OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

General Certificate of Secondary Education

MATHEMATICS B (MEI) 1968/2316A

PAPER 2 SECTION A

HIGHER TIER

Wednesday **15 JUNE 2005** Morning 1 hour

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

Candidate Name	Centre Number	Candidate Number

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers, in blue or black ink, in the spaces provided on the question paper.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Show all your working. Marks may be given for working which shows that you know how to solve the problem, even if you get the answer wrong.

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 50.

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 question paper consists of 12 printed pages.

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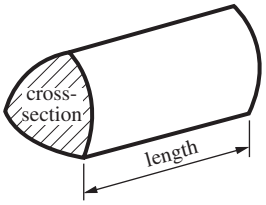
Formulae Sheet: Higher Tier

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

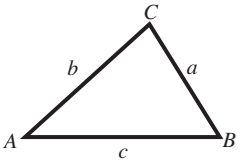


In any triangle *ABC*

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

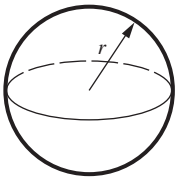
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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



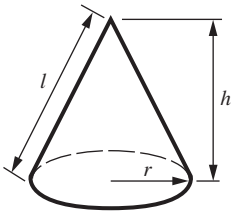
Volume of sphere = $\frac{4}{3}\pi r^3$

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

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

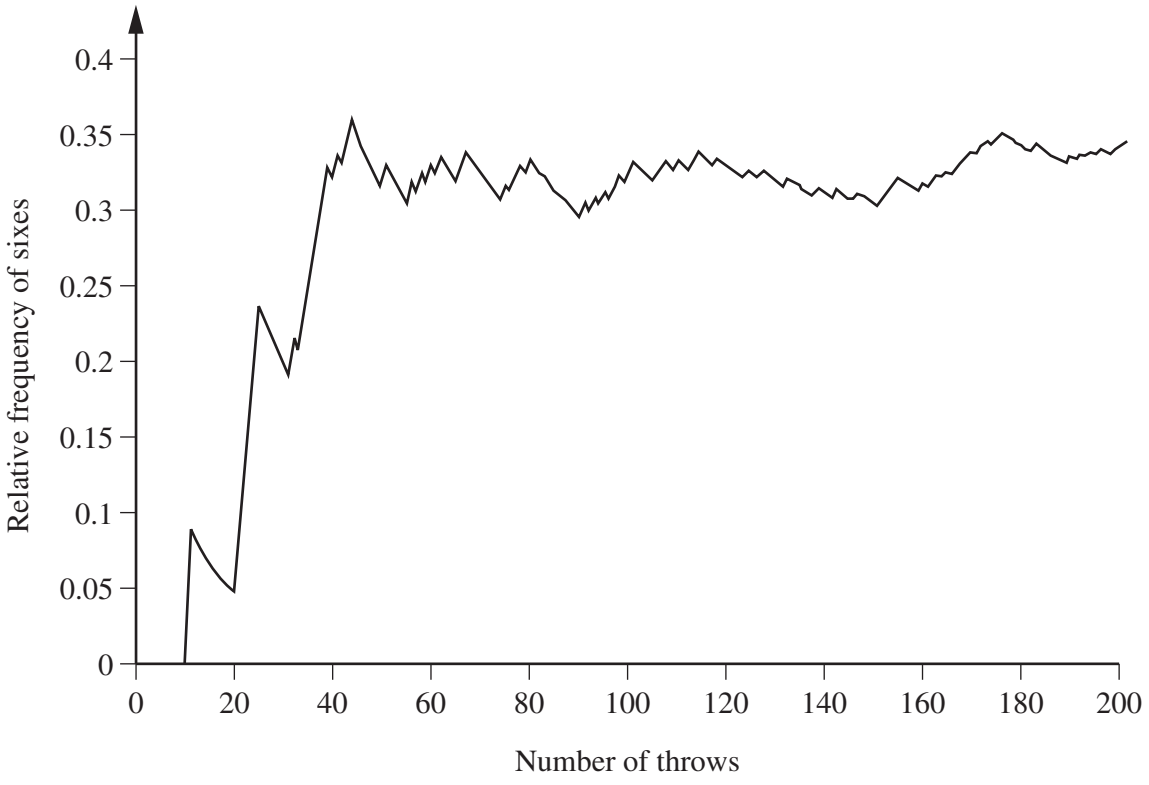
1 Sanjit threw a six-sided die numbered one to six 200 times and recorded the results on a spreadsheet.

He calculated the relative frequency of the number of sixes thrown.
This table shows some of his results.

Total number of throws	10	20	100	150	200
Total number of sixes	0	1	33	48	69
Relative frequency of sixes	0	0.05	0.33		0.345

(a) Complete the relative frequency row in the table.
Show how you obtained your answer. [2]

Sanjit then used the computer to draw this relative frequency graph of the number of sixes he threw.



(b) How does this graph indicate that Sanjit's die is biased?

.....

.....[2]

[Turn over

2 Bungee jump cord stretches.
When stretched, the maximum length of a cord is 320% of its unstretched length.

(a) The unstretched length of a bungee jump chord is 30 m.

What is its maximum length when stretched?

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

(b) Amber is taking part in a bungee jump for charity.
She is to jump from a bridge above a river.
She wants to just touch the water - not go into it!
For this to happen, the maximum stretched length of the bungee jump cord is 64 m.

What length of unstretched cord should she use?

A photograph has been removed due to third party copyright restrictions

Details: A photograph of a person bungee jumping

(b) .....m [3]

3 **(a)** Simplify.

(i) $b^2 \times b^4$

(a)(i) .....[1]

(ii) $c^5 \div c^9$

(ii) .....[1]

(b) Make t the subject of $s = \frac{1}{2}at^2$.

(b) .....[3]

(c) Solve these simultaneous equations algebraically.

$$3x + y = 4$$
$$2x + 4y = 1$$

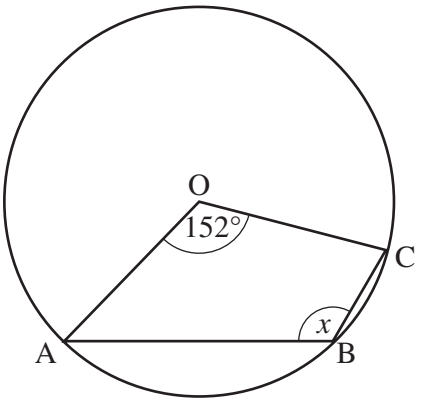
(c) $x =$ .....

$y =$ .....[3]

[Turn over

4 O is the centre of this circle.
A, B and C are on the circumference.

Work out angle x.



Not to scale

.....° [3]

5 **(a)** Simplify.

$$(3ab^2)^4$$

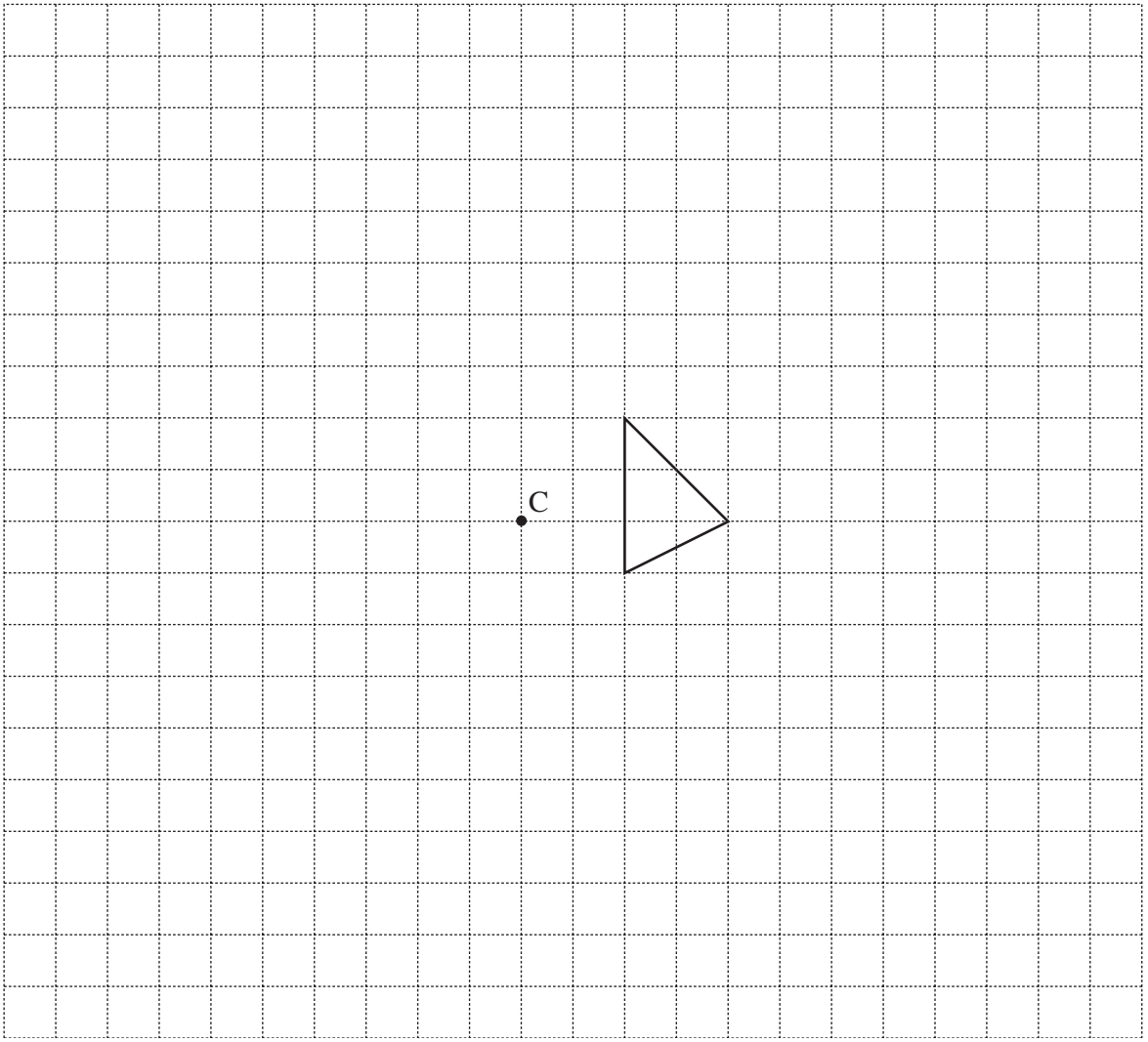
(a) .....[2]

(b) Solve.

$$\frac{x-2}{x} - \frac{3}{4} = 0$$

(b) .....[3]

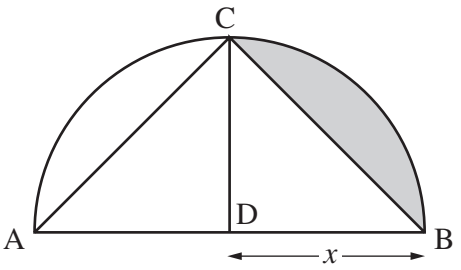
6 Draw an enlargement of the triangle with centre C and scale factor –2.



[3]

[Turn over

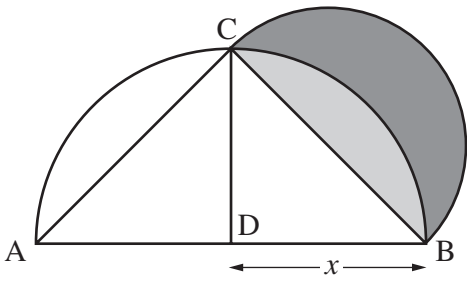
7 AB is the diameter of a semi-circle radius x and centre D.
C is on the circumference and angle BDC is a right angle.



(a) Show that the area of triangle CBD is $\frac{x^2}{2}$. [1]

(b) Show that the area of the light grey region is $x^2\left(\frac{\pi}{4} - \frac{1}{2}\right)$. [2]

(c)



A smaller semi-circle is drawn using BC as diameter, as shown.

Show that the area of the dark grey region is $\frac{x^2}{2}$. [3]

8 **(a)** Write down the value of the following.

(i) 9^0

(a)(i) .....[1]

(ii) $\sqrt[3]{\frac{1}{8}}$

(ii) .....[1]

(iii) $9^{-\frac{1}{2}}$

(iii) .....[1]

(b) Rationalise the denominator and simplify

$$\frac{15}{\sqrt{10}}.$$

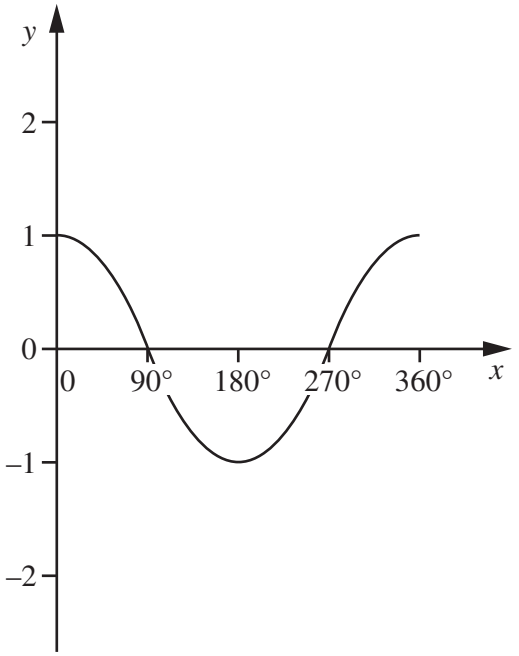
(b) .....[2]

(c) Express $(3 + \sqrt{5})^2$ in the form $a + b\sqrt{5}$, where a and b are integers.

(c) .....[2]

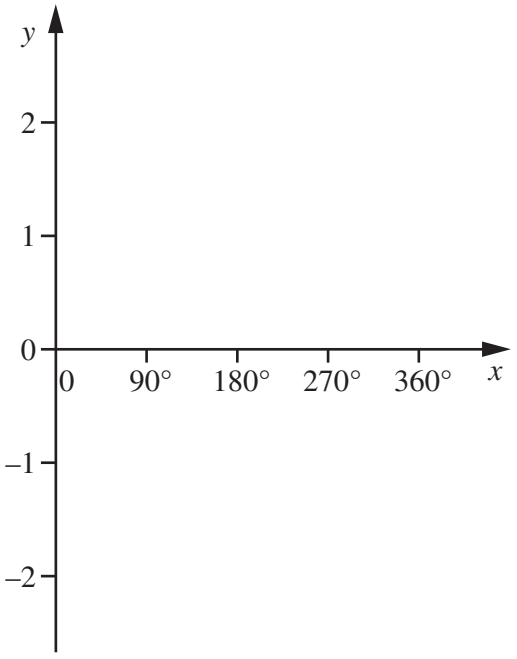
[Turn over

9 **(a)** Here is the graph of $y = \cos x$ for $0° \leqslant x \leqslant 360°$.

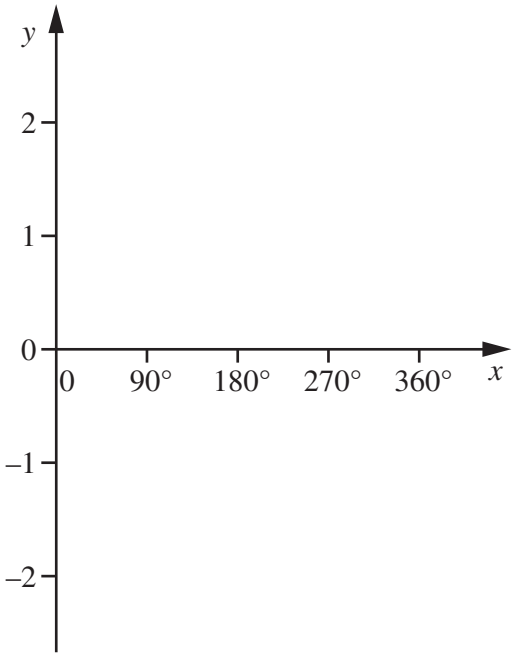


On the axes below, sketch the graph of:

(i) $y = 2\cos x$

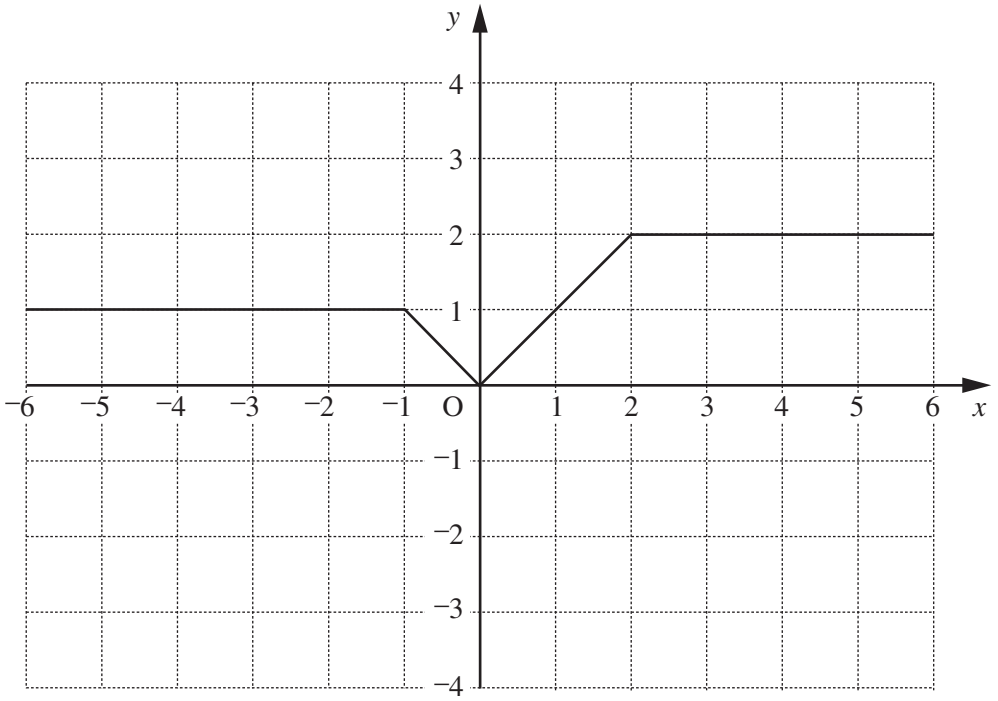


(ii) $y = \cos 2x$

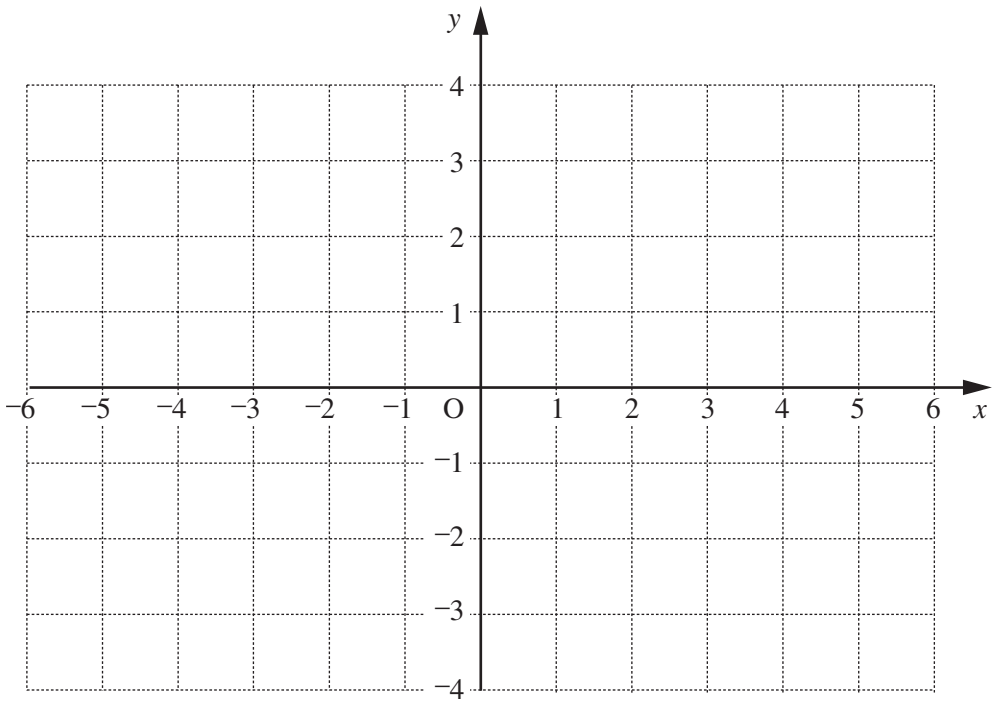


[2]

(b) This is the graph of $y = f(x)$.



On the grid below sketch the graph of $y = f(x - 2)$.



[2]

[Turn over

10 Find algebraically the coordinates of the two points where the line $y = x + 4$ intersects the parabola $y = x^2 - 2x$.

(..... , ...)

(..... , ...) [5]