Surname		Other Names	
Centre Number			Candidate Number									
Candidate Signature												

For Examiner's Use

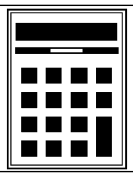
General Certificate of Secondary Education
June 2008

MATHEMATICS (MODULAR) (SPECIFICATION B) 43005/2H
Module 5 Higher Tier
Paper 2 Calculator

H

Monday 2 June 2008 1.30 pm to 2.45 pm

For this paper you must have:
- a calculator
- mathematical instruments.



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.

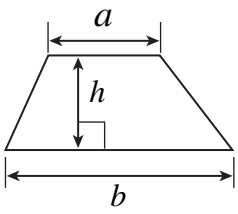
Information
- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You may ask for more answer paper, graph paper and tracing paper. This must be tagged securely to this answer book.

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

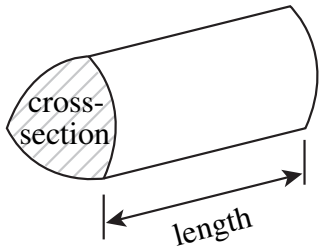
For Examiner's Use	
Pages	Mark
3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
TOTAL	
Examiner's Initials	

Formulae Sheet: Higher Tier

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

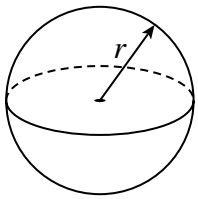


Volume of prism = area of cross-section × length



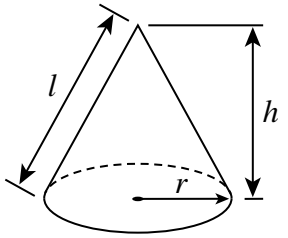
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

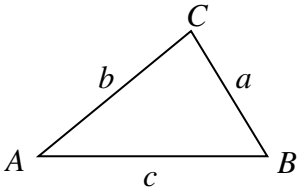
Curved surface area of cone = $\pi r l$



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

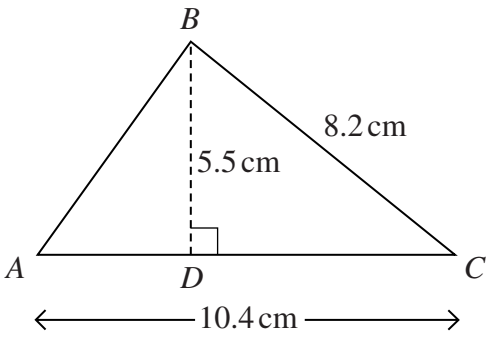
The Quadratic Equation

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 In triangle ABC, $AC = 10.4\,\text{cm}$, $BC = 8.2\,\text{cm}$ and the height $BD = 5.5\,\text{cm}$



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Calculate the area of triangle ABC.

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Answer ..... cm^2 *(2 marks)*

2 Solve these equations.

2 (a) $5x - 4 = 7 + 3x$

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Answer $x =$ ..... *(3 marks)*

2 (b) $\dfrac{13 - 5y}{3} = 4$

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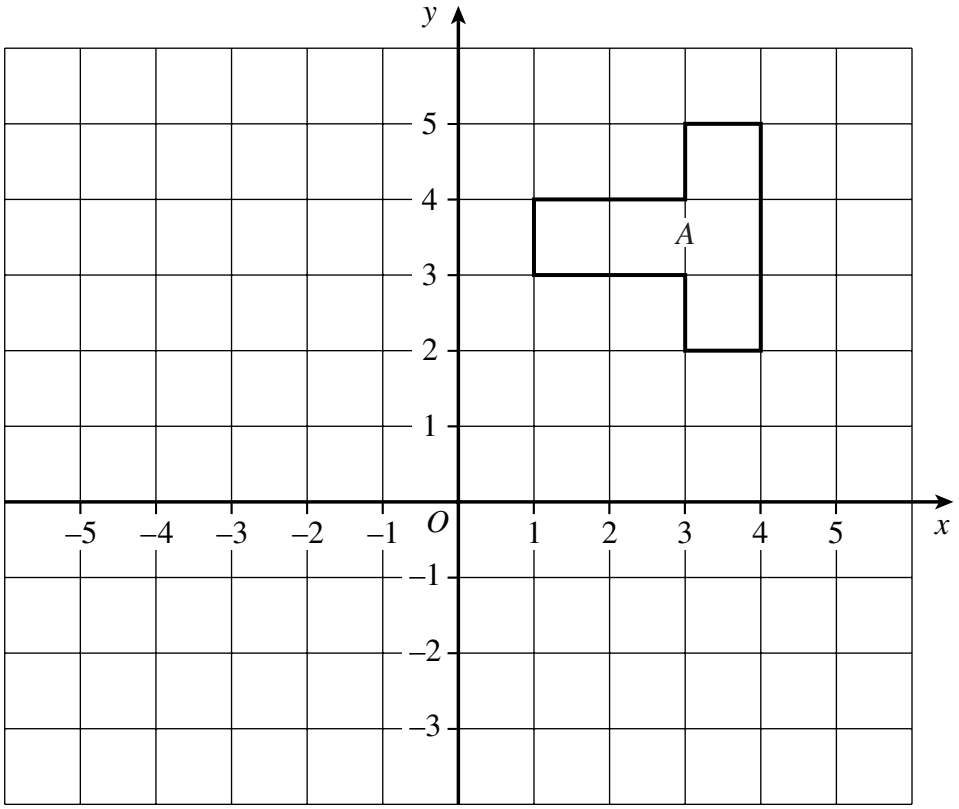
Answer $y =$ ..... *(3 marks)*

8

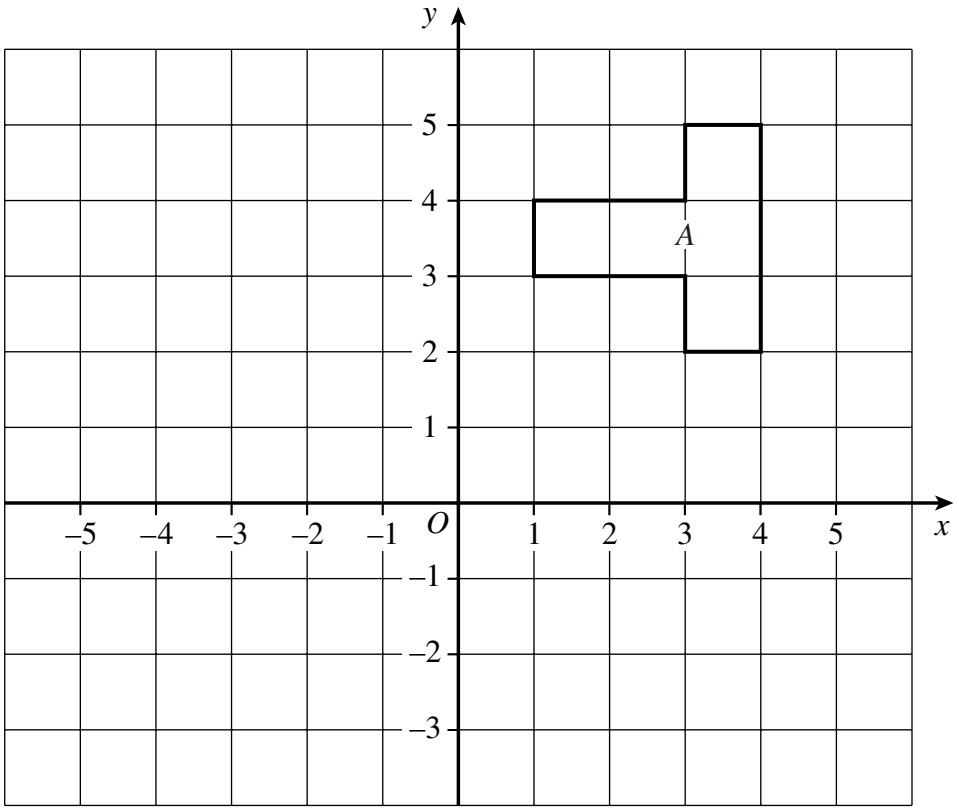
Turn over ▶

3 (a) Reflect shape *A* in the line $y = 2$



(2 marks)

3 (b) Translate shape *A* five units to the left and four units down.



(1 mark)

4 Part of a number grid is shown below.

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

The shaded shape is called S_{11} because it has the number 11 in the top row.

4 (a) Write down the sum of the numbers in S_{25}.

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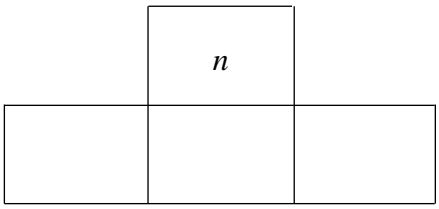
Answer ..... *(1 mark)*

4 (b) Fill in the empty boxes of S_n.



(2 marks)

4 (c) Write down an expression for the sum of the numbers in S_n.
Simplify your expression.

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Answer ..... *(2 marks)*

4 (d) Explain why the sum of the numbers in S_n will always be an odd number.

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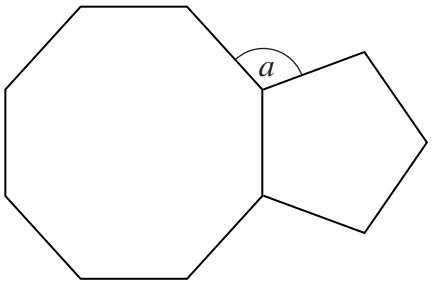
(2 marks)

10

Turn over ▶

5 This shape is made from a regular octagon and a regular pentagon.



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Work out the size of angle a.

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Answer ..... degrees *(4 marks)*

6 Make d the subject of the formula $c = 5d + 2$

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Answer $d =$ ..... *(2 marks)*

7 (a) The line $x + y = 5$ has been drawn on the grid.

Draw the graph of $y = 2x - 5$ for values of x from -1 to $+5$.

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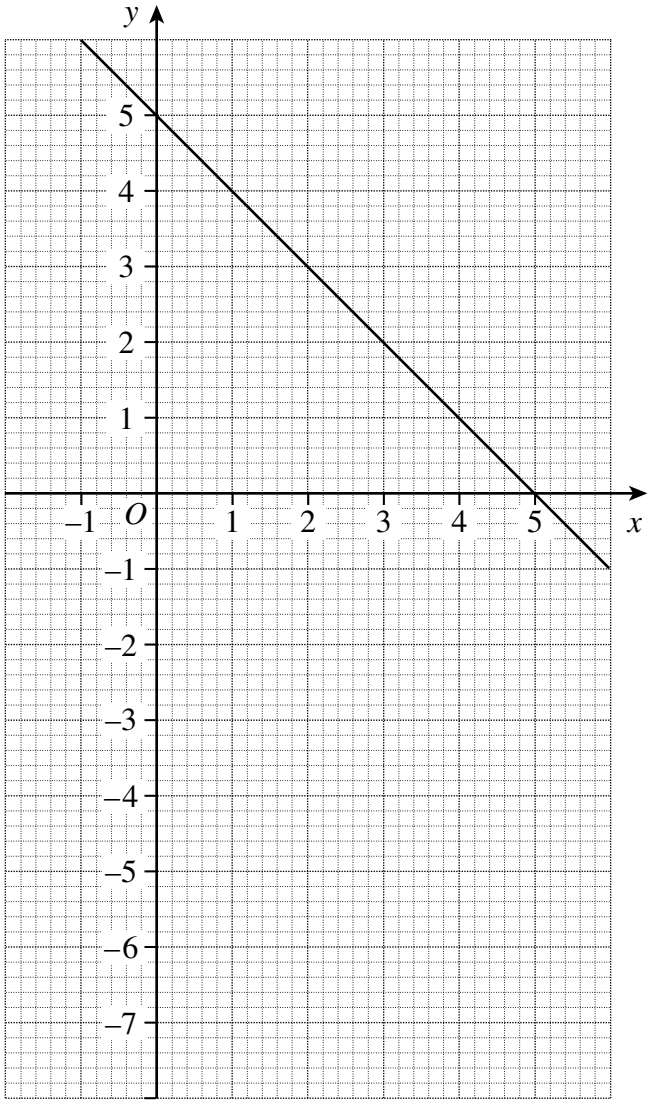


(3 marks)

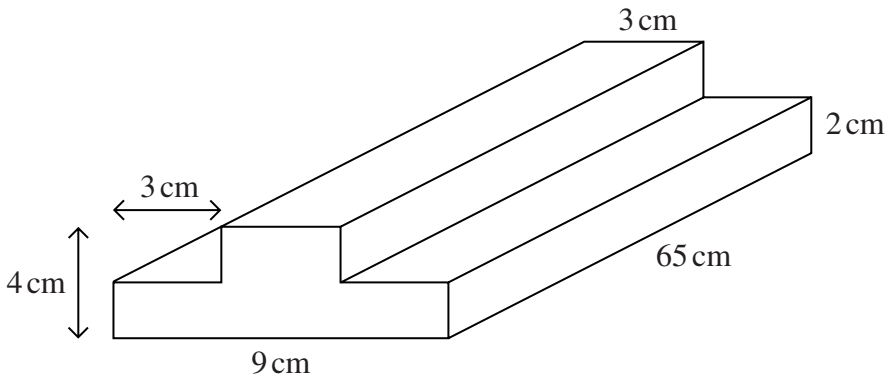
7 (b) Use the graphs to find the solution to the simultaneous equations

$$x + y = 5$$
$$y = 2x - 5$$

Answer $x =$ ..... $y =$ ..... *(2 marks)*

11

8 The diagram shows a block of wood with uniform cross-section.
The cross-section is made of rectangles.
The block is 65 cm long.



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Calculate the volume of the block.
State the units of your answer.

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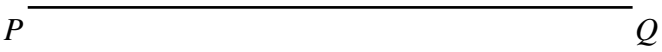
Answer ..... *(5 marks)*

9 (a) Using ruler and compasses only, construct the perpendicular bisector of the line PQ.



(2 marks)

9 (b) Complete the sentence.

The perpendicular bisector of the line PQ is the locus of points that are

.....

(1 mark)

8

10 Simplify

10 (a) $\frac{x^6}{x^2}$

Answer ..... *(1 mark)*

10 (b) $3y^2z^4 \times 2y^5z$

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Answer ..... *(2 marks)*

10 (c) $(2p^3r^2)^3$

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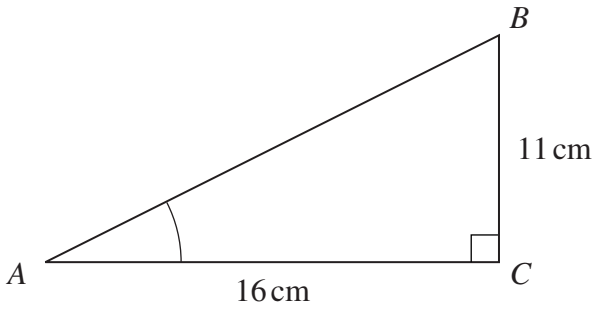
Answer ..... *(2 marks)*

11 (a) In triangle ABC, angle $C = 90°$, $BC = 11\,\text{cm}$ and $AC = 16\,\text{cm}$



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Calculate angle A.

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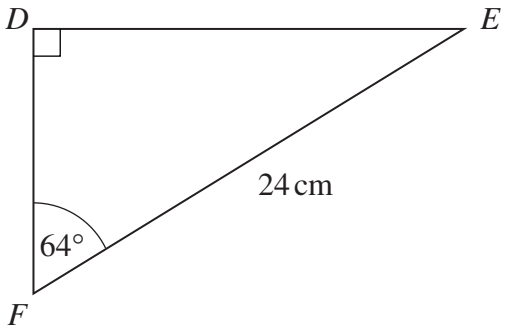
Answer ..... degrees *(3 marks)*

11 (b) In triangle DEF, angle $D = 90°$, angle $F = 64°$ and $FE = 24\,\text{cm}$



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Calculate the length of DF.
Give your answer to an appropriate degree of accuracy.

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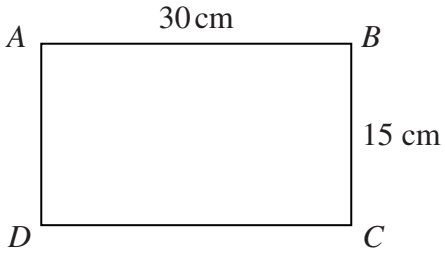
Answer ..... cm *(4 marks)*

12

12 The diagram shows a rectangle *ABCD*.



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The side *AB* is increased by 20%.
The side *BC* is increased by 10%.

Work out the area of the new rectangle.

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Answer ..... cm^2 *(3 marks)*

13 (a) Factorise $5x^2 + 36x + 7$

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Answer ..... *(2 marks)*

13 (b) Factorise completely $3y^2 - 12z^2$

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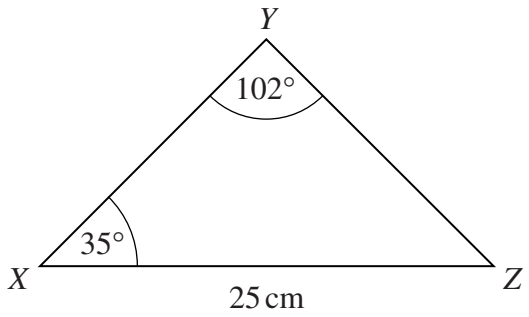
Answer ..... *(3 marks)*

14 In triangle *XYZ*, angle $X = 35°$, angle $Y = 102°$ and XZ = 25 cm



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Calculate *YZ*.

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Answer ..... cm *(3 marks)*

Turn over for the next question

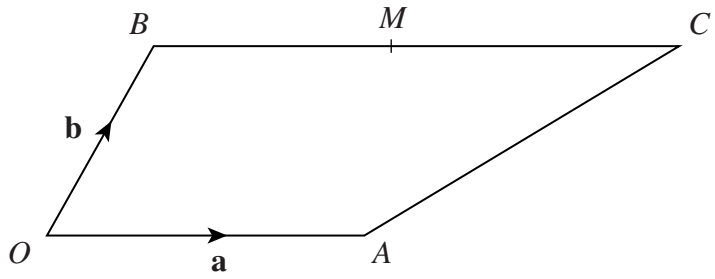
11

15 *OACB* is a trapezium with *BC* parallel to *OA*.

$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$

The length of *BC* is twice the length of *OA*.

M is the mid point of *BC*.



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Prove that *OACM* is a parallelogram.

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(2 marks)

16 The volume of a cone is 2400 cm^3.
The height of the cone is 28 cm.

Calculate the radius of the cone.

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Answer ..... cm *(3 marks)*

17 Solve the equation $\frac{4}{x} + \frac{3}{x-2} = 1$

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Answer ..... *(5 marks)*

END OF QUESTIONS

10

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED