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| Centre Number | | | | | | Candidate Number | | | | | |
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| For Examiner's Use |
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General Certificate of Secondary Education
November 2008



MATHEMATICS (MODULAR) (SPECIFICATION B)
Module 5 Higher Tier
Paper 1 Non-calculator

43005/1H
H

Thursday 6 November 2008 9.00 am to 10.15 am

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| <p>For this paper you must have:</p> <ul style="list-style-type: none"> mathematical instruments. <p>You must not use a calculator.</p> | |
|--|--|

| 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.
- 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.

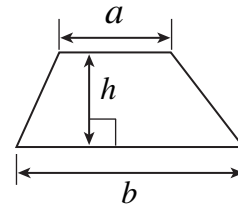
Advice

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

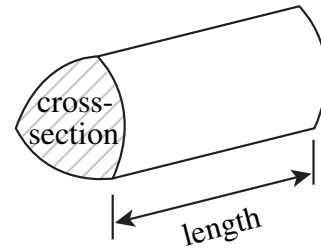


Formulae Sheet: Higher Tier

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

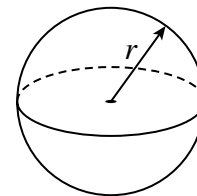


Volume of prism = area of cross-section \times length



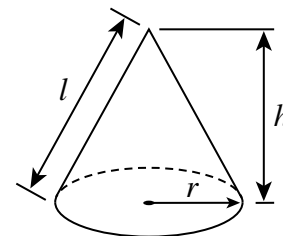
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

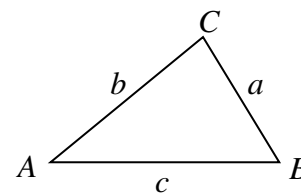


In any triangle ABC

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

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



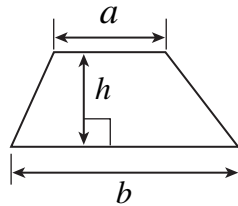
Answer **all** questions in the spaces provided.

1 The diagram shows a trapezium.

$a = 5 \text{ cm}$

$b = 7 \text{ cm}$

$h = 4 \text{ cm}$



Not drawn accurately

Work out the area of the trapezium.

State the units of your answer.

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Answer (3 marks)

Turn over for the next question

Turn over ►



2 (a) Factorise fully $x^3 - 4x^2$

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Answer (2 marks)

2 (b) Work out the value of $14^3 - 4 \times 14^2$

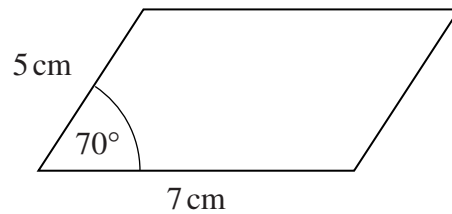
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Answer (3 marks)

3 The diagram shows a sketch of a parallelogram.



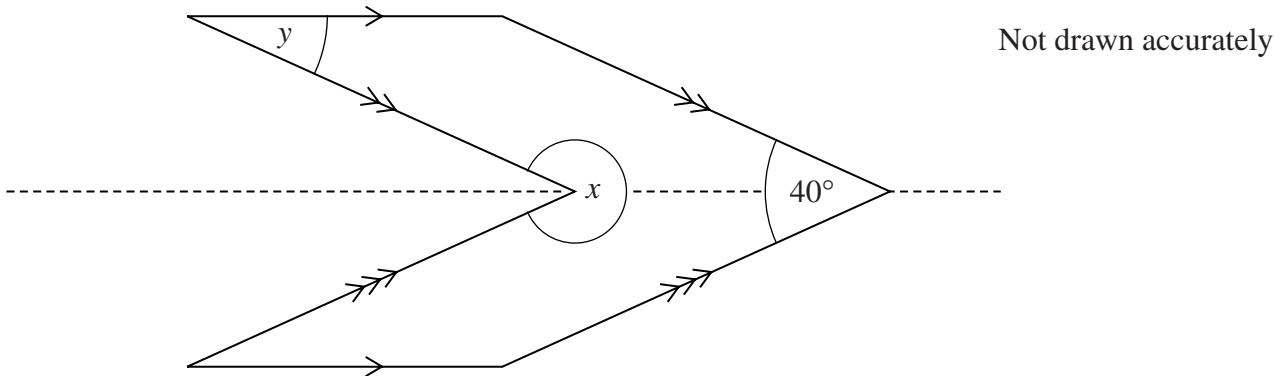
Not drawn
accurately

Make an accurate drawing of the parallelogram.

(3 marks)



4 The diagram shows a chevron.
It has one line of symmetry as shown.



4 (a) Work out the value of x .

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Answer degrees (2 marks)

4 (b) Work out the value of y .

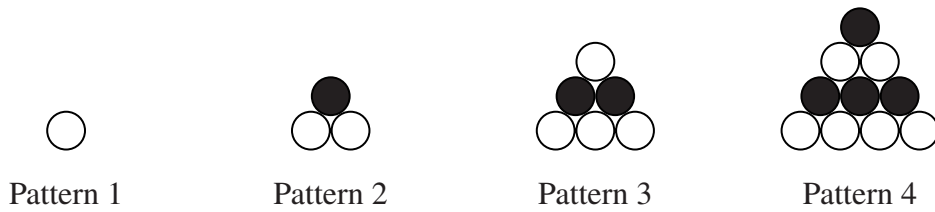
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Answer degrees (2 marks)



5 (a) Shaded and unshaded circles are used to make a sequence of patterns as shown.



5 (a) (i) There are 12 unshaded circles in Pattern 6.

Work out the number of shaded circles in Pattern 7.

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Answer (1 mark)

5 (a) (ii) There are n unshaded circles in Pattern p .

Write down the number of shaded circles in Pattern $(p + 1)$.

Answer (1 mark)

5 (a) (iii) The total number of circles in a pattern is given by the formula

$$C = \frac{p(p + 1)}{2}$$

C is the total number of circles.
 p is the pattern number.

Work out the value of C when $p = 100$

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Answer (2 marks)



- 5 (b) The n th term of a sequence is given by the formula $2n - 1$

Write down the first **four** terms of the sequence.

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Answer (2 marks)

- 6 (a) Solve $6x + 9 = 2x + 7$

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Answer $x =$ (3 marks)

- 6 (b) Expand and simplify $3(7a - 5b) + 2(4a - 3b)$

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Answer (3 marks)

- 6 (c) Given that $a = 8$, $b = -3$, $c = 1$ and $d = -5$

work out the value of $\frac{a + b}{cd}$

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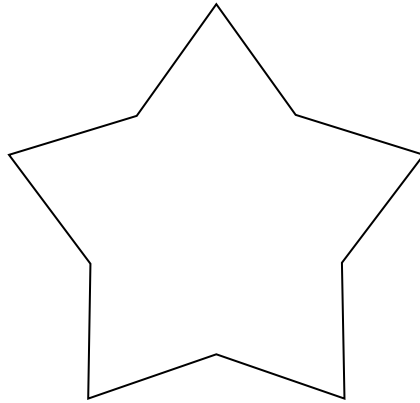
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Answer (3 marks)



- 7 The diagram shows a decagon.
All the sides are equal in length.



Not drawn accurately

The interior angles of the decagon have a sum of 1440° .
Each reflex interior angle is 200° .

Work out the size of each acute interior angle.

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Answer degrees (4 marks)



- 8** (a) Simplify $8^4 \times 8^5$
Leave your answer as a power of 8.

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Answer (1 mark)

- 8** (b) Simplify $w^6 \div w^2$

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Answer (1 mark)

- 8** (c) Chris simplifies $3x \times 4x^5$

His answer is $7x^5$

Explain the mistakes he has made.

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..... (2 marks)

- 8** (d) Simplify fully $15y^6 z^3 \div 5y^2 z$

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Answer (2 marks)



- 9 Here are some expressions.
 r , h , l , w and b represent lengths.

| | | | | | |
|-----------|-------------|-----------|-------|-----------------|----------|
| πr^2 | $\pi r^2 h$ | $2l + 2w$ | lwh | $\frac{1}{2}bh$ | $2\pi r$ |
| | | | | | |

- 9 (a) Put a tick under each expression which represents volume.

(2 marks)

- 9 (b) Ismail says that any expression containing exactly two letters must represent area.

Is he correct?

Explain your answer.

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(2 marks)



10 You may use the graph paper below to help you with this question.

The points $A(0, 10)$ and $B(5, -2)$ are joined by a straight line.

10 (a) Work out the length of AB .

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Answer units (3 marks)

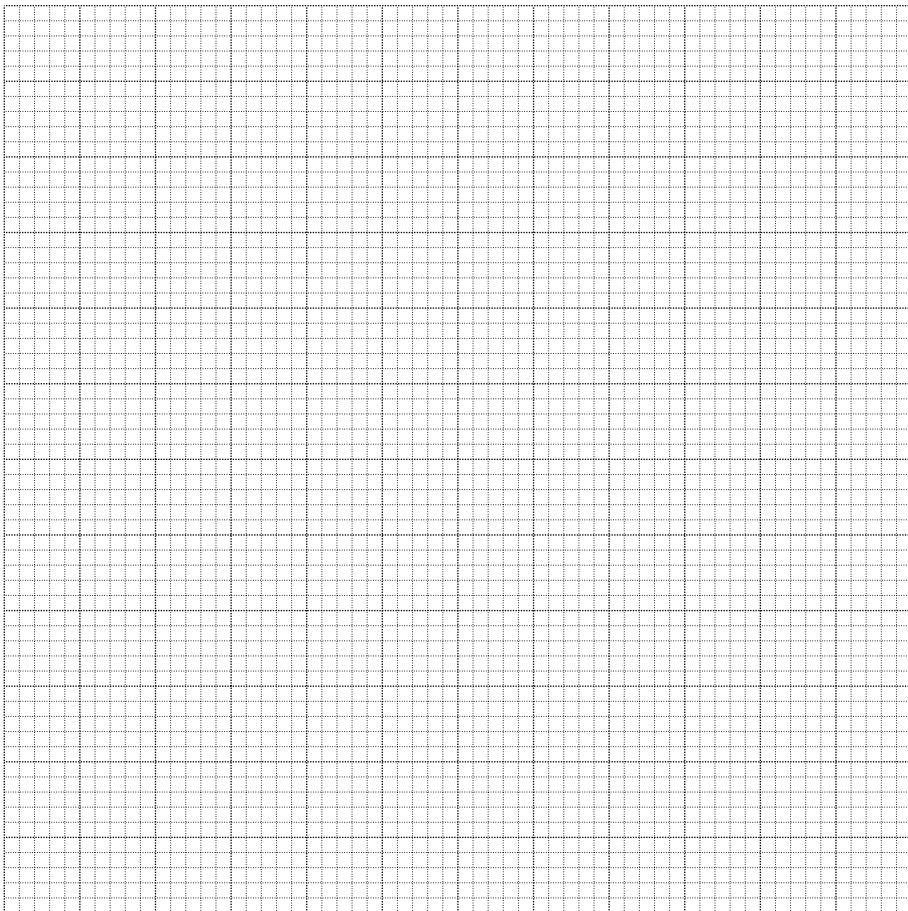
10 (b) (i) Work out the gradient of line AB .

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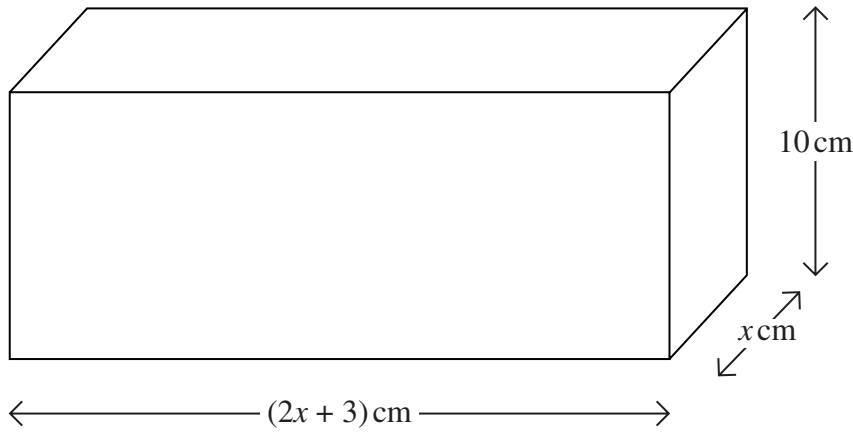
Answer (2 marks)

10 (b) (ii) Write down the equation of line AB .

Answer (1 mark)



- 11** The diagram shows a cuboid.
The volume of the cuboid is 900 cm^3 .



Not drawn
accurately

- 11** (a) Show that $2x^2 + 3x - 90 = 0$

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(3 marks)

- 11** (b) Solve $2x^2 + 3x - 90 = 0$

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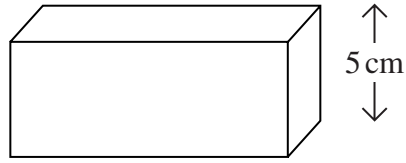
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Answer (3 marks)



11 (c) Here is a similar cuboid.



Not drawn
accurately

Work out the volume of this cuboid.

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Answer cm³ (3 marks)

Turn over for the next question



12 Simplify fully $\frac{4x^2 - 25}{6x^2 - 15x}$

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Answer (3 marks)

13 (a) **s** and **t** are vectors.

$$\begin{aligned} \vec{AB} &= \mathbf{s} + \mathbf{t} \\ \vec{BC} &= 2\mathbf{s} + \mathbf{t} \\ \vec{CD} &= \mathbf{s} + 2\mathbf{t} \end{aligned}$$

13 (a) (i) Show that \vec{BD} is parallel to \vec{AB} .

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(2 marks)

13 (a) (ii) Write down the ratio $BD : AB$

Answer (1 mark)

13 (a) (iii) Write down a different fact about points *A*, *B* and *D*.

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(1 mark)



- 13 (b) O is the origin.
 F , G and H are three points such that

$$\vec{OF} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$$

$$\vec{OG} = \begin{pmatrix} 3 \\ -3 \end{pmatrix}$$

$$\vec{OH} = \begin{pmatrix} 6 \\ 2 \end{pmatrix}$$

Prove that angle GFH is a right angle.
You **must** show your working.

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(4 marks)

END OF QUESTIONS



There are no questions printed on this page

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