

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
General Certificate of Secondary Education

MATHEMATICS B (MEI)
PAPER 2 SECTION B
HIGHER TIER

1968/2316B

Monday **12 JUNE 2006** Morning 1 hour

Candidates answer on the question paper.

Additional materials:

- Geometrical instruments
- Scientific or graphical calculator
- Tracing paper (optional)

Candidate Name	Centre Number	Candidate Number												
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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

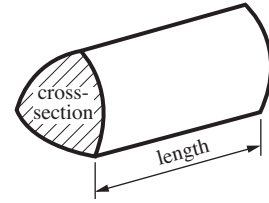
- The number of marks is given in brackets [] at the end of each question or part question.
- Unless otherwise instructed in the question, take π to be 3.142 or use the π button on your calculator.
- The total number of marks for this section is 50.
- Section B starts with question 10.

FOR EXAMINER'S USE	
Section B	

This question paper consists of 12 printed pages.

Formulae Sheet: Higher Tier

Volume of prism = (area of cross-section) \times length

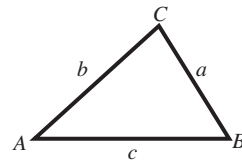


In any triangle ABC

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

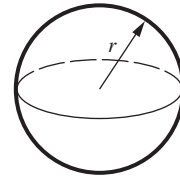
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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



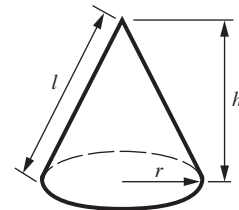
Volume of sphere = $\frac{4}{3} \pi r^3$

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



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

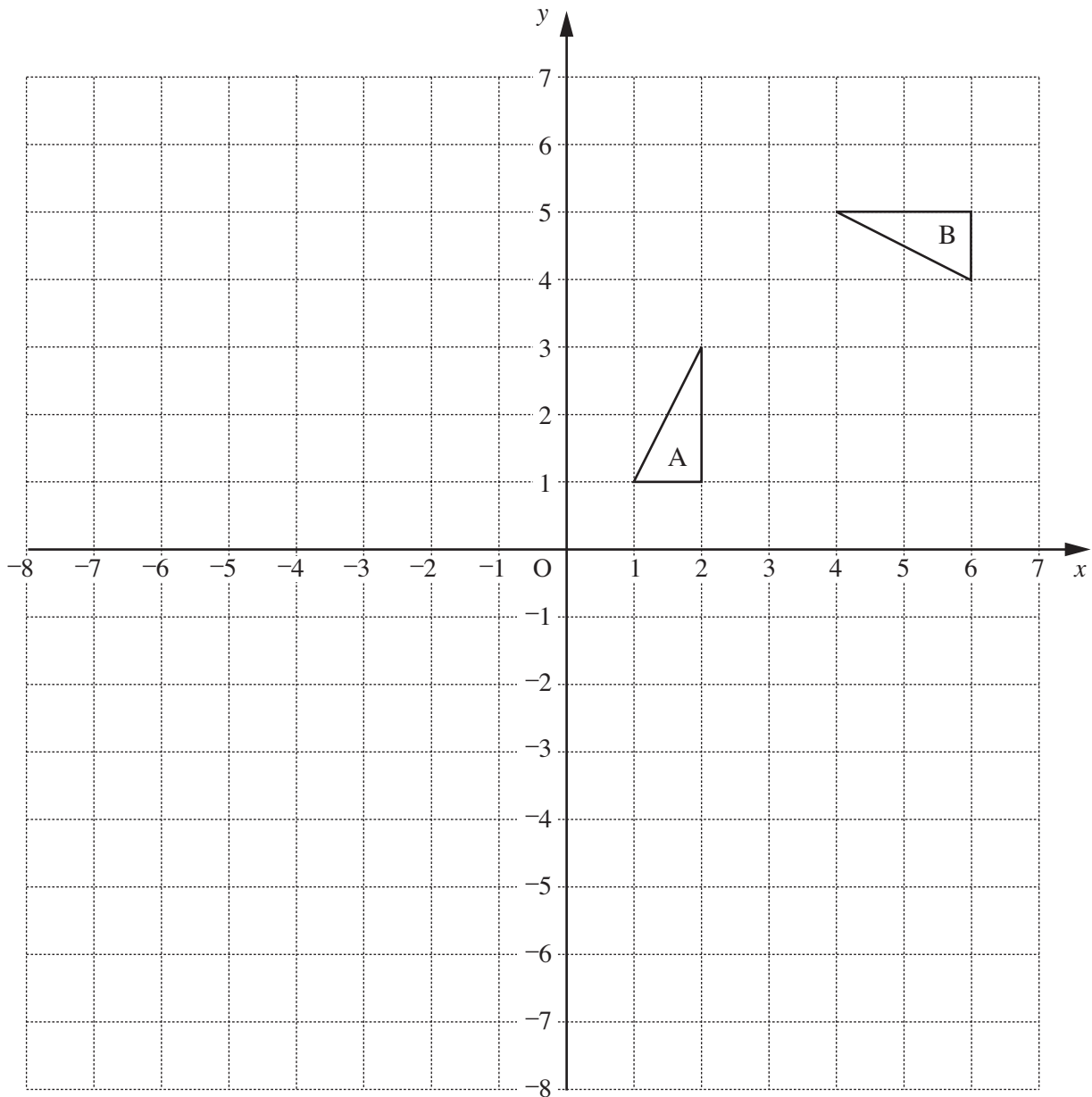
Curved surface area of cone = $\pi r l$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

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



(a) Translate triangle A by $\begin{pmatrix} 0 \\ -4 \end{pmatrix}$. Label the image C. [2]

(b) Describe completely the **single** transformation that maps triangle A onto triangle B.

.....
[3]

11 Here are some newspaper reports about the final of the Rugby World Cup in 2003.

- During the final, there were 10 million **fewer** vehicles on the roads in the UK. This was equivalent to 60% **fewer** vehicles than normal.
- At half-time there was a power surge of 2100 megawatts in the UK as 850 000 electric kettles were switched on by those watching on TV.

(a) How many vehicles would normally have been on the roads in the UK?

(a)million [3]

(b) 1 megawatt is 10^6 watts.

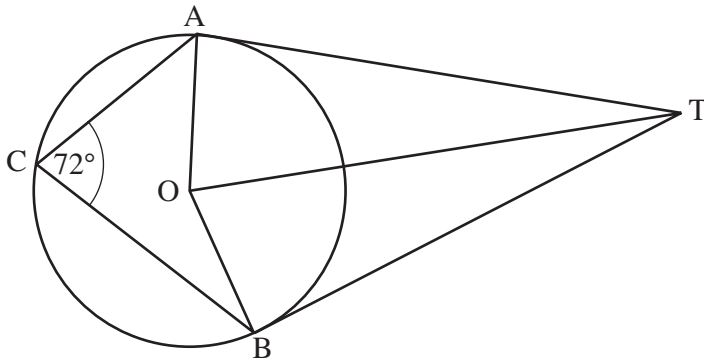
How many watts is 2100 megawatts?
Express your answer in standard form.

(b)[2]

(c) Use the data in this question to find how many watts an electric kettle needs, on average.

(c)[2]

- 12 In the diagram, O is the centre of the circle.
Tangents from T meet the circle at A and B.
C is a point on the circumference.
Angle $ACB = 72^\circ$.



Not to
scale

Complete the following.

Angle $OAT = 90^\circ$ because
.....[1]

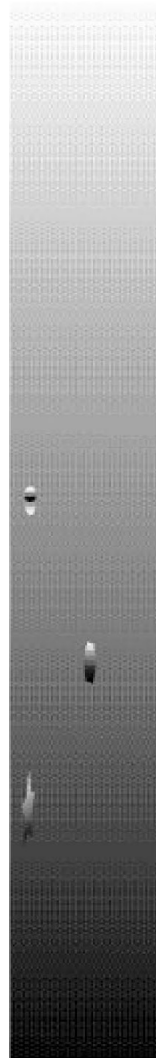
Angle $AOB = 144^\circ$ because
.....[1]

- 13** Water absorbs light passing through it.
The percentage of light passing through d metres of water is given by

$$100(0.65)^d.$$

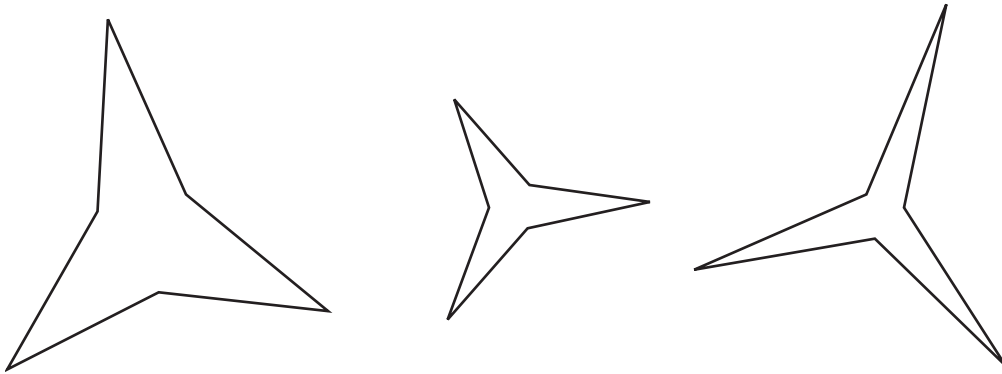
In a certain lake, only 1% of the light reaches the bottom.

Use trial and improvement to find the depth of this lake.
Show all your trials and their outcomes.
Give your answer to the nearest metre.

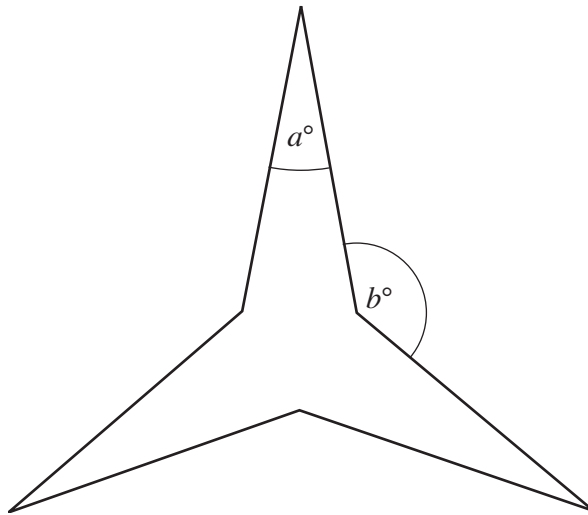


.....m [3]

14 Hexagons like those drawn below have three lines of symmetry.



(a) Derive an expression for the value of a in terms of b .



(a)[3]

(b) Explain why it is not possible for b to have a value of 110° . [1]

15 Solve.

(a) $x^{\frac{1}{3}} = 2$

(a)[1]

(b) $x^2 + 2x - 5 = 0$

Give the roots correct to 2 decimal places.

(b)[3]

- 16 (a) The general equation for a straight line is $y = mx + c$.
A straight line passes through the points $(0, p)$ and $(q, 0)$.

Find an expression for m in terms of p and q .

(a) $m = \dots\dots\dots$ [2]

- (b) A circle has the equation $x^2 + y^2 = 40$.

Write down an expression for y in terms of x .

(b) $y = \dots\dots\dots$ [2]

- (c) You are given that $a = 3b - 1$ and $b^2 = 4c$.

Find and simplify an expression for c in terms of a .

(c) $c = \dots\dots\dots$ [4]

17 In 2004 the Royal Mail claimed:
"92.5% of 1st class mail arrives the next working day".

Assume that the Royal Mail's claim is still true and that delivering each card is an independent event.

An image has been removed due to third party copyright restrictions
Details: An image of four first class postage stamps

A postcard has been removed due to third party copyright restrictions
Details: A postcard with roses on with the words 'Wishing you a very happy Eid!'

Jamil posts four Eid cards. He posts them first class.

(a) What is the probability that all four cards arrive the next working day?

(a)[2]

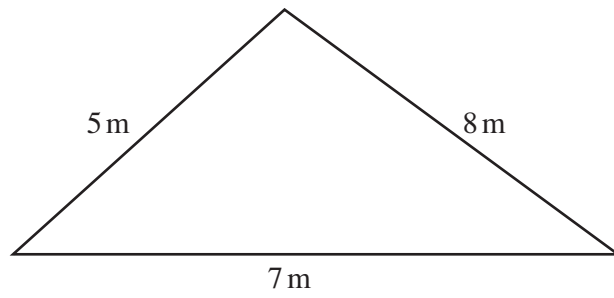
(b) What is the probability that one or more of the cards will not arrive the next working day?

(b)[2]

(c) What is the probability that exactly three of the cards arrive the next working day?

(c)[3]

- 18 Using the information on the Formulae Sheet, or otherwise, calculate the area of this triangle.

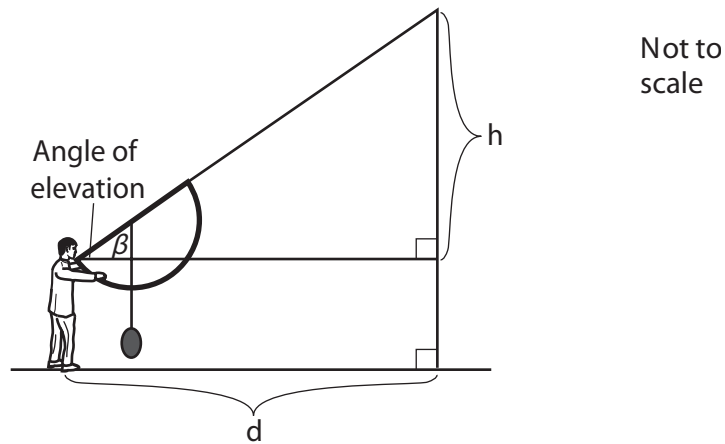


**Not to
scale**

.....m² [5]

TURN OVER FOR QUESTION 19

19 Lien and Lok are using a clinometer to find the height of a tower.



They use the formula

$$h = d \tan \beta.$$

To measure d , Lien paces the distance. She finds it is exactly 25 of her paces. She measures one of her paces as 90 cm to the nearest 10 centimetres.

Lok measures the angle of elevation β , as 51° to the nearest degree.

Calculate the lower bound for h .

Give the units of your answer.

.....[5]