Surname		Other Names	
Centre Number			Candidate Number									
Candidate Signature												

For Examiner's Use

General Certificate of Secondary Education
June 2008

MATHEMATICS (MODULAR) (SPECIFICATION B) **43005/1H**
Module 5 Higher Tier
Paper 1 Non-Calculator

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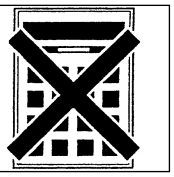
Monday 19 May 2008 9.00 am to 10.15 am

For this paper you must have:
- mathematical instruments.

You must **not** use a calculator.



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Pages	Mark
3	
4–5	
6–7	
8–9	
10–11	
12–13	
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.
- Do all rough work in this book.

Information

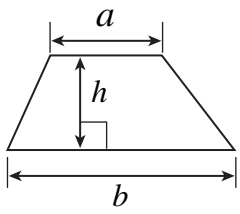
- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You may ask for more answer paper, graph paper and tracing paper. This must be tagged securely to this answer book.

Advice

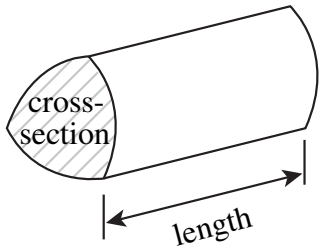
- In all calculations, show clearly how you work out your answer.

Formulae Sheet: Higher Tier

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

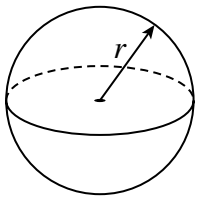


Volume of prism = area of cross-section × length



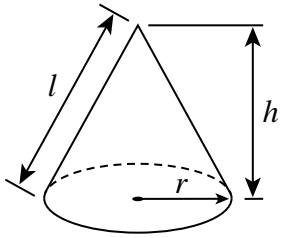
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

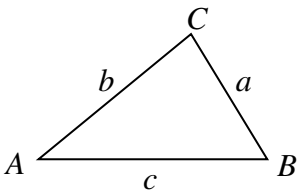
Curved surface area of cone = $\pi r l$



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 Here is a multiplication table.

×	11	12	13	14	15
3	33	36	39	42	45
4	44	48	52	56	60

1 (a) Emma says that $\frac{37}{48}$ is greater than $\frac{3}{4}$

Is she correct?
Explain your answer.

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(2 marks)

1 (b) Complete the following.

1 (b) (i) $\frac{3}{4} = \frac{\square}{88}$

(1 mark)

1 (b) (ii) $\frac{4}{3} = \frac{116}{\square}$

(1 mark)

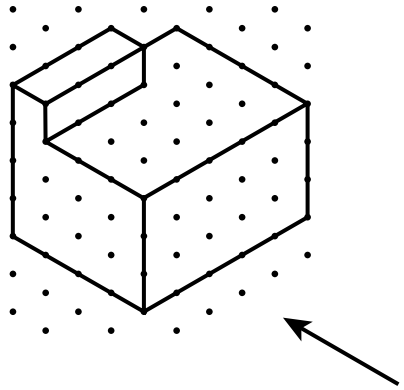
1 (c) Factorise $33x + 44$

.....

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

5

2 The diagram shows a solid made from two cuboids.
The large cuboid is 5 cm by 4 cm by 3 cm.
The small cuboid is 3 cm by 1 cm by 1 cm.



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On the centimetre grids draw the plan view, side elevation and front elevation.

Plan view

Side elevation

Front elevation

(3 marks)

3 (a) Use $\pi = 3$ to work out an estimate for the circumference of a circle with diameter 15 cm.

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

3 (b) (i) Use $\pi = 3.14$ to work out the area of a circle with radius 10 cm.

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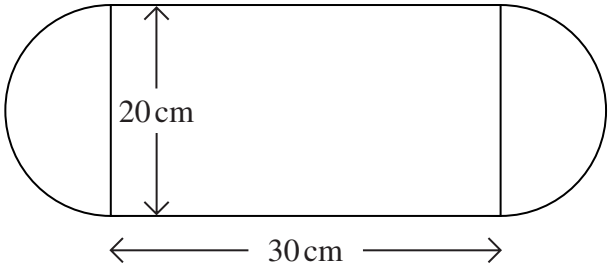
Answer ..... cm^2 *(2 marks)*

3 (b) (ii) The diagram shows a shape made of two semicircles and a rectangle.



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Use your answer to part (b)(i) to work out the area of the shape.

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

10

Turn over ▶

4 Matias is x years old.
Kaz is three years younger than Matias.

4 (a) Write down an expression, in terms of x, for Kaz's age.

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

4 (b) The sum of the ages of Matias and Kaz is 91.

Use this information to write down an equation in terms of x.

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

4 (c) Solve your equation formed in part (b) to work out the age of Matias.

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

5 (a) Multiply out $a(b + c)$

.....

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

5 (b) Work out the value of $xy + xz$ when $x = 27$, $y = 3$ and $z = 7$

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

6 (a) Write down the value of 13^2

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

6 (b) Explain how you know that 14^2 is **not** equal to 192.

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(1 mark)

7 (a) Multiply out $-2(3a - b + 5)$

.....

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

7 (b) Multiply out and simplify $4(8e - 9) + 2e$

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

8 Solve $(x - 13)(x + 1) = 0$

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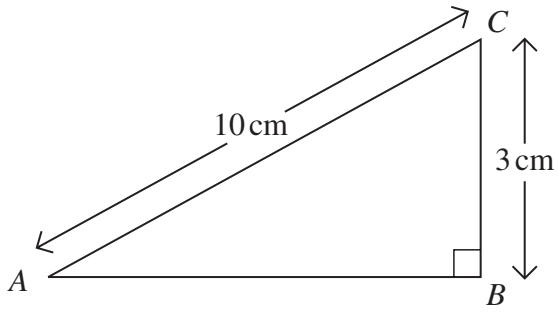
Answer ..... *(2 marks)*

17

9 (a) The diagram shows a right-angled triangle *ABC*.
AC = 10 cm and *BC* = 3 cm



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Calculate the length of *AB*.
Leave your answer as a square root.

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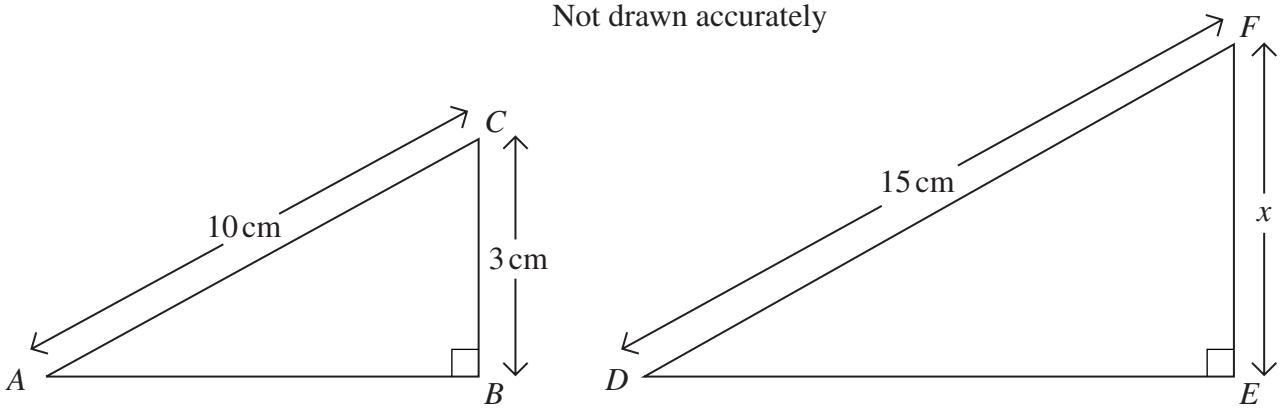
Answer ..... cm *(3 marks)*

9 (b) Triangles *ABC* and *DEF* are similar.

Not drawn accurately



Work out the length of *EF*, marked *x* on the diagram.

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

10 You are given the formula $y = \dfrac{x^2 - 49}{5}$

10 (a) Make x the subject of the formula.

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

10 (b) Work out the values of x when $y = -9$

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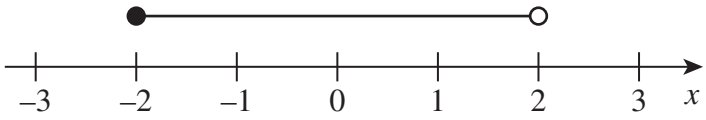
Answer $x =$ ..... and $x =$ ..... *(3 marks)*

11



11 (a) Write down the integers that satisfy the inequality shown above.

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

11 (b) Solve the inequality $14 + x \leqslant 12 + 3x$

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

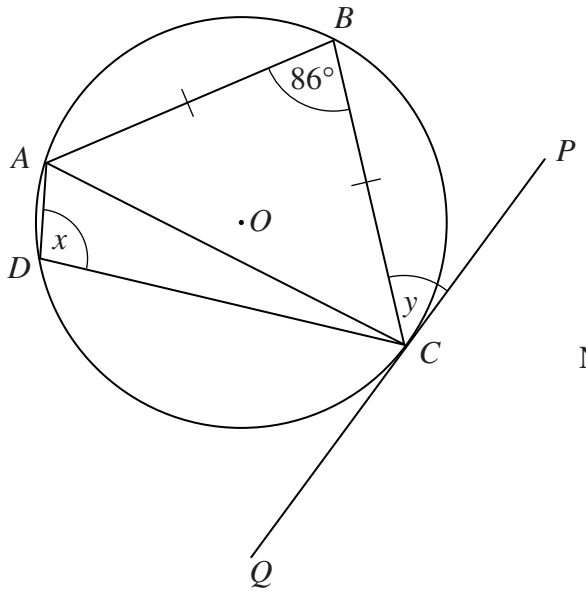
11 (c) Write down a non-integer value that satisfies both the inequality diagram and part (b).

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

17

Turn over ▶

12 *ABCD* is a cyclic quadrilateral.
PCQ is a tangent at *C*.
O is the centre of the circle.
Triangle *ABC* is isosceles.



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12 (a) Work out the value of *x*.

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

12 (b) (i) Work out the value of *y*.

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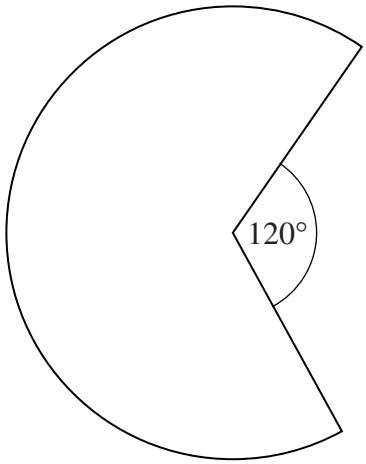
Answer ..... degrees *(3 marks)*

12 (b) (ii) Write down the name of the circle theorem used in part (b)(i).

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

13 The diagram shows a major sector of a circle.
The radius of the sector is 18 cm.
The angle of the minor sector is 120°.



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Work out the perimeter of the major sector.
Leave your answer in terms of π.
Simplify your answer as fully as possible.

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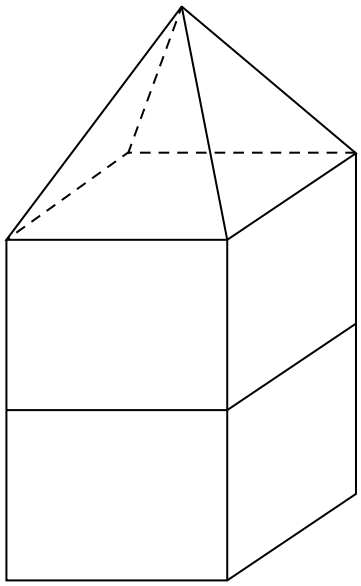
Answer ..... cm *(4 marks)*

10

14 The diagram shows a solid metal object made from two cubes and a square-based pyramid.
The area of the base of each cube is 25 cm^2.
The height of the pyramid is equal to the height of each cube.
The density of the metal is 9 g/cm^3.



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You are given the formula

$$\text{Volume of pyramid} = \frac{1}{3} \times \text{area of base} \times \text{vertical height}$$

Work out the mass of the solid metal object.

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Answer ..... g *(7 marks)*

15 Prove that $\frac{x-3}{x} - \frac{x-2}{x+2} \equiv \frac{x-6}{x(x+2)}$

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(4 marks)

END OF QUESTIONS

11

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