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Centre Number						Candidate Number					
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For Examiner's Use

General Certificate of Secondary Education
November 2008



MATHEMATICS (MODULAR) (SPECIFICATION B)
Module 5 Higher Tier
Paper 2 Calculator

43005/2H

H

Wednesday 12 November 2008 9.00 am to 10.15 am

<p>For this paper you must have:</p> <ul style="list-style-type: none"> • a calculator • mathematical instruments. 	
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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 black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Use a calculator where appropriate.
- Do all rough work in this book.
- If your calculator does not have a π button, take the value of π to be 3.14 unless another value is given in the question.

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.

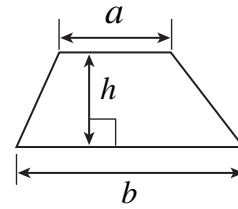
Advice

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

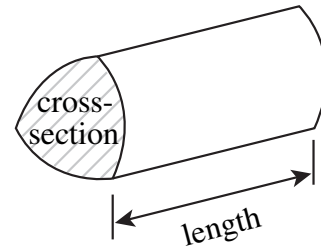


Formulae Sheet: Higher Tier

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

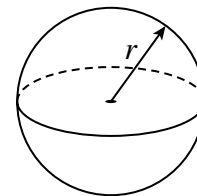


Volume of prism = area of cross-section \times length



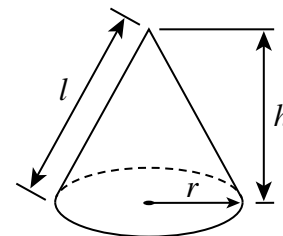
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

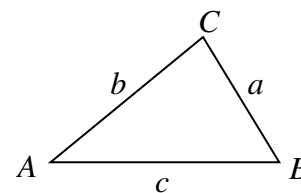


In any triangle ABC

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 A wheel of a bicycle is shown.



1 (a) The circumference is 70 cm.

Calculate the diameter.

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.....

Answer cm (2 marks)

1 (b) The bicycle travels 50 metres.

How many complete revolutions does the wheel make?

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Answer (3 marks)

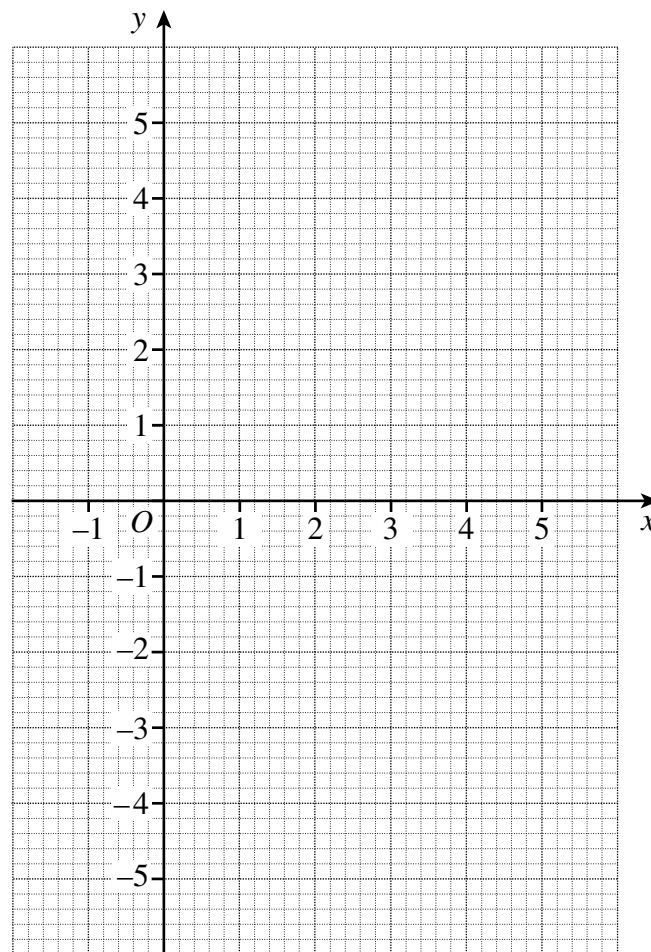


- 2 (a) Complete the table of values for $y = x^2 - 4x$

x	-1	0	1	2	3	4	5
y		0	-3	-4		0	5

.....
(2 marks)

- 2 (b) On the grid, draw the graph of $y = x^2 - 4x$ for values x from -1 to 5.



(2 marks)

- 2 (c) Use your graph to find the solutions of the equation $x^2 - 4x = 2$

Answer and (2 marks)

- 2 (d) Explain why you cannot find solutions of the equation $x^2 - 4x = -5$

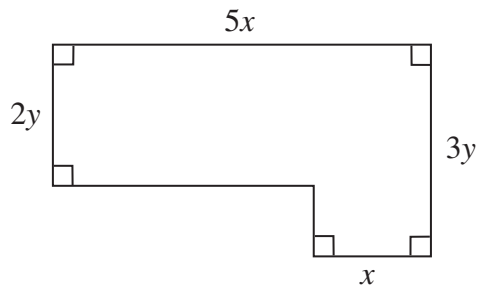
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(1 mark)



3 In this diagram, all lengths are in centimetres.



Not drawn accurately

3 (a) Tian says the perimeter of this shape is $6x + 5y$.

Explain why Tian is wrong.

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(1 mark)

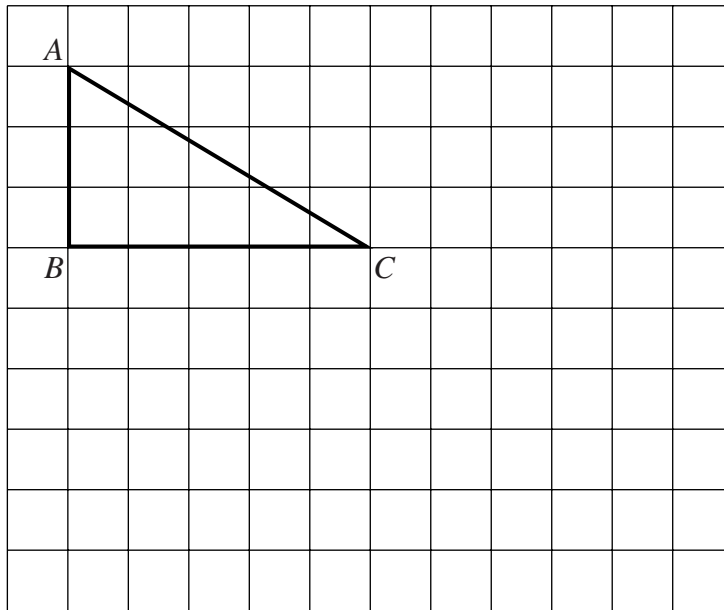
3 (b) Work out the correct expression for the perimeter.
 Give your answer in its simplest form.

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Answer (2 marks)

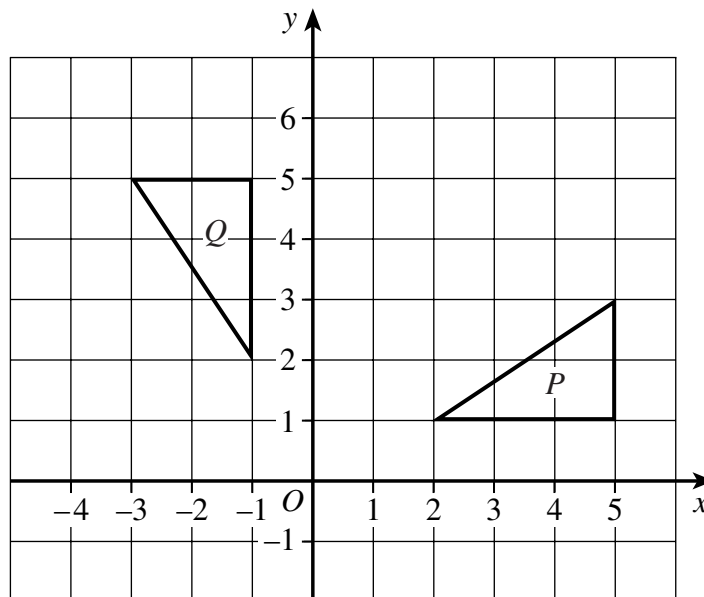


4 (a) Enlarge triangle ABC by scale factor 2, using A as the centre of enlargement.



(2 marks)

4 (b) Triangle P has been transformed to triangle Q .



Describe fully the **single** transformation which takes triangle P to triangle Q .

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.....

.....

(3 marks)



5 (a) Complete the following.

$$\frac{3}{4} = \frac{\square}{28}$$

$$\frac{1}{7} = \frac{\square}{28}$$

(2 marks)

5 (b) Simplify $\frac{3x}{4} + \frac{x}{7} - \frac{x}{2}$

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Answer (3 marks)

Turn over for the next question



6 (a) Solve the equation $\frac{y}{4} + 1 = 3 - y$

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.....

Answer $y =$ (3 marks)

6 (b) List all the integer solutions of the inequality $-6 \leq 3n < 5$

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.....

Answer (3 marks)

6 (c) Solve the simultaneous equations

$$4x + y = 5$$
$$3x - 2y = 12$$

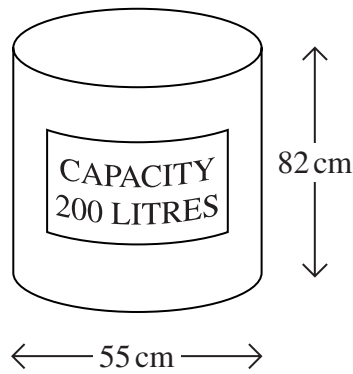
Do **not** use trial and improvement.
You **must** show your working.

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Answer $x =$, $y =$ (3 marks)



- 7 The diameter of a cylindrical water-butt is 55 cm.
The height is 82 cm.



Not drawn accurately

One litre = 1000 cm³

The label states that the capacity of the water-butt is 200 litres.

Is this accurate?

You **must** show your working.

.....

(4 marks)

- 8 (a) Multiply out $x(3 - x)$

.....

Answer (1 mark)

- 8 (b) Expand and simplify $(2q - 7)(3q - 4)$

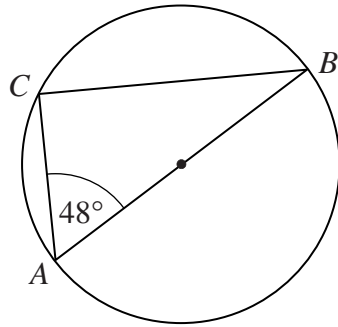
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Answer (3 marks)

Turn over ►



- 9 AB is a diameter of the circle shown.
Angle BAC is 48°



Not drawn accurately

- 9 (a) Give a reason why angle ACB is a right angle.

.....

(1 mark)

- 9 (b) The length of AB is 8.6 cm.

Calculate the length of BC .
 Give your answer to a suitable degree of accuracy.

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Answer cm (4 marks)

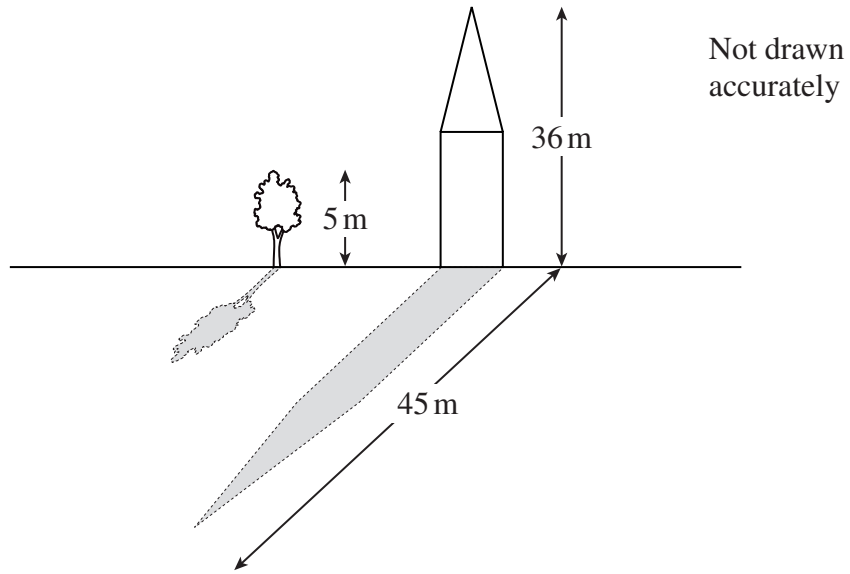
- 10 Show that $(y + 2)^2 - (y - 2)^2 \equiv 8y$

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(3 marks)



11 A church spire is 36 metres high and a tree is 5 metres high.
At 4pm, the shadow of the church spire is 45 metres long.



Calculate the length of the shadow of the tree.

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Answer m (3 marks)

Turn over for the next question



12 Make v the subject of the formula $f = \frac{uv}{u+v}$

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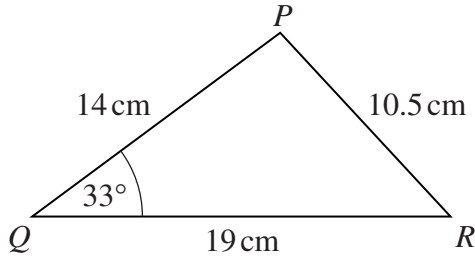
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Answer (4 marks)



13 In triangle PQR , angle $Q = 33^\circ$, $QP = 14$ cm, $PR = 10.5$ cm and $QR = 19$ cm.



Not drawn accurately

13 (a) Calculate the area of triangle PQR .

.....

Answer cm^2 (3 marks)

13 (b) Triangle XYZ is an enlargement of triangle PQR .
 Each side has been increased by 20%.

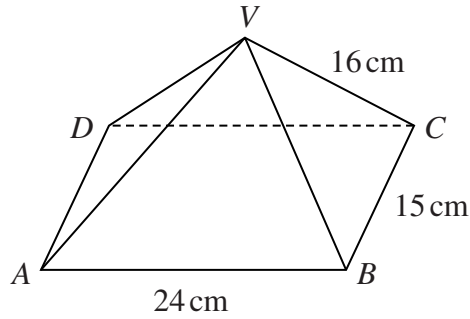
Calculate the area of triangle XYZ .

.....

Answer cm^2 (3 marks)



- 14** $VABCD$ is a pyramid.
The vertex V is directly above the centre of the rectangular base $ABCD$.
 $AB = 24$ cm, $BC = 15$ cm and each slant edge is 16 cm.



Not drawn accurately

Calculate the vertical height of the pyramid.

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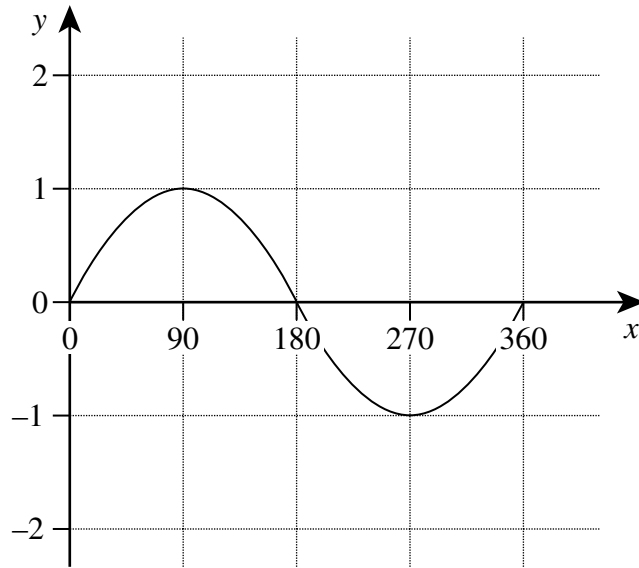
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Answer cm (5 marks)



15 The graph $y = \sin x$ is shown for $0^\circ \leq x \leq 360^\circ$

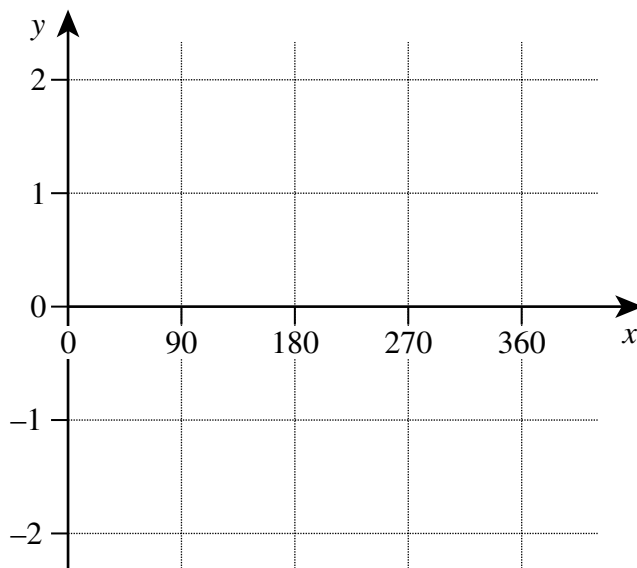


15 (a) Describe how you would use the graph of $y = \sin x$ to sketch the graph of $y = 1 + \sin x$

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(1 mark)

15 (b) On the grid below, sketch the graph of $y = \sin 2x$ for $0^\circ \leq x \leq 360^\circ$



(1 mark)

END OF QUESTIONS



There are no questions printed on this page

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