Version 1.1

Surname		Other Names	
Centre Number			Candidate Number									
Candidate Signature												

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General Certificate of Secondary Education
June 2003

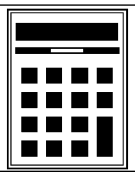
ASSESSMENT and QUALIFICATIONS ALLIANCE

MATHEMATICS (MODULAR) (SPECIFICATION B) 33005/I2
Module 5 Intermediate Tier
Paper 2 Calculator

I

Tuesday 10 June 2003 9.00 am to 10.15 am

In addition to this paper you will require:
- a calculator
- mathematical instruments.



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 in the spaces provided.
- Do all rough work in this booklet.
- If your calculator does not have a π button, take the value of π to be 3.14 unless otherwise instructed in the question.

Information
- The maximum mark for this paper is 70.
- Mark allocations are shown in brackets.
- Additional answer paper, graph paper and tracing paper will be issued on request and must be tagged securely to this answer booklet.
- You are expected to use a calculator where appropriate.

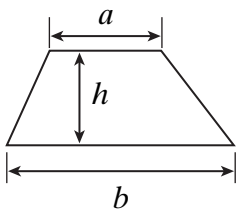
Advice
- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16	
TOTAL	
Examiner's Initials	

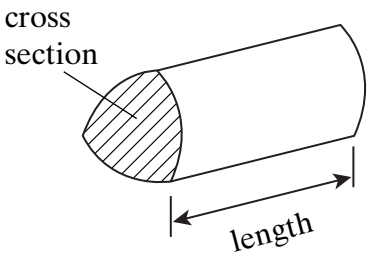
Formulae Sheet: Intermediate Tier

You may need to use the following formulae:

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



Volume of prism = area of cross section × length



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

1 From the list of numbers

4 9 20 27 32 51 65 81 125

write down the cube numbers.

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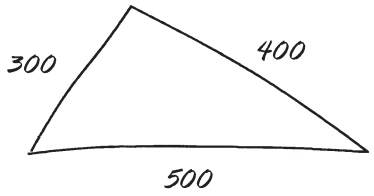
.....

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

2 Mutasem draws a rough sketch of a triangle with sides 300 m, 400 m and 500 m.



Using ruler and compasses only, make an accurate scale drawing of the triangle.
Use a scale of 1 cm to represent 50 m.

You **must** show clearly all your construction arcs.

(3 marks)

5

3 Solve the equations

(a) $8z - 5 = 11$

.....

.....

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

(b) $3(w - 2) = 9$

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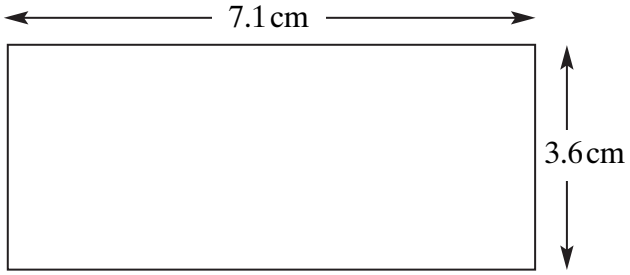
.....

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

4 A rectangle has length 7.1 cm and width 3.6 cm.



Not to scale

(a) Calculate the area of the rectangle.
Give your answer to 1 decimal place.

.....

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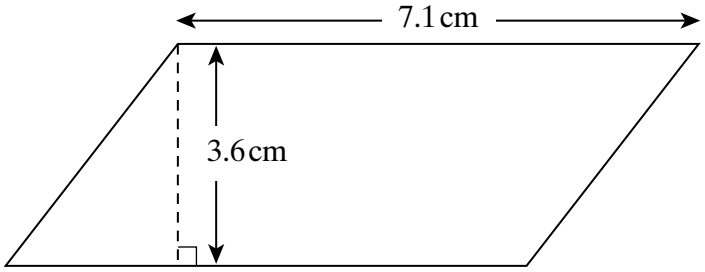
Answer ..... cm^2 *(3 marks)*

(b) The diagram shows a parallelogram.



Not to scale

Explain why the area of the parallelogram is equal to the area of the rectangle.

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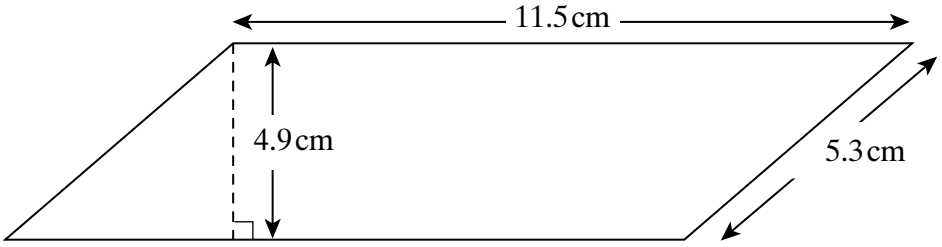
(1 mark)

(c) This diagram shows a different parallelogram of length 11.5 cm, height 4.9 cm and slant height 5.3 cm.



Not to scale

Calculate the area of this parallelogram.

.....

.....

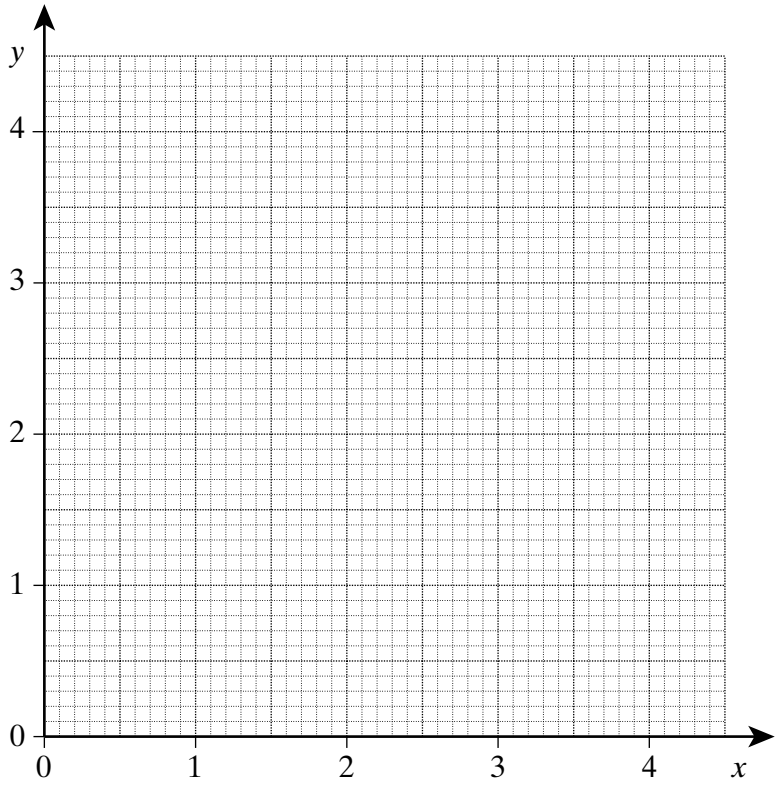
Answer ..... cm^2 *(2 marks)*

5 (a) Complete the table of values for the graph of $x + y = 4$

x	0	1	2	3	4
y	4			1	

(2 marks)

(b) On the grid, draw the graph of $x + y = 4$



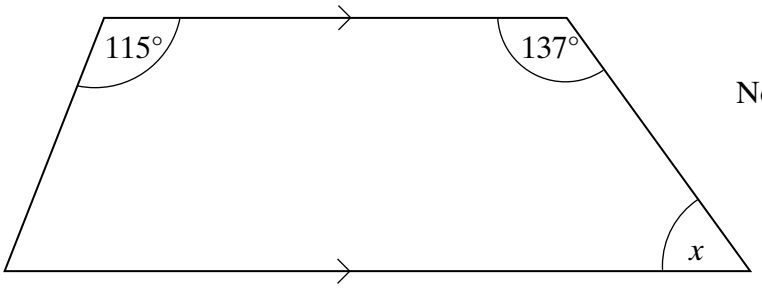
(1 mark)

(c) P is a point on the line $x + y = 4$
David says, "the x coordinate of P is one greater than the y coordinate of P".

Write down the coordinates of P.

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

6 The diagram shows a trapezium.



Not drawn accurately

Calculate the value of x.

.....

.....

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

7 The radius of the wheel of Ellie's bicycle is 0.3 m.

(a) Calculate the circumference of the wheel.

.....

.....

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

(b) Ellie cycles 100 m.

How many revolutions does the wheel make?

.....

.....

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

10

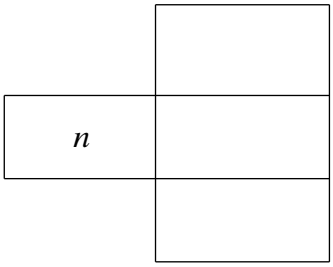
8 Part of a number grid is shown below.

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

The shaded shape is called T_{16} because it has the number 16 on the left.

The sum of the numbers in T_{16} is 67.

(a) This is T_n .



Fill in the empty boxes of T_n . *(2 marks)*

(b) Find the sum of all the numbers in T_n in terms of n.

Give your answer in its simplest form.

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

(c) Explain why the sum of the numbers in T_n cannot be equal to 93.

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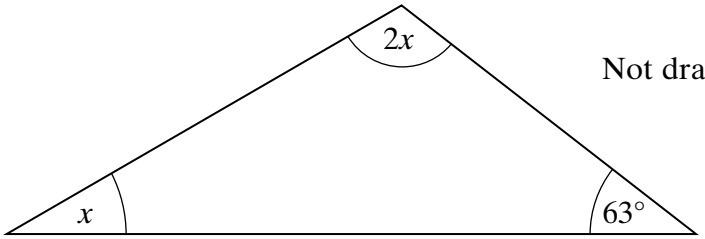
(2 marks)

9 A triangle has angles of 63°, $2x$ and x.



Not drawn accurately

Work out the value of x.

.....

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.....

.....

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

TURN OVER FOR THE NEXT QUESTION

9

10 Parveen is using trial and improvement to find a solution to the equation

$$x^3 + 7x = 30$$

This table shows her first two trials.

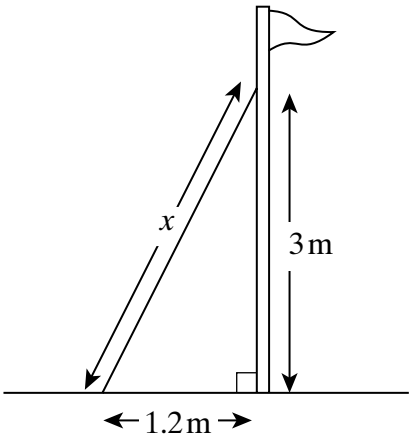
x	$x^3 + 7x$	**Comment**
2	22	Too small
3	48	Too big

Continue the table to find a solution to the equation.

Give your answer to 1 decimal place.

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

11 A support for a flagpole is attached at a height of 3 m and is fixed to the ground at a distance of 1.2 m from the base.



Not to scale

Calculate the length of the support (marked x on the diagram).

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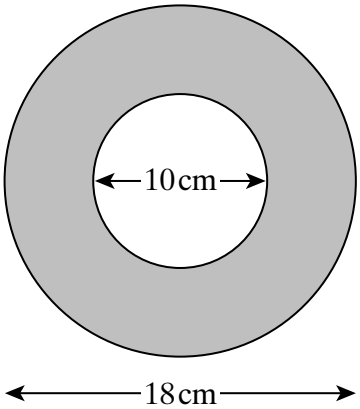
.....

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

6

12 A circular photo frame is shown below.

The diameter of the photo is 10 cm and the outer diameter of the frame is 18 cm.



Not to scale

Calculate the area of the frame.

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

13 Solve the equation $2(x + 5) = 7 - 4x$

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.....

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

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14 In the formulae given below, the letters p, q and r represent lengths.

(a) Grant has written down this formula

$$\text{Volume} = \frac{1}{4}\pi r^4$$

Explain how you can tell that Grant has made a mistake.

.....

.....

(1 mark)

(b) Jared has this formula

$$\text{Area} = p^2 + 2q$$

Explain how you can tell that Jared has made a mistake.

.....

.....

(1 mark)

TURN OVER FOR THE NEXT QUESTION

10

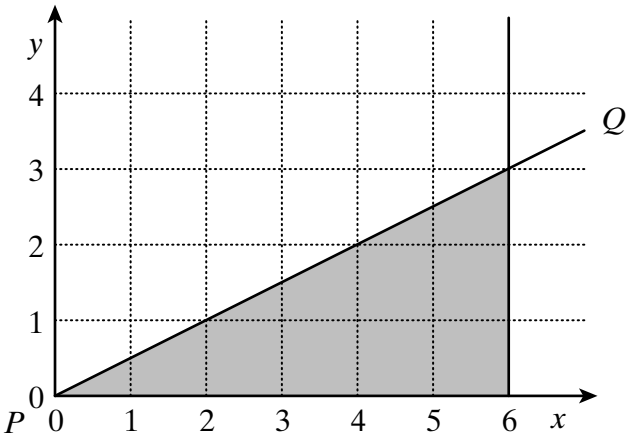
15 (a) List the integer values of n such that $3 \leqslant 3n < 18$

.....

.....

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

(b)



(i) Find the equation of the line PQ.

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

(ii) Write down **three** inequalities which together describe the shaded area.

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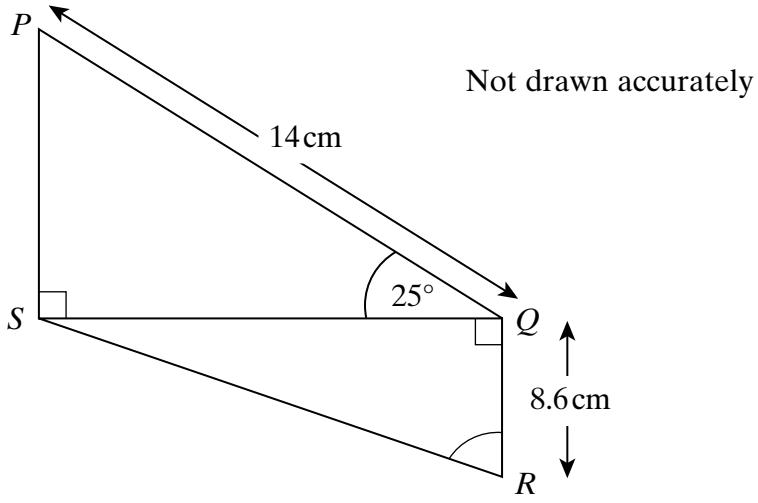
Answer ..... *(3 marks)*

16 In the diagram, $PQ = 14\,\text{cm}$ and $QR = 8.6\,\text{cm}$.

Angle PSQ = angle $SQR = 90°$

Angle $PQS = 25°$



Calculate angle R.

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

12

17 (a) Factorise completely $3x^2 - 6xy$

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

(b) Factorise $y^2 - 9y + 14$

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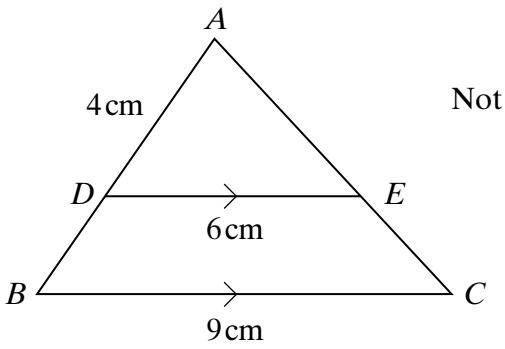
.....

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

18 Triangles ADE and ABC are similar.

DE is parallel to BC.

$AD = 4\,\text{cm},\ DE = 6\,\text{cm}$ and $BC = 9\,\text{cm}$.



Calculate the length of BD.

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

END OF QUESTIONS