M10

GENERAL CERTIFICATE OF SECONDARY EDUCATION
MATHEMATICS C (GRADUATED ASSESSMENT)   **B280B**
MODULE M10 – SECTION B

Candidates answer on the Question Paper

OCR Supplied Materials:
None

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

Monday 8 March 2010
Morning

Duration: 30 minutes

Candidate Forename		Candidate Surname	

| Centre Number						Candidate Number					

INSTRUCTIONS TO CANDIDATES
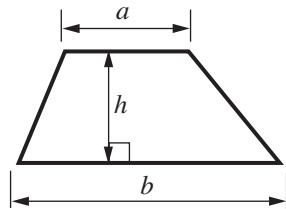
* Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
* Use black ink. Pencil may be used for graphs and diagrams only.
* Read each question carefully and make sure that you know what you have to do before starting your answer.
* Show your working. 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
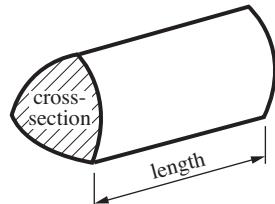
* The number of marks is given in brackets **[ ]** at the end of each question or part question.
* Section B starts with question 7.
* You are expected to use a calculator in Section B of this paper.
* Use the π button on your calculator or take π to be 3·142 unless the question says otherwise.
* The total number of marks for this Section is **25**.
* This document consists of **8** pages. Any blank pages are indicated.

Turn over

Formulae Sheet

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

Volume of prism = (area of cross-section) × length
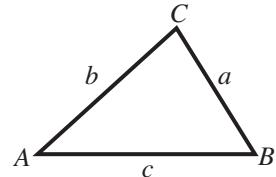
In any triangle *ABC*

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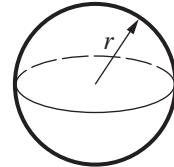
Cosine rule $\quad a^2 = b^2 + c^2 - 2bc \cos A$

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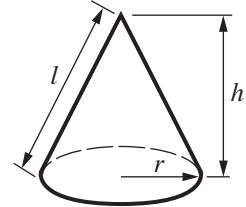
Volume of sphere $= \frac{4}{3}\pi r^3$

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

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

PLEASE DO NOT WRITE ON THIS PAGE

7 In 1961 the world population was 3·1 billion, correct to 2 significant figures.
For the next 10 years, the population increased by approximately 2% per year.

Work out an estimate of the population of the world in 1971.
Write your answer in billions correct to 2 significant figures.
Show your method clearly.

.................................billion **[2]**
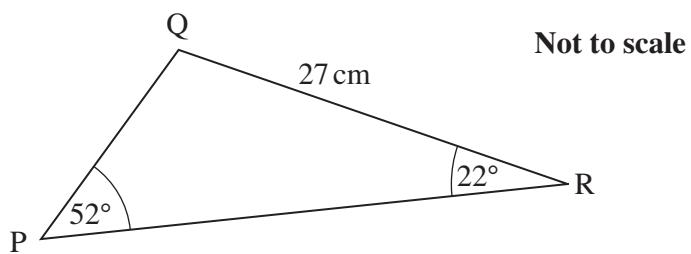
8 The expression $x^2 - 6x + 14$ can be written in the form $(x - a)^2 + b$.

(a) Find the values of a and b.

(a) $a =$ .... $b =$ .... **[3]**

(b) Hence find the minimum value of $x^2 - 6x + 14$.

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

Turn over

9

Q

27 cm

Not to scale

22°

R

52°

P

Calculate the length PR.

.... cm **[3]**

10 Solve.
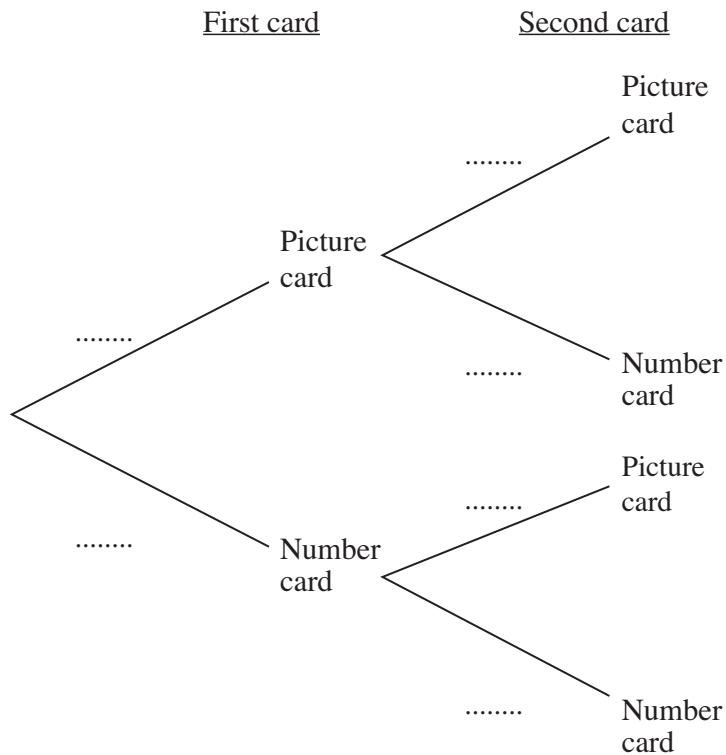
$$3x^2 - 8x + 2 = 0$$

Give your answers correct to 2 decimal places.

.... **[3]**

11 Jodi has a set of 13 cards. There are 3 picture cards and 10 number cards.
Jodi picks out one card at random and keeps it.
She then picks another card at random.

(a) Complete the tree diagram to show the probabilities.

First card   Second card

Picture
card

....

Picture
card

....

....

Number
card

Picture
card

....

Number
card

....

Number
card

....

[2]

(b) Work out the probability that **at least one** of Jodi's two cards is a picture card.

(b) ....**[3]**

Turn over
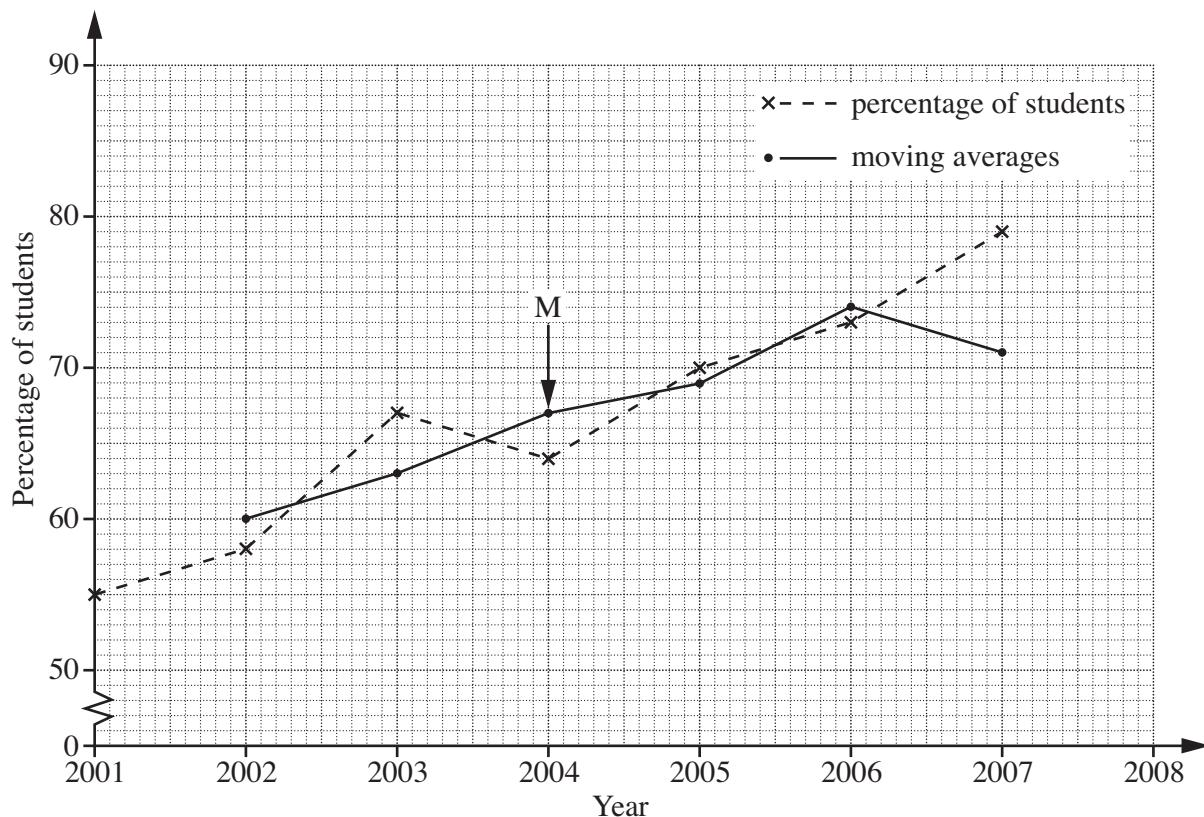
12 This table shows the percentage of students who gained level 5 or higher in
Mathematics in each of the last few years at Lord's Hill School.

Year	2001	2002	2003	2004	2005	2006	2007
Percentage of students	55	58	67	64	70	73	79

These results are plotted on the graph below.
The graph also shows the 3-year moving averages of these percentages.

(a) One of the moving averages has been plotted at M.

Show how this moving average has been calculated.

....

.... **[1]**
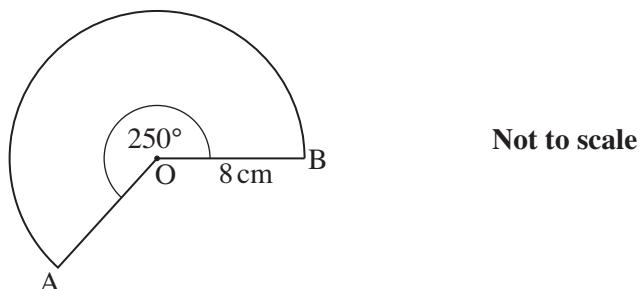
(b) The percentage of students for 2008 has been omitted.

Use the graph to help you calculate the percentage of students for 2008.
Show your method clearly.
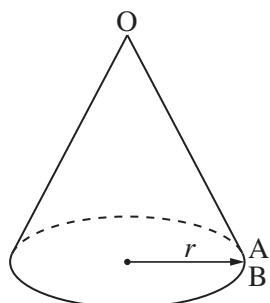
(b) ....% **[3]**

TURN OVER FOR QUESTION 13

13 This diagram shows a sector of a circle, centre O.
The radius of the circle is 8 cm and reflex angle AOB is 250°.

Not to scale

A cone is made from this sector by joining OA and OB.

Calculate r, the radius of the base of the cone.

.... cm **[4]**