MATHEMATICS B (MEI)
PAPER 2 SECTION A
HIGHER TIER

1968/2316A

Specimen Paper 2003

Additional materials: Geometrical instruments
                          Tracing paper (optional).

Candidates answer on the question paper.

Calculators are **not** allowed.

TIME 1 hour.

Candidate Name		Centre Number	Candidate Number

INSTRUCTIONS TO CANDIDATES

- Write your name in the space above.
- Write your 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.

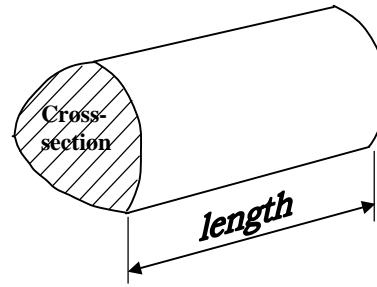**YOU ARE NOT ALLOWED TO USE A CALCULATOR IN THIS PAPER.**

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use Only	
Section A	
Section B	
TOTAL	

FORMULAE SHEET: HIGHER TIER

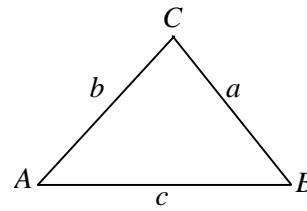**Volume of prism** = (area of cross section) × length

In any triangle ABC

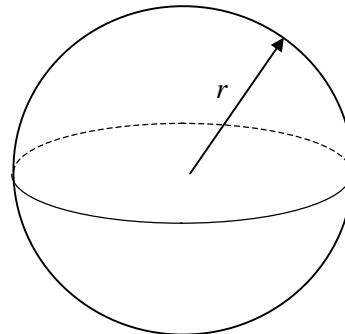**Sine rule** $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

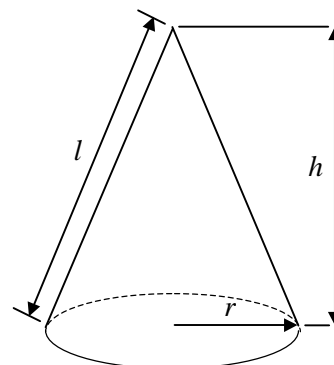**Area of triangle** = $\dfrac{1}{2} ab \sin C$

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

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

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

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

The Quadratic Equation

The solution of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by $x = \dfrac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$
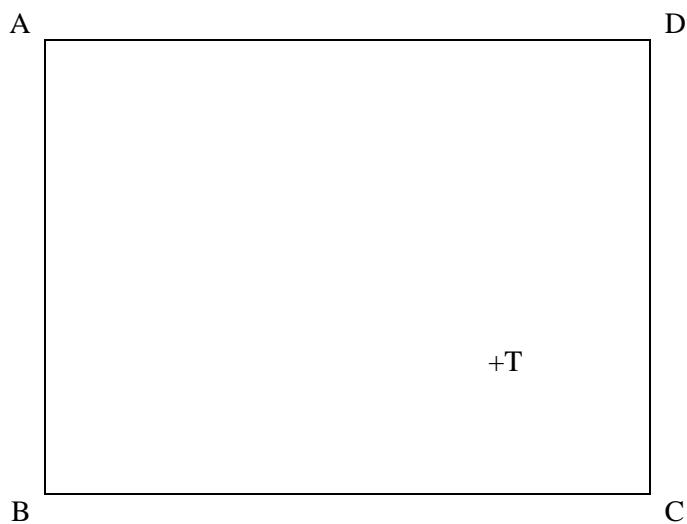
1 **(a)** Factorise $x^2 - 2x$.

Answer *(a)* _____ [1]

(b) Simplify

$(3pq^4)^3$.

Answer *(b)* _____ [2]

2 This is the plan of a garden drawn to a scale 1cm to 1m.
Charlie is planting a new tree in the garden.
There is already a tree at the point marked T.

A ──────────────────── D

B ──────────────────── C

+T

The new tree must be

(i) at least 3 metres from T,
(ii) nearer to AB that it is to CD.

Shade the region where she could plant the tree. [3]

3   The six faces of an ordinary die are marked 1, 2, 3, 4, 5, 6.
The six faces of another die are marked 1, 2, 3, 3, 3, 4.
When a die is thrown each face is equally likely to finish on top.
The two dice are thrown together.
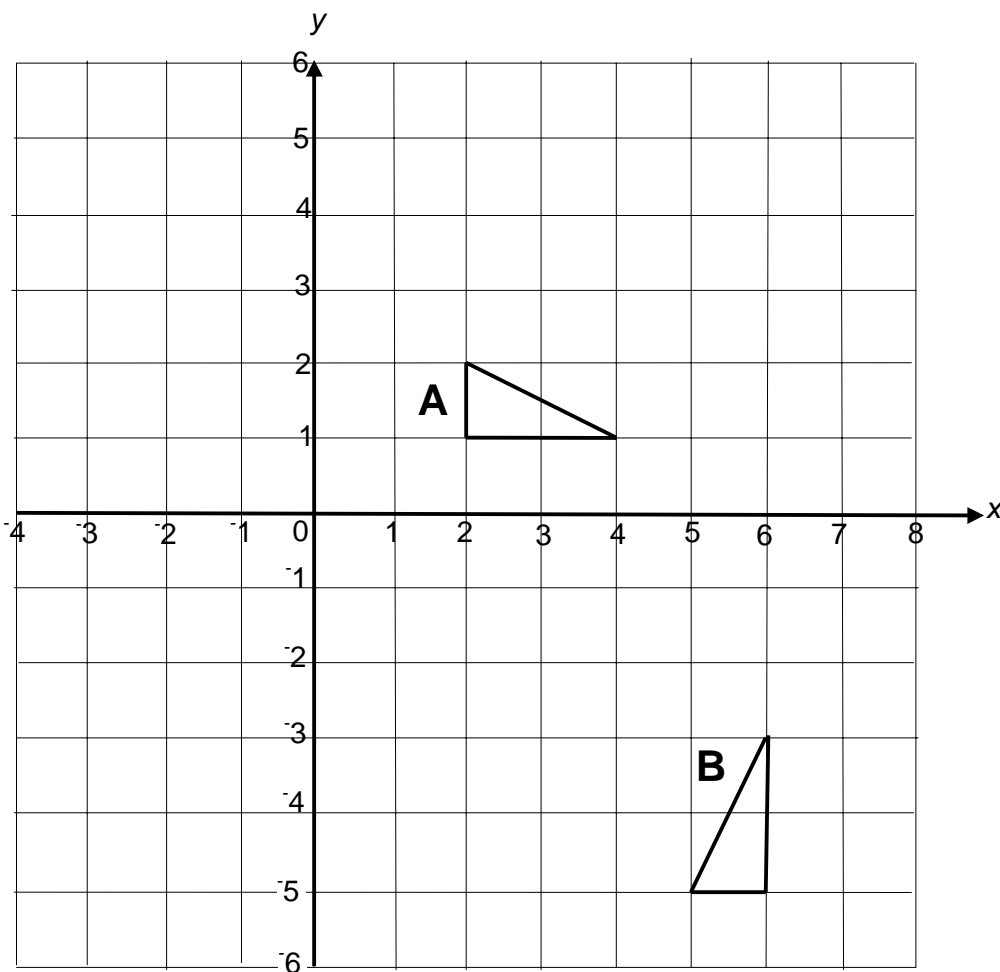Showing your working find the probability that

(a) the two dice show the same score,

Answer   *(a)* _____

(b) the sum of the scores shown by the two dice is 9.

Answer   *(b)* _____

[4]

4   Shapes A and B are shown on the grid below.

**(a)**   Describe fully the single transformation that maps shape A onto shape B.

*Answer (a)*_____

_____

_____   [3]

(b)   Draw the image of triangle A after a translation with vector $\begin{bmatrix} -3 \\ 2 \end{bmatrix}$.

Label it C.

[2]

5 Arresh, Babs and Celyn have made 5-sided spinners.
They want to know if the spinners are unbiased.
They each test their own spinner, recording the results shown in the table.

	Total number of spins	Number of 2s
Arresh	500	91
Babs	200	72
Celyn	60	13
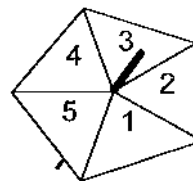
(a) Whose results should be the most reliable? Explain your choice.

Answer (a) _____

_____ [2]

(b) Who appears to be using a biased spinner? Explain your choice.

Answer (b) _____

_____ [2]

6 **(a)** Express $0.\dot{4}\dot{5}$ as a fraction. Simplify your answer.

Answer *(a)* _____ [3]

(b) **(i)** Simplify $(\sqrt{7} + \sqrt{5})^2$.

Answer *(b)(i)* _____ [2]

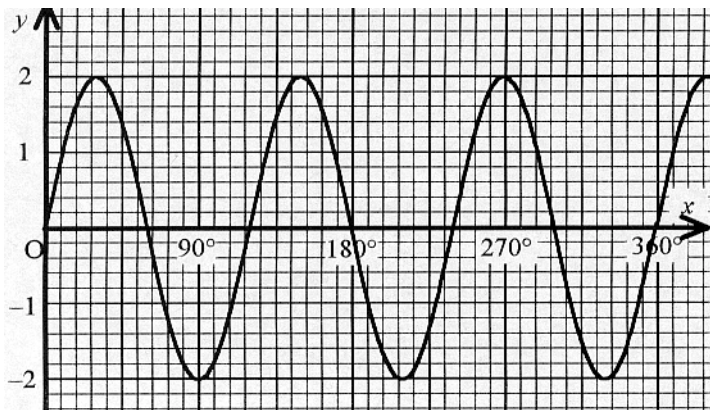**(ii)** State whether your answer to (i) is rational or irrational.

Answer *(ii)* _____ [1]

7 Solve these equations algebraically.

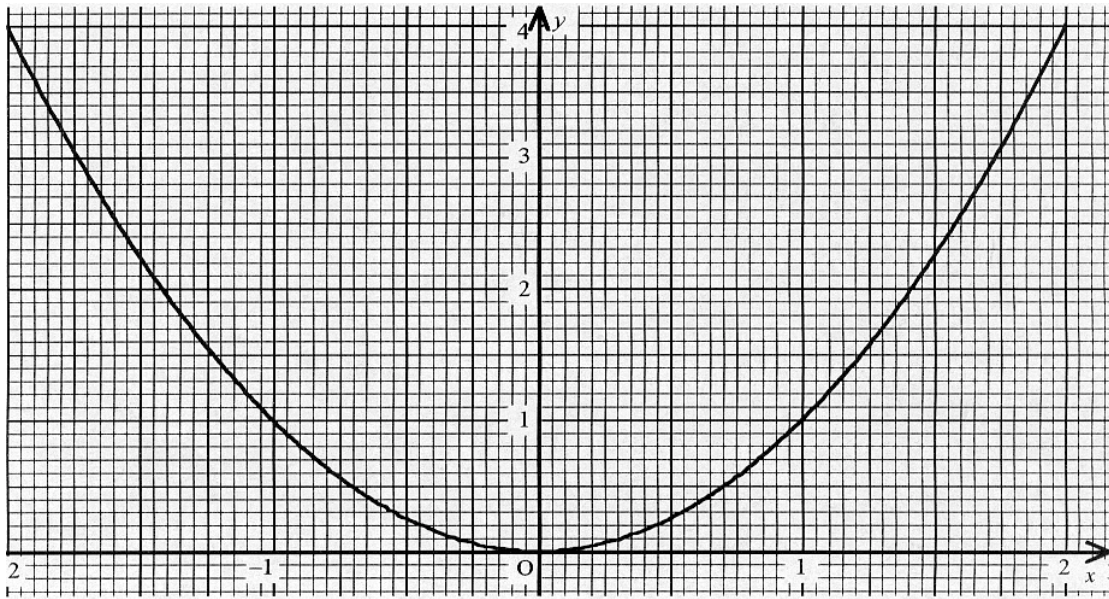$y = x^2$
$y = 5x + 6$

Answer _____ [4]

8 Find a possible equation for the graph shown.

Answer $y =$ _____ [3]

9 The graph of $y = x^2$ has been drawn below.

By drawing a suitable straight line solve the equation $10x^2 + 2x - 25 = 0$

Answer $x =$ _____ [5]

10 **(a)** Find integers p and q such that $x^2 - 8x = (x - p)^2 + q$ for all x.

Answer   *(a)* $p =$ _____ , $q =$ _____   [3]

(b) **(i)** Using your answer to **(a)** express $x^2 + y^2 - 8x = 0$ in the form
$(x + u)^2 + y^2 = v$ where u and v are constants.

Answer   *(b)(i)* _____   [1]

(ii) Describe the shape and other important features of the graph of $x^2 + y^2 - 8x = 0$.

Answer (ii) _____   [4]

11 Siobhan sells hand made picture frames.
A square frame of side length p centimetres uses materials worth C pence.

C is the sum of two terms, one proportional to side length, the other proportional to area.
The table shows the cost of the materials in two square frames.

Side Length (p cm)	30	60
Cost of materials (C pence)	525	1950

Express C in terms of p.

Answer $C =$ _____   [5]

Oxford Cambridge and RSA Examinations

General Certificate of Secondary Education

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MARK SCHEME

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SECTION A

1			$x(x-2)$	B1	
			$27p^3q^{12}$	B2	B1 for one correct power.
2			Circle centre T, radius 3cm	B1	
			Line midway between AB and CD	B1	
			Correct shading	B1	
3			e.g. Tabulated correctly (in either part)	M1 A1	
	(a)		1/6 oe	A1	
	(b)		1/9 oe	A1	
4	**(a)**		Rotation	B1	
			90° anticlockwise	B1	
			About (7,0)	B1	
	(b)		Correct position	B2	B1 for one correct side
5	**(a)**		Largest no. of spins so Arresh	M1 A1	
	(b)		72/200 >> 0.2 so Babs	M1 A1	
6	**(a)**		45/99	M1 M1	
			= 5/11	A1	
	(b)	**(i)**	$7 + 2\sqrt{7}\sqrt{5} + 5$	M1	
			$12 + 2\sqrt{35}$	A1	
		(ii)	irrational	B1	
7			$x^2 - 5x - 6 = 0$	M1	
			$(x-6)(x+1) = 0$	M1	
			$x = 6, y = 36;\quad x = -1, y = 1$	A1 A1	
8			$y = 2\sin(3x)$	B3	B2: $\sin(3x)$ or $2\sin x$; M1: sine function used
9			$10x^2 = 25 - 2x$	M1	
			$x^2 = 2.5 - 0.2x$ oe	M1	
			Correct line	M1	
			leading to –1.68, 1.48	A1 A1	

10	(a)	Completing square or expanding	M1	
		$p = 4$, $q = -16$	A1 A1	
	(b)	$(x-4)^2 + y^2 = 16$	B2	B1 for one of u or v correct
		Circle	M1	
		centre (4, 0)	A1	
		radius 4	A1	
11		$30x + 900y = 525$	M1	
		$60x + 3600y = 1950$	M1	
		$1800y = 900$ or $60x = 150$	M1	
		$y = 0.5$ or $x = 2.5$	A1	
		$C = 2.5p + 0.5p^2$	A1	