

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

For Examiner's Use

General Certificate of Secondary Education
June 2007



MATHEMATICS (MODULAR) (SPECIFICATION B)
Module 5 Higher Tier
Paper 1 Non-Calculator

33005/H1

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Monday 4 June 2007 1.30 pm to 2.45 pm

<p>For this paper you must have:</p> <ul style="list-style-type: none"> mathematical instruments. <p>You must not use a calculator.</p>	
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For Examiner's Use	
Pages	Mark
3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
TOTAL	
Examiner's Initials	

Time allowed: 1 hour 15 minutes

Instructions

- Use blue or black ink or ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Do all rough work in this book.

Information

- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You may ask for more answer paper, graph paper and tracing paper. This must be tagged securely to this answer book.

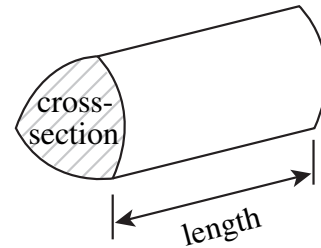
Advice

- In all calculations, show clearly how you work out your answer.

Formulae Sheet: Higher Tier

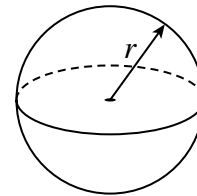
You may need to use the following formulae:

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



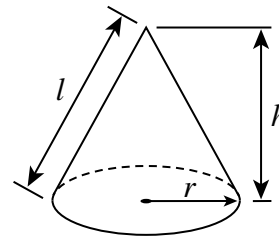
Volume of sphere = $\frac{4}{3} \pi r^3$

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



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

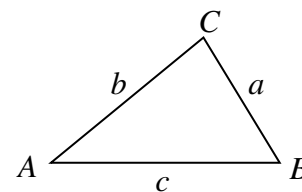
Curved surface area of cone = $\pi r l$



In any triangle ABC

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

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



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

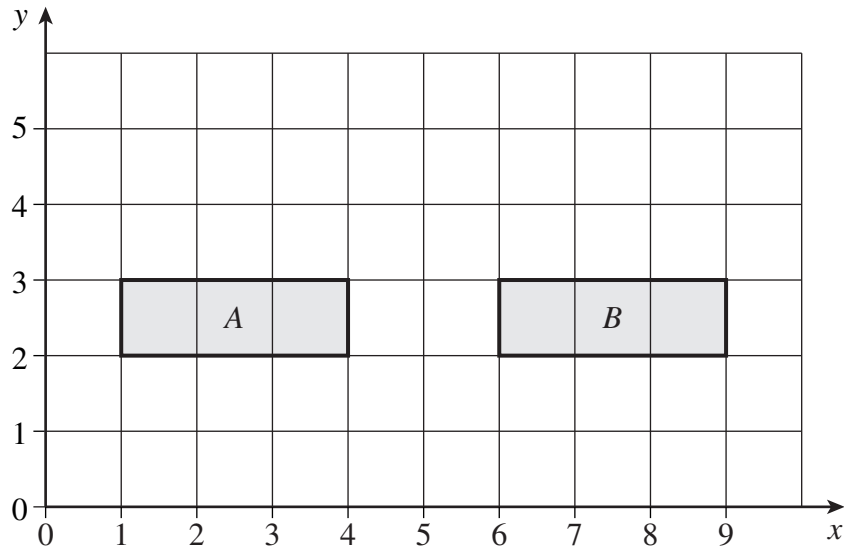
The Quadratic Equation

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

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

Answer **all** questions in the spaces provided.

1 The diagram shows two rectangles *A* and *B*.



Complete the sentences.

(a) Rectangle *B* is a reflection of rectangle *A* in the line

(1 mark)

(b) Rectangle *B* is a translation of rectangle *A* by the vector $\begin{pmatrix} \dots\dots\dots \\ \dots\dots\dots \end{pmatrix}$

(1 mark)

(c) Rectangle *B* is a rotation of rectangle *A* through
..... degrees about the point (..... ,).

(2 marks)

Turn over ►

- 2 (a) Work out the integer values of n which satisfy the inequality $15 \leq 5n < 30$

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Answer (3 marks)

- (b) Solve $4n - 15 > 0$

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Answer (2 marks)

- (c) Write down the value of the positive odd integer that satisfies both

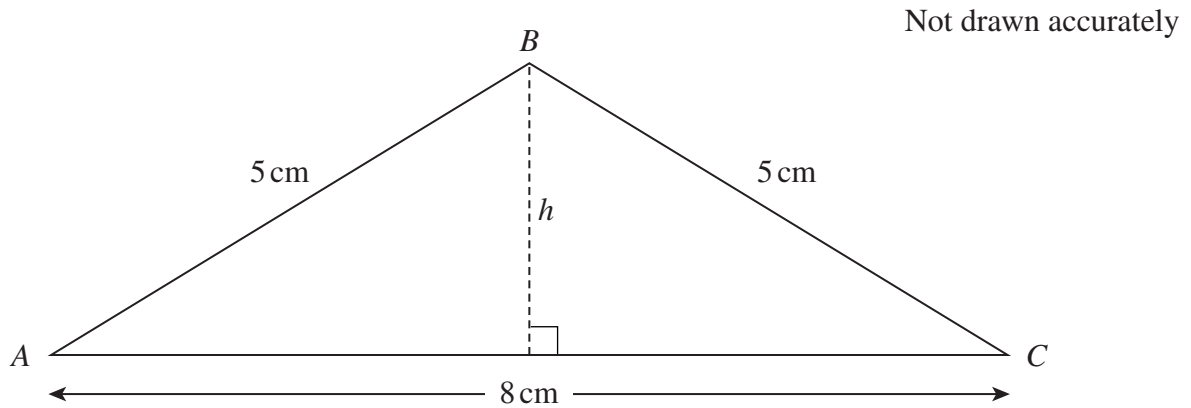
$$15 \leq 5n < 30$$

$$\text{and } 4n - 15 > 0$$

.....

Answer (1 mark)

3 The diagram shows an isosceles triangle ABC .



Calculate the area of the triangle ABC .

Show your working.

State the units of your answer.

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Answer (6 marks)

Turn over ►

- 4 (a) Explain why the value of x^2 is **never** negative.

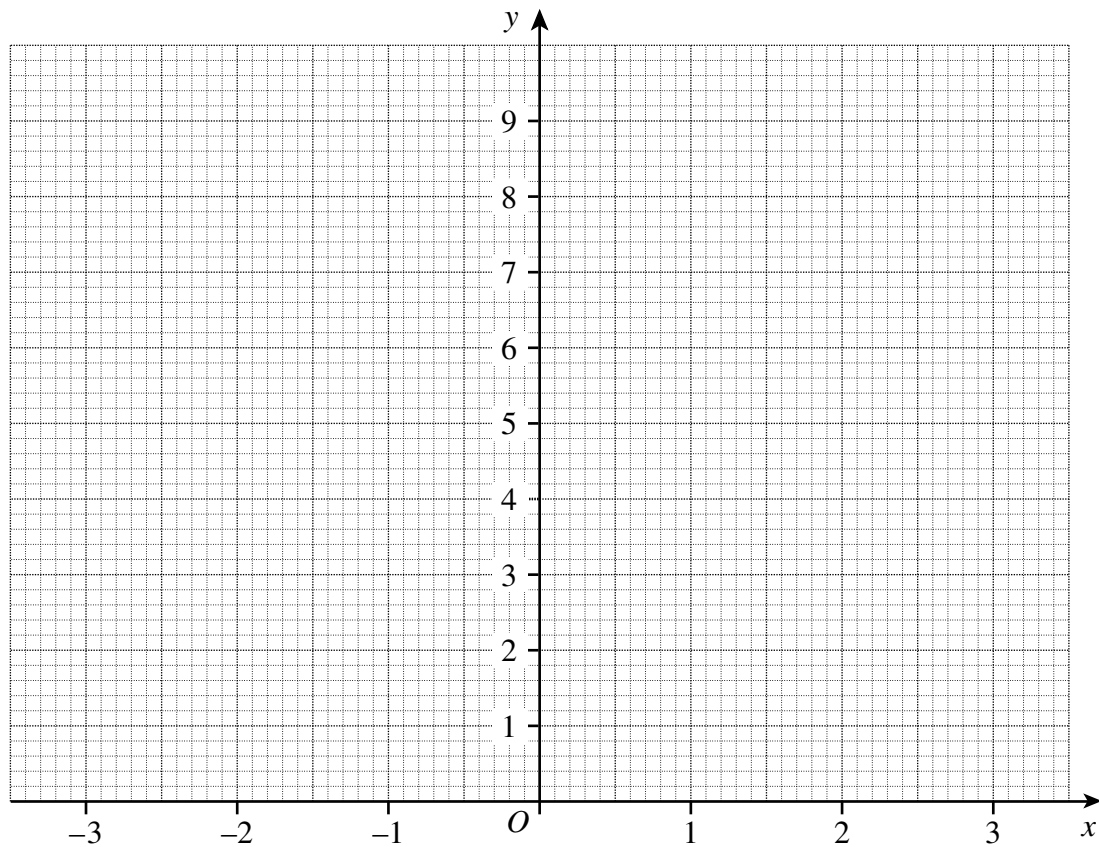
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(1 mark)

- (b) On the grid, draw the graph of $y = x^2$ for values of x from -3 to $+3$.



(2 marks)

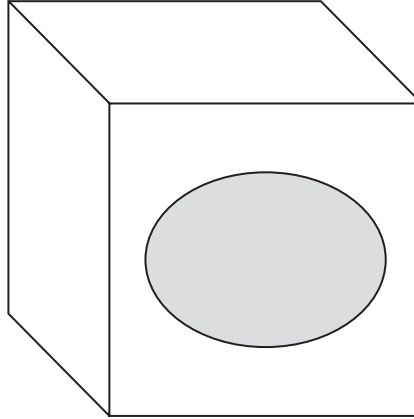
- (c) Use your graph to estimate the values of $\sqrt{3}$

.....

Answer (2 marks)

5 The diagram shows a cube.
The volume of the cube is 1000 cm^3 .

(a) A label covers half the area of the front of the cube.



Calculate the area of the label.
Show your working.

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Answer cm^2 (3 marks)

(b) The cube contains 200 cm^3 of water.

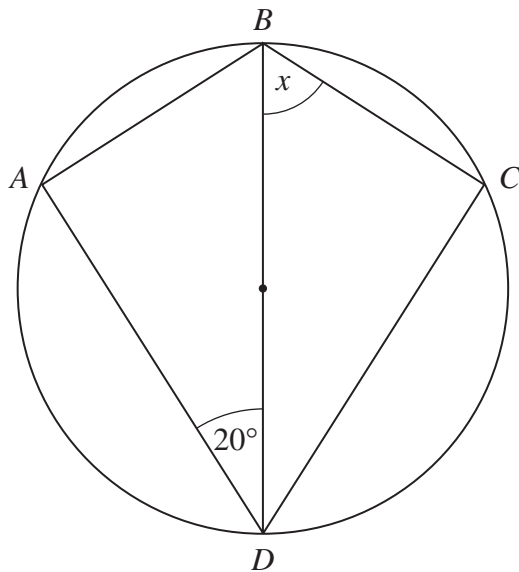
How much more water is needed for the cube to be three-quarters full?
Give your answer in litres.

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Answer litres (3 marks)

Turn over ►

- 6 (a) The diagram shows four points A , B , C and D on the circumference of a circle.
 BD is a diameter.
 $ABCD$ is a kite.



Not drawn accurately

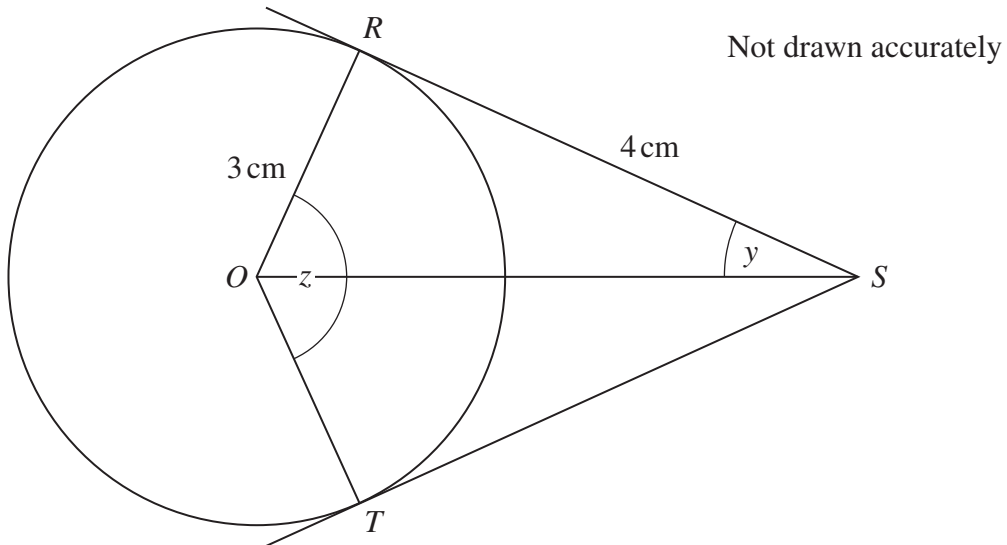
Work out the value of x .

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Answer degrees (2 marks)

- (b) The diagram shows a circle with centre O .
 RS and TS are tangents to the circle.
 $OR = 3$ cm and $RS = 4$ cm.



- (i) Write down the length of TS .

Answer cm (1 mark)

- (ii) Give a reason for your answer.

.....

 (1 mark)

- (iii) Use the facts below to write down the value of y .

$$\sin 48.6^\circ = \frac{3}{4} \quad \cos 41.4^\circ = \frac{3}{4} \quad \tan 36.9^\circ = \frac{3}{4}$$

Answer $y =$ degrees (1 mark)

- (iv) Use your answer to part (iii) to work out the value of z .

.....

Answer degrees (3 marks)

7 In the expressions in the table x , y and z represent lengths.

	Expression	Length	Area	Volume	None
A	xy		✓		
B	$xy(x + y)$				
C	$xy + z$				
D	y^2				

- (a) Complete the table to show whether each expression could represent length, area, volume or none of these.

(3 marks)

- (b) Explain your answer for expression C.

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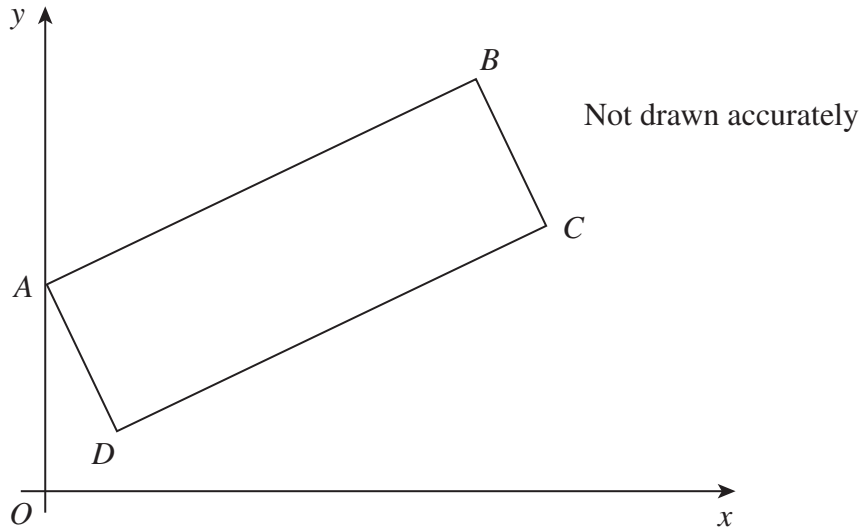
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(1 mark)

8 The diagram shows a rectangle $ABCD$.

The gradient of $AB = \frac{2}{5}$



(a) Write down the gradient of DC .

Answer (1 mark)

(b) Work out the gradient of BC .

.....

Answer (2 marks)

(c) A is the point $(0, 4)$

Write down the equation of the line AD .

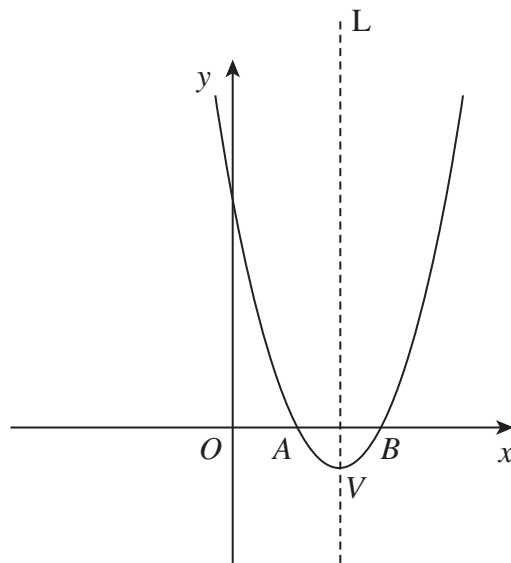
Answer (1 mark)

9 (a) Factorise $x^2 - 6x + 8$

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Answer (2 marks)

(b) The diagram shows the graph of $y = x^2 - 6x + 8$
 The curve cuts the x -axis at the points A and B .



Not drawn accurately

Work out the equation of the line L which passes through the vertex V of the curve.

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Answer (3 marks)

10 Simplify fully $\frac{8(x + 1)(2x - 3)}{2(2x - 3)}$

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Answer (2 marks)

11 Make s the subject of the formula $t = \frac{3(10 - s)}{s}$

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Answer (4 marks)

12 Given that n is an integer, prove that

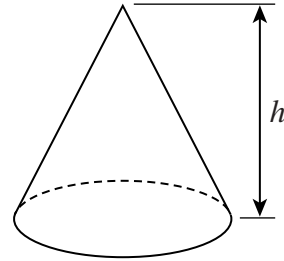
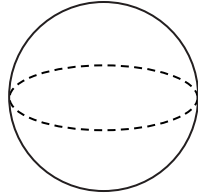
$(n + 3)(2n + 1) + (n - 2)(2n + 1)$ is **not** a multiple of 2.

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(5 marks)

Turn over ►

- 13** The diagram shows a sphere and a cone.
The radius of the sphere is 4 cm.
The radius of the base of the cone is 6 cm.
The volume of the sphere and the volume of the cone are equal.



Calculate the height, h , of the cone.

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Answer cm (5 marks)

14 Solve the simultaneous equations

$$y = 5x - 1$$

$$y = 2x^2 + 1$$

Do **not** use trial and improvement.
You **must** show your working.

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Answer (6 marks)

END OF QUESTIONS

There are no questions printed on this page