

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

For Examiner's Use

General Certificate of Secondary Education
June 2009



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

43055/2H

H

Monday 1 June 2009 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	
16	
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

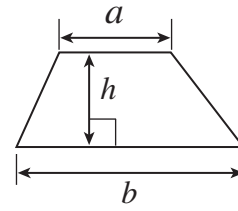
- In all calculations, show clearly how you work out your answer.



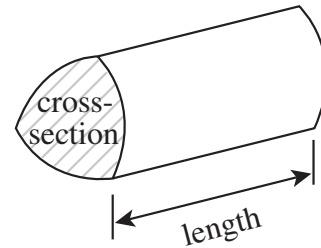
J U N 0 9 4 3 0 5 5 2 H 0 1

Formulae Sheet: Higher Tier

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

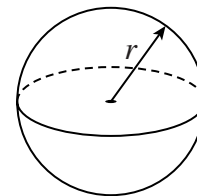


Volume of prism = area of cross-section \times length



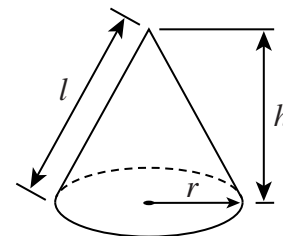
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

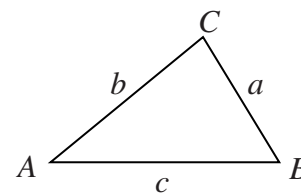


In any triangle ABC

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

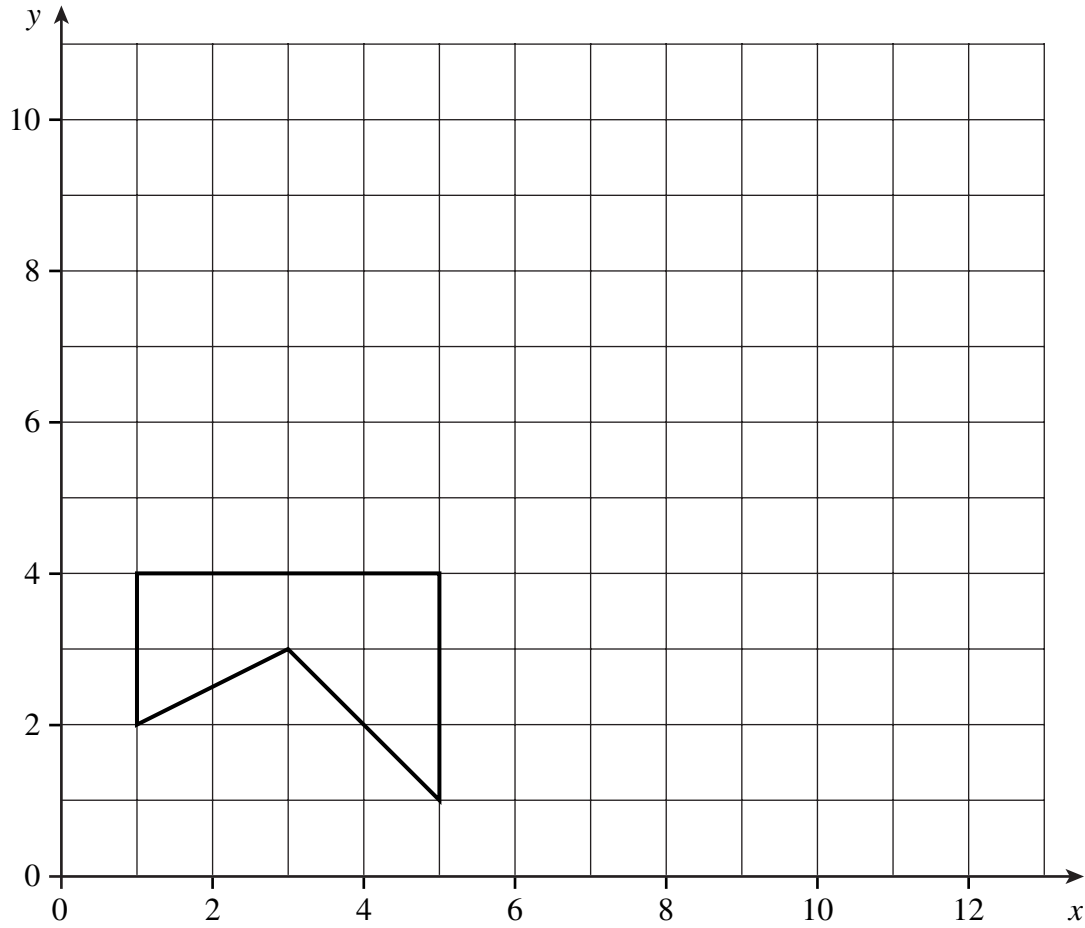
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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



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

- 1 Enlarge the shape by scale factor 2, using the origin as the centre of enlargement.



(3 marks)

Turn over for the next question

3

Turn over ►



2 (a) Complete the table of values for $y = x(x + 3)$

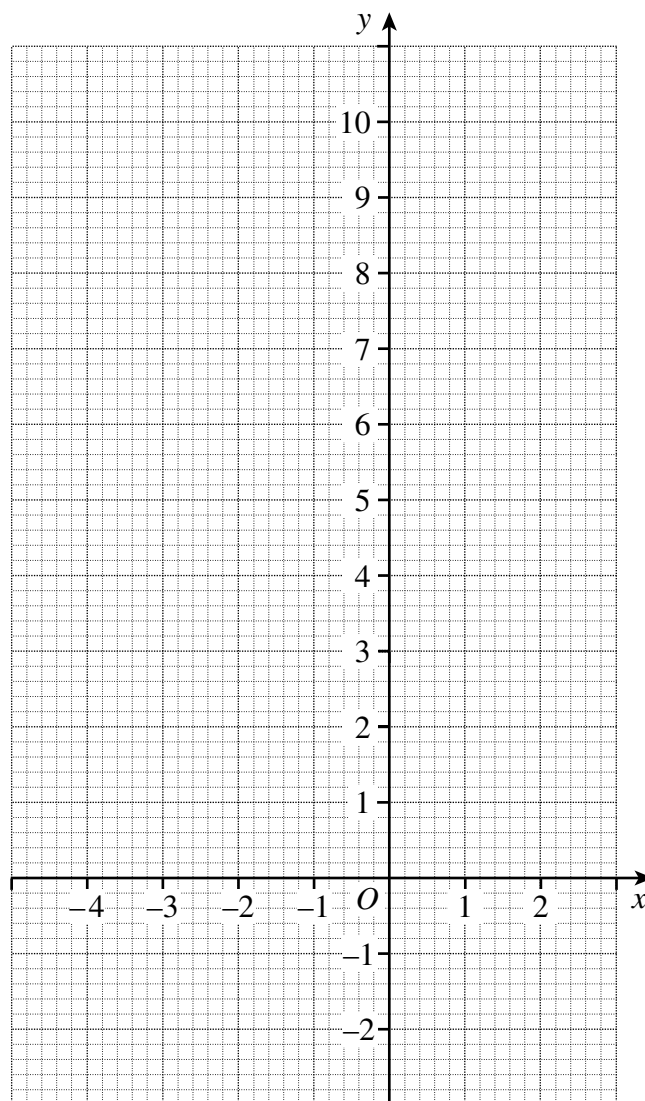
x	-4	-3	-2	-1	0	1	2
y	4	0		-2	0	4	

.....

.....

(2 marks)

2 (b) On the grid, draw the graph of $y = x(x + 3)$ for values of x from -4 to $+2$.



(2 marks)



2 (c) Work out the coordinates of the lowest point on the graph.

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Answer (..... ,) (2 marks)

3 Triangle ABC is isosceles.

One angle is x°

Another angle is $4x^\circ$

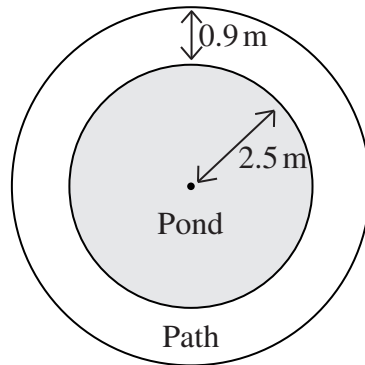
Find the **two** possible values of x .

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Answer or (4 marks)



- 4 The diagram shows a circular pond surrounded by a path.



Not drawn
accurately

- 4 (a) The radius of the pond is 2.5 metres.

Calculate the area of the pond.

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Answer m² (2 marks)

- 4 (b) The path is 0.9 metres wide.

Calculate the area of the path.

Give your answer to a suitable degree of accuracy.

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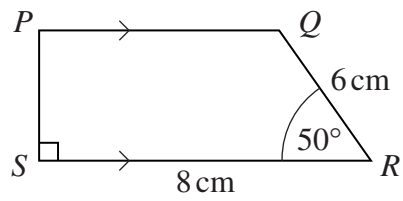
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Answer m² (3 marks)



5 In trapezium $PQRS$, the sides PQ and SR are parallel.



Not drawn accurately

Make an accurate drawing of the trapezium.
One side has been drawn for you.



(4 marks)



6 Solve the equations.

6 (a) $4 - w = 12$

.....

Answer $w = \dots\dots\dots$ (1 mark)

6 (b) $2(4x - 1) = 18$

.....

Answer $x = \dots\dots\dots$ (3 marks)

6 (c) $5 + \frac{1}{4}y = 7$

.....

Answer $y = \dots\dots\dots$ (2 marks)

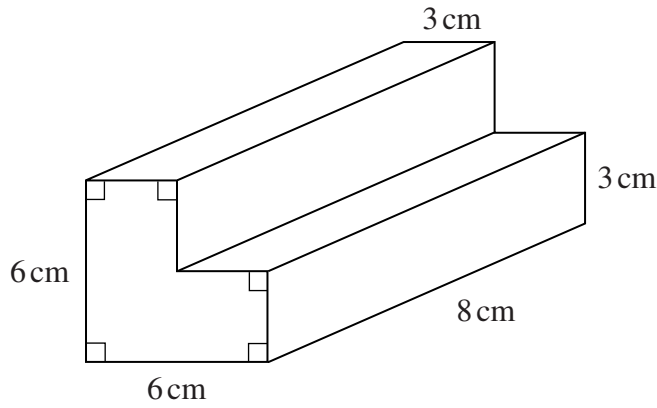
6 (d) $\frac{2t + 1}{3} + \frac{5 - t}{4} = 3$

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Answer $t = \dots\dots\dots$ (4 marks)



- 7 Sam has made wooden play blocks for a nursery class.
Each block is a prism with an L-shaped cross-section.



Not drawn accurately

Work out the total surface area of the prism.

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Answer cm² (4 marks)

Turn over for the next question



8 Simplify

8 (a) $m^3 \times m^5$

Answer (1 mark)

8 (b) $x^8 \div x^2$

Answer (1 mark)

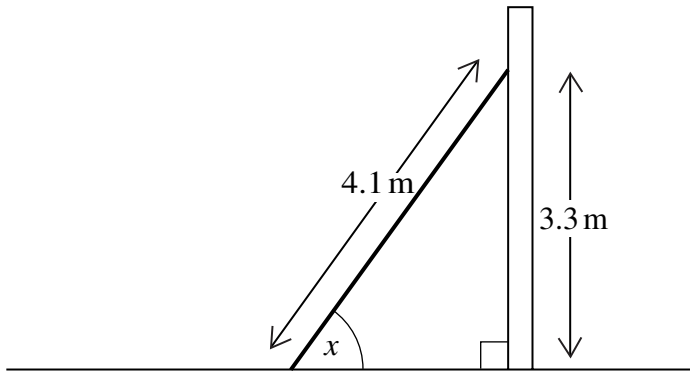
8 (c) $(5y^5)^2$

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Answer (2 marks)



- 9 A ladder rests against a wall as shown in the diagram.
The ladder is 4.1 metres long and reaches 3.3 metres above the ground.



Not drawn accurately

- 9 (a) Calculate angle x .

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Answer degrees (3 marks)

- 9 (b) The top of the ladder slips down the wall until the angle between the ladder and the wall is 48° .

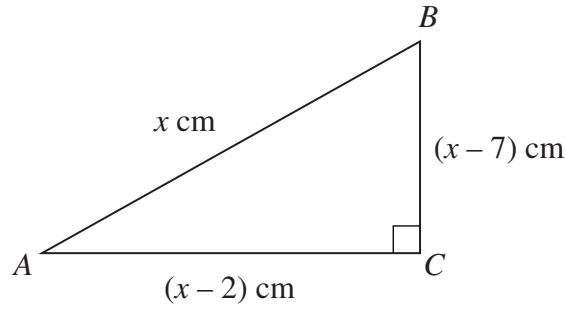
How far above the ground does the ladder now reach?

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Answer m (3 marks)



- 10** The hypotenuse of triangle ABC is x cm.
The other sides are $(x - 2)$ cm and $(x - 7)$ cm.



Not drawn accurately

- 10 (a)** Show that $x^2 - 18x + 53 = 0$

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(3 marks)

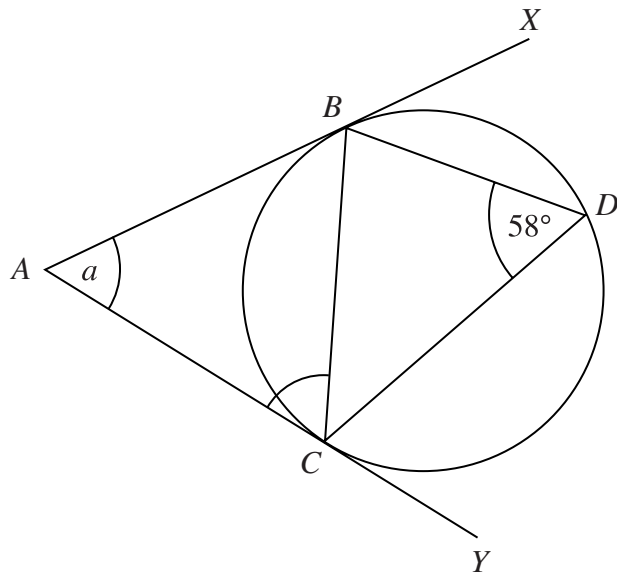
- 10 (b)** Solve $x^2 - 18x + 53 = 0$ to find the length of the hypotenuse.
Give your answer to one decimal place.

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Answer cm (4 marks)



- 11** The line AX is a tangent to the circle at B .
 The line AY is a tangent to the circle at C .
 Angle $BDC = 58^\circ$



Not drawn accurately

- 11 (a)** State the reason why angle ACB is also equal to 58° .

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(1 mark)

- 11 (b)** Work out the value of a .

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Answer degrees (3 marks)



12 Make t the subject of the formula $x = \frac{3t - 5}{t - 2}$

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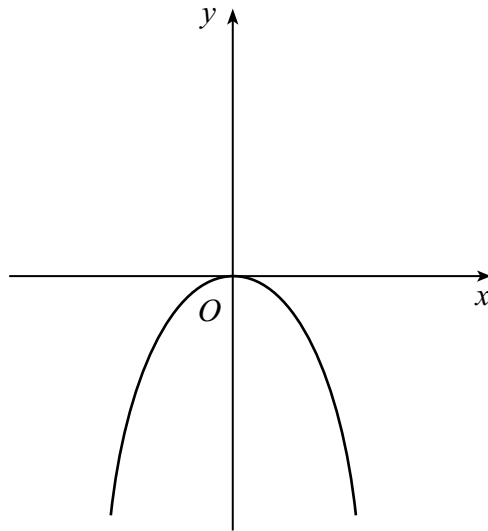
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Answer $t =$ (4 marks)



- 13 (a) The graph of $y = -x^2$ is sketched below.

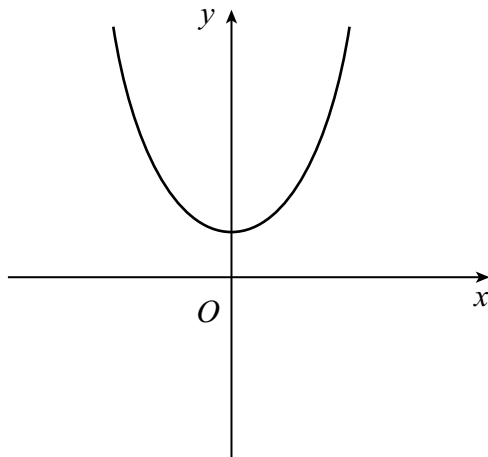


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accurately

On the same axes, sketch the graph of $y = -x^2 + 9$

(1 mark)

- 13 (b) The graph of $y = x^2 + 3$ is sketched below.



Not drawn
accurately

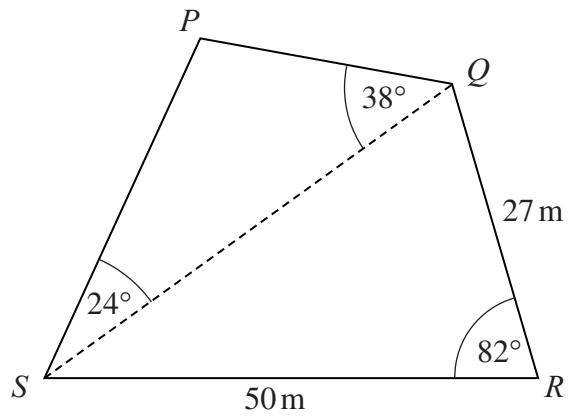
On the same axes, sketch the graph of $y = (x - 2)^2 + 3$

(2 marks)

Turn over for the next question



14 The diagram shows the plan of a field $PQRS$.



Not drawn
accurately

Calculate the length of PS .

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Answer m (6 marks)

END OF QUESTIONS

