Each side of the base is 12 cm long.
The height EP is 20 cm.

(a) Show that AP = 8·49 cm, correct to two decimal places. **[2]**

(b) Calculate the angle EAP.

(b) ....° **[3]**

Turn over

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Not to scale

12 m   135°   12 m

The diagram shows a lawn cut in the shape of a sector of a circle.
The radius is 12 m and the angle of the sector is 135°.

Calculate the length of the perimeter of the lawn.

.... m **[3]**

10 An object travels in a straight line.
The distance travelled, d metres, is directly proportional to the square of the travelling time, t seconds.
The object moves a distance of 20 metres in 2·5 seconds.

(a) Find an equation for d in terms of t.

(a).................................... **[3]**

(b) Which of these graphs, A, B, C or D, represents the relationship
between the distance and the travelling time?

A

B

C

D

(b) .... **[1]**
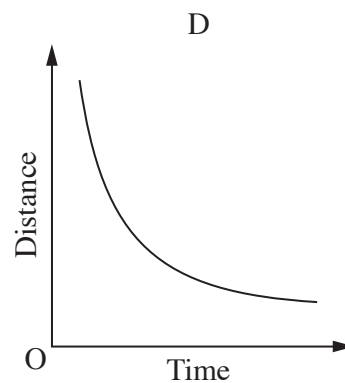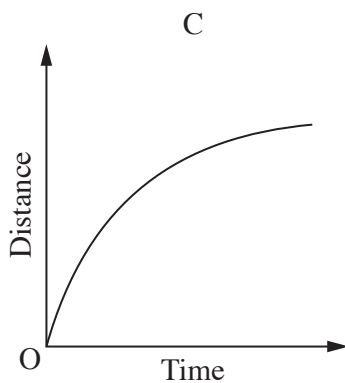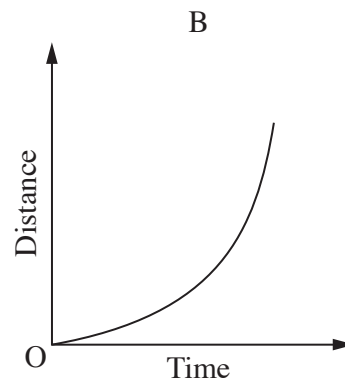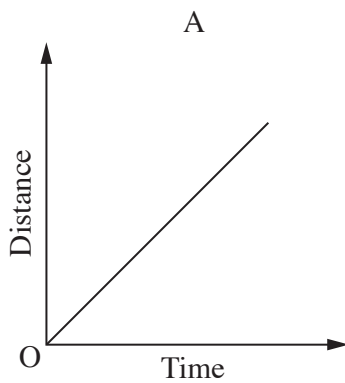
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