General Certificate of Secondary Education
June 2005

MATHEMATICS (MODULAR) (SPECIFICATION B)   33005/I1
Module 5 Intermediate Tier
Paper 1 Non-Calculator

Tuesday 7 June 2005 1.30 pm to 2.45 pm

AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

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

You must **not** use a calculator.

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.

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.

Advice

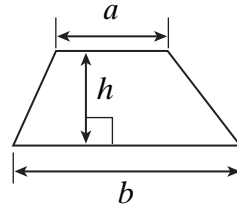- In all calculations, show clearly how you work out your answer.
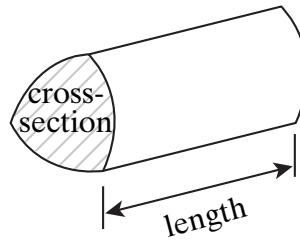
33005/I1

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

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

1 (a) (i) Complete the list.

$$3^2 = 9$$

$$3^3 = 27$$

$$3^4 = \text{………}$$

$$3^5 = \text{………}$$

(2 marks)

(ii) Here is a sequence.

$$1, \ \frac{1}{3}, \ \frac{1}{9}, \ \frac{1}{27}, \ \dots$$

Write down the next two fractions in the sequence.

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Answer .... *(2 marks)*

(b) Work out the value of $3x^2 - 18$ when $x = 3$

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Answer .... *(2 marks)*

$$\frac{}{6}$$

Turn over ▶

2 (a) Use the formula $a = 5b + 2c$ to work out a when $b = 3$ and $c = -4$

....

....

Answer .... *(2 marks)*

(b) Use the formula $a = 5b + 2c$ to work out c when $a = 16$ and $b = 2$

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Answer .... *(3 marks)*

3 Work out $\quad 0.3 \times 100 + 2.4 \times 10$

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Answer .... *(2 marks)*

4
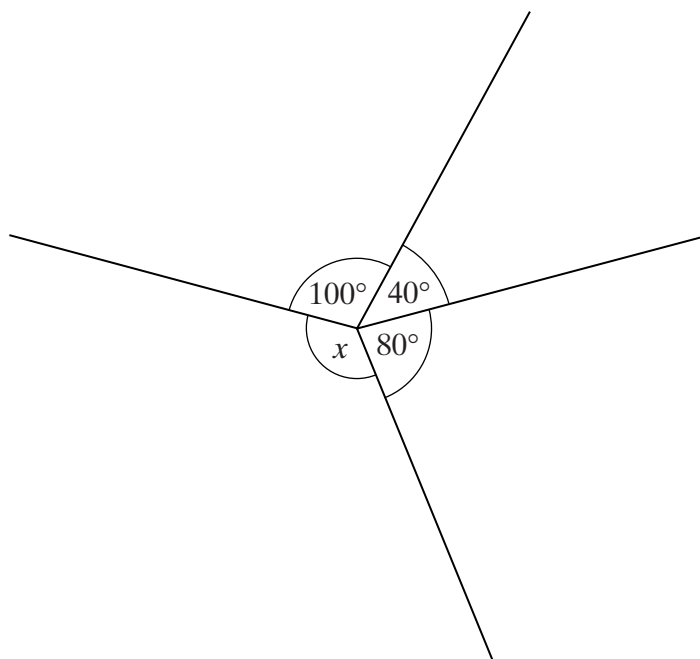
Not drawn accurately

Work out the size of angle *x*.

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

TURN OVER FOR THE NEXT QUESTION

$\frac{}{9}$

Turn over ▶

5 Which is larger $\frac{5}{6}$ or $\frac{3}{4}$?

You **must** show your working.
You may use the grids to help you.

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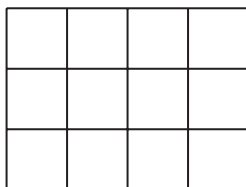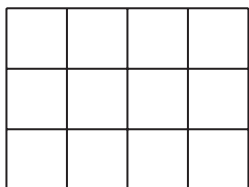
Answer ....   *(2 marks)*

6 *p* and *q* are odd numbers.

(a) Is *p* + *q* an odd number, an even number or could it be either?
Tick the correct box.

odd   even   either

(1 mark)

(b) Is *pq* an odd number, an even number or could it be either?
Tick the correct box.

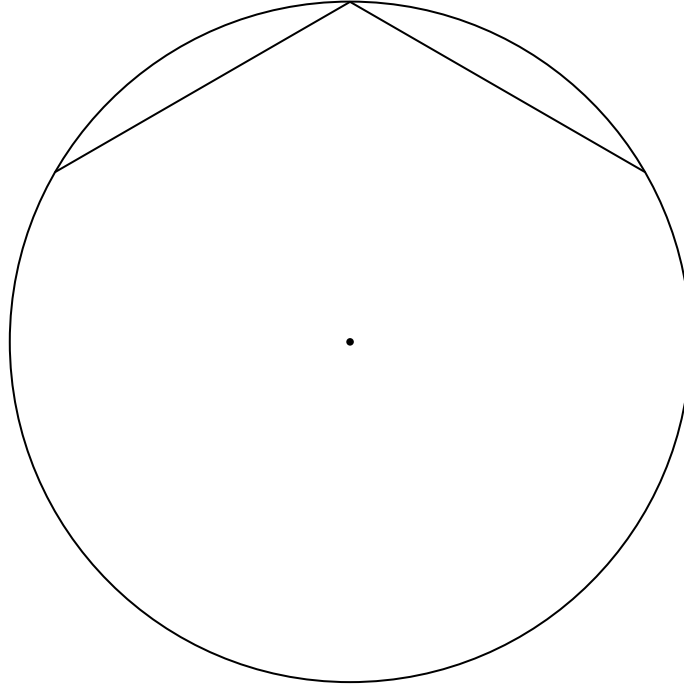odd   even   either

(1 mark)

7 Two sides of a regular hexagon have been drawn in the circle.

Complete the regular hexagon.

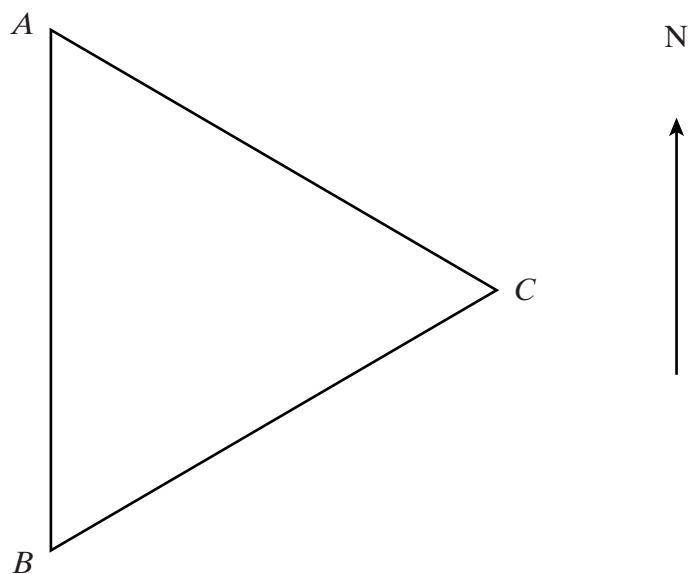*(2 marks)*

TURN OVER FOR THE NEXT QUESTION

Turn over ▶

8 (a) *A*, *B* and *C* are three towns which form an equilateral triangle as shown.

Use the given bearings to complete the sentences.

060°   120°   180°   240°   300°

(i) *C* is on a bearing of .... from *A*.

(1 mark)

(ii) *B* is on a bearing of .... from *C*.

(1 mark)

(b) *D*, *E* and *F* are three towns.
     E and *F* are shown on the diagram.
     D is on a bearing of 070° from *E*.
     D is also on a bearing of 320° from *F*.
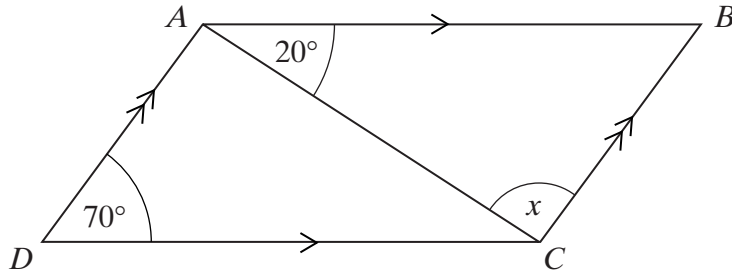
Complete the diagram to show accurately the position of *D*.

N   N

↑   ↑

✕   ✕

E   *F*

(2 marks)

4

Turn over ▶

9 The diagram shows a parallelogram *ABCD*.
Angle *BAC* = 20°
Angle *ADC* = 70°

Not drawn accurately

(a) Show that angle *x* is a right angle.

....

....

....

....

(2 marks)

(b) The area of the triangle *ADC* is $8.4 \, \text{cm}^2$.

Work out the area of the parallelogram.

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

10 (a) Factorise $10p - 4$

....

Answer .... *(1 mark)*

(b) Factorise $q^2 + 3q$

....

Answer .... *(1 mark)*

(c) Factorise $r^2 - r$

....

Answer .... *(1 mark)*

(d) Simplify $t^2 \times t^3$

....

Answer .... *(1 mark)*

TURN OVER FOR THE NEXT QUESTION

$\dfrac{}{8}$

Turn over ▶

11 (a) Complete the table of values for $y = x^3 - 4$

x	–2	–1	0	1	2
y	–12	–5			

(2 marks)

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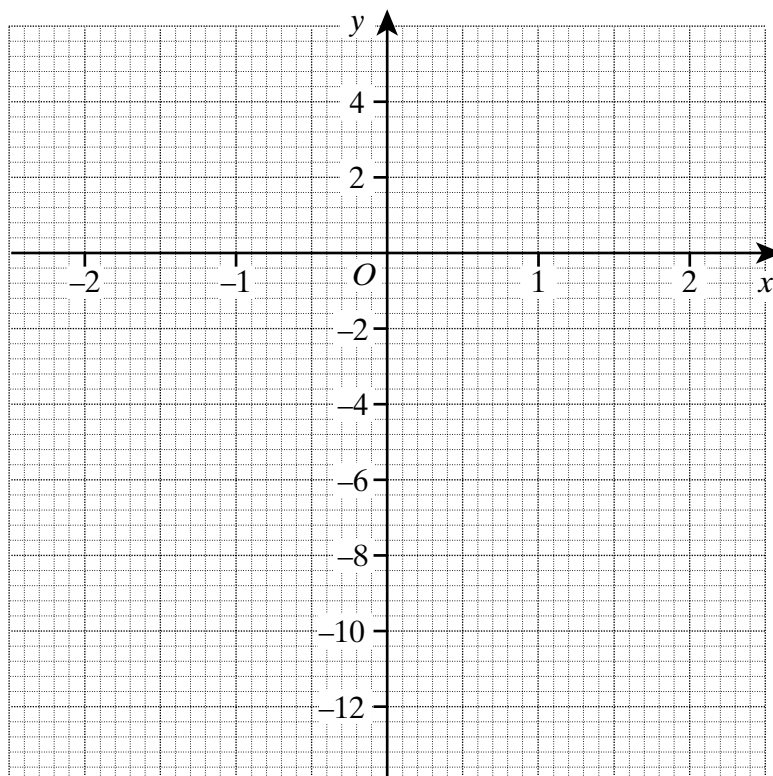
(2 marks)

12 Find, using trial and improvement, an exact solution of

$$3x^2 - 2x = 96$$

x	$3x^2 - 2x$	**Comment**
1	1	Too small

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

13 (a) Solve the inequality $3x + 5 \leqslant 16$

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Answer .... *(2 marks)*

  (b) Write down the integer value satisfied by the inequality $5 < 2x < 7$

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Answer .... *(2 marks)*

Turn over ▶

14 Two congruent triangles are shown.
Angle *B* = Angle *E*

Diagrams not drawn accurately
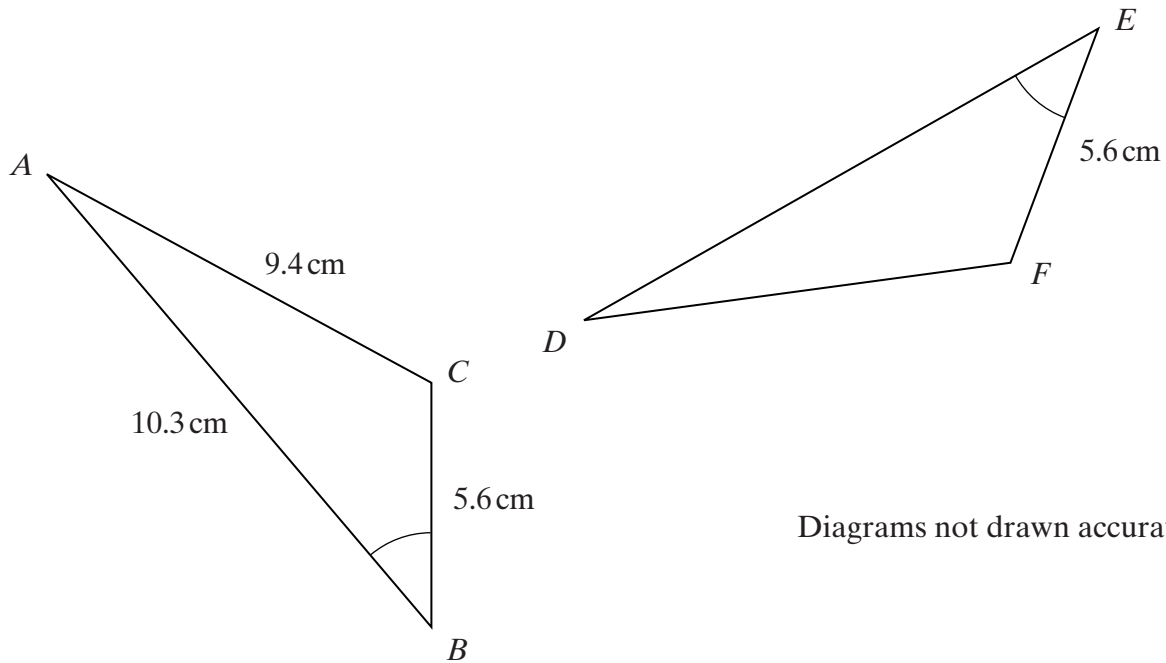
(a) Write down the length of *DF*.

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

(b) Explain why angle *A* = angle *D*

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(1 mark)

15 (a) Factorise $x^2 + 5x - 14$

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Answer .... *(2 marks)*

(b) Hence solve the equation $x^2 + 5x - 14 = 0$

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....

Answer .... *(1 mark)*

16 (a) Write down the equation of a line that is parallel to the line $y = 5x$

Answer .... *(1 mark)*

(b) Work out the gradient of the line $y + 2x = 6$

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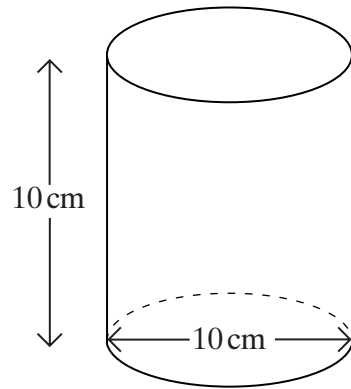Answer .... *(2 marks)*

TURN OVER FOR THE NEXT QUESTION

$\dfrac{\ }{8}$

Turn over ▶

17   The diagram shows a cylinder.
The diameter of the cylinder is 10 cm.
The height of the cylinder is 10 cm.

10 cm

10 cm

Not drawn accurately

(a)   Work out the volume of the cylinder.
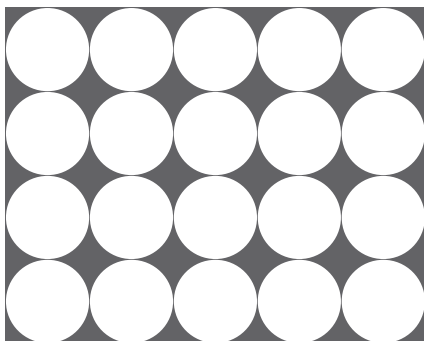Give your answer in terms of π.

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Answer .... cm³   *(3 marks)*

(b) Twenty of the cylinders are packed in a box of height 10 cm.
The diagram shows how the cylinders are arranged inside the box.
The shaded area is the space between the cylinders.

Not drawn accurately

Work out the volume inside the box that is **not** filled by the cylinders.
Give your answer in terms of π.

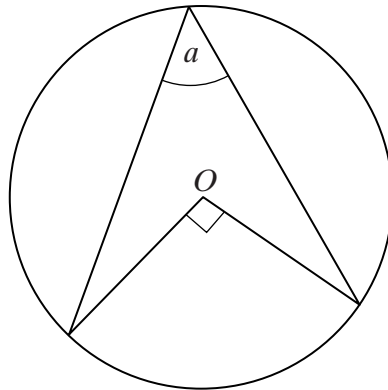...

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Answer .... cm³   *(4 marks)*

Turn over ▶

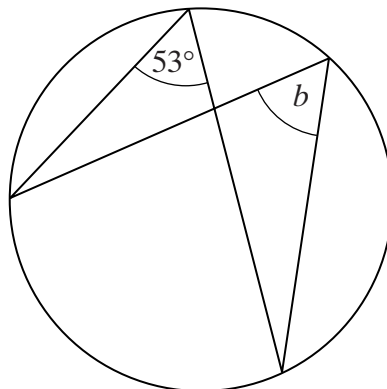**18** (a) In the diagram, *O* is the centre of the circle.

Not drawn accurately

Write down the value of *a*.

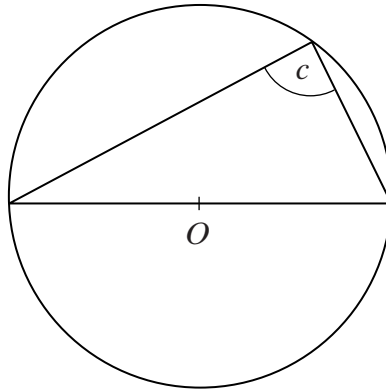Answer .... degrees   *(1 mark)*

(b)

Not drawn accurately

Write down the value of *b*.

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

(c)   In the diagram, O is the centre of the circle.

Not drawn accurately

Write down the value of c.

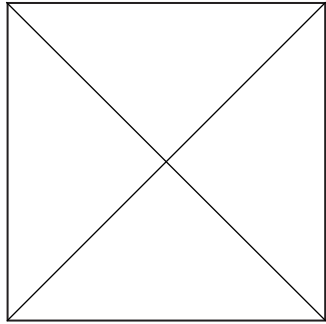Answer .... degrees   *(1 mark)*

(d)

Not drawn accurately

100°
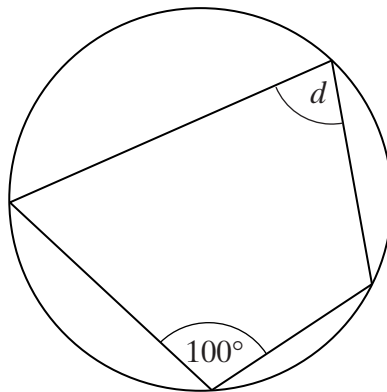
Write down the value of d.

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

4

Turn over ▶

19 (a) The diagram shows a square and its diagonals.
Each diagonal is 8 centimetres long.

Not drawn accurately
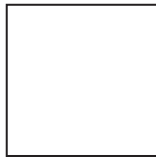
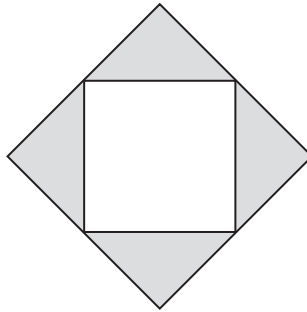Calculate the area of the square.

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Answer .... cm^2 *(3 marks)*
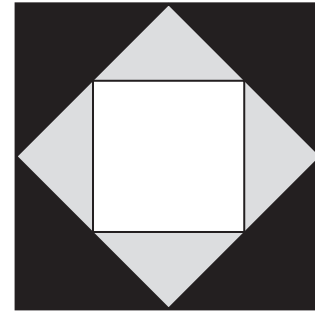
(b)   A pattern is made using different squares as shown.

Diagrams
not drawn accurately

Pattern 1   Pattern 2   Pattern 3

The area of the square in Pattern 1 is $25 \, \text{cm}^2$.

(i)   Work out the area shaded black in Pattern 3.

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....

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

(ii)   A sheet of A4 paper measures 29.7 cm by 21 cm.

The pattern above is continued.

What is the pattern number of the largest pattern which could be drawn accurately on a sheet of A4 paper?

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

END OF QUESTIONS

7

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