![OCR logo] **OCR**
RECOGNISING ACHIEVEMENT

GENERAL CERTIFICATE OF SECONDARY EDUCATION

MATHEMATICS C (Graduated Assessment)

MODULE M9 – SECTION A

MONDAY 22 JANUARY 2007

M9 **2339A**

Morning

Time: 30 minutes

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

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

- The number of marks is given in brackets [ ] at the end of each question or part question.
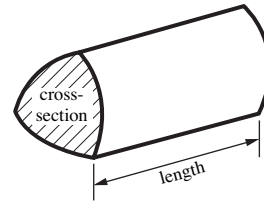- The total number of marks for this Section is 25.

WARNING
You are not allowed to use a calculator in Section A of this paper.

For Examiner's Use	
Section A	
Section B	
Total	

This document consists of **8** printed pages.
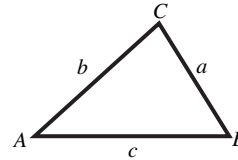
[Turn over

Formulae Sheet

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

In any triangle *ABC*

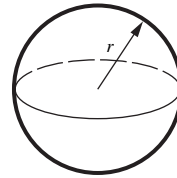**Sine rule** $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

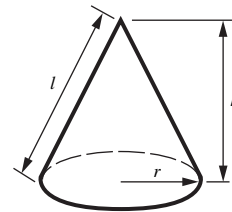**Area of triangle** = $\frac{1}{2} ab \sin C$

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

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

PLEASE DO NOT WRITE ON THIS PAGE

1 **(a)** Estimate.

$$\sqrt{\frac{502 \times 6180}{324}}$$

(a)..................................... [2]

(b) Estimate.

$$(1{\cdot}8 \times 10^5) \times (4{\cdot}3 \times 10^{-3})$$

(b) .... [2]

[Turn over

2 **(a)** Make *d* the subject of this formula.

$$t = \sqrt{\frac{2d}{a}}$$

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

(b) Make *x* the subject of this formula.

$$3x - 2y = ax + 5$$

(b) .... [3]

6

3
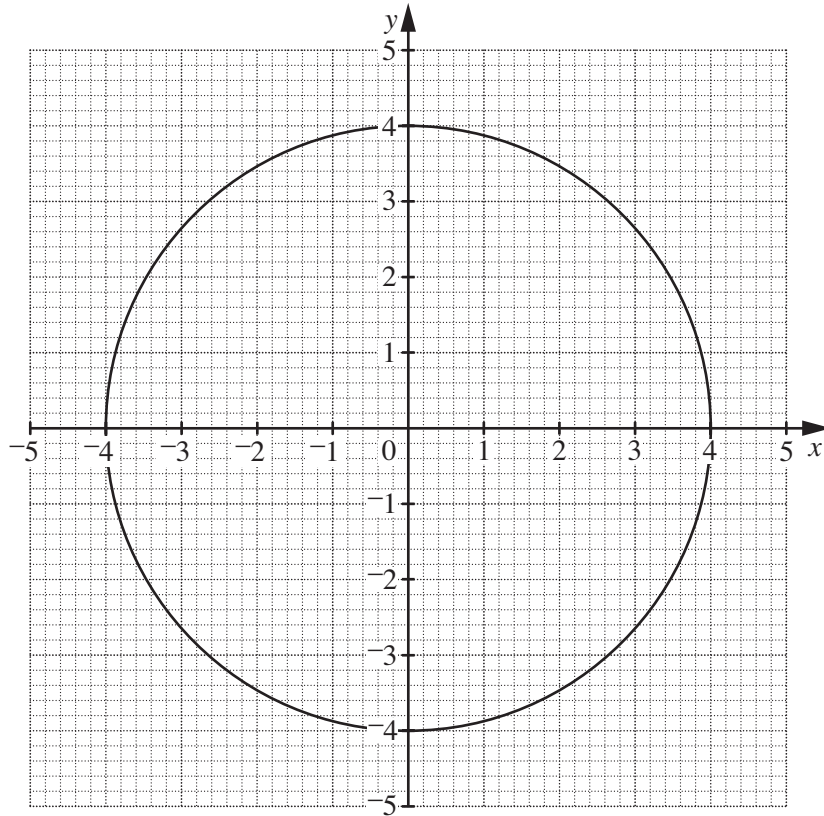
(a) Write down the equation of this circle.

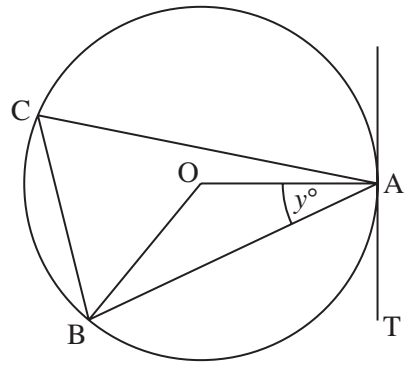**(a)** .... [2]

(b) Find **graphically** the coordinates of the points of intersection of this circle with the line $y = 3 - 2x$.

(b) (........ , ...) and (........ , ...)   [3]

[Turn over

4 A, B and C are points on a circle, centre O.
AT is a tangent.
Angle OAB = $y°$.

Not to scale

(a) Express angle BAT in terms of y, giving your reason.

Angle BAT = ...° because ....

.... [2]

(b) Using triangle OAB, express angle BOA in terms of y.

(b) ....° [2]

(c) Using the theorem

the angle at the centre is double the angle at the circumference,

express angle ACB in terms of y.
Write your answer as simply as possible.

(c).................................° [1]

(d) What theorem do your results for parts **(a)** and **(c)** prove?

.... [1]

5 The frequency (f Hz) of the note produced by a string is **inversely proportional** to the length (s cm) of the string.
A string of length 30 cm produces a note of frequency 150 Hz.

   (a) Find the equation connecting f and s.

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

   (b) Find the frequency of the note produced by 20 cm of this string.

   (b) .... Hz [1]

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