General Certificate of Secondary Education
November 2004

MATHEMATICS (MODULAR) (SPECIFICATION B)   **33003/HA**
Module 3 Higher Tier Section A

AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

Wednesday 17 November 2004 9.00 am to 9.40 am

H

In addition to this paper you will require:
•   a calculator
•   mathematical instruments
•   a treasury tag.

Time allowed for Section A: 40 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.
• This paper is divided into **two** sections: Section A and Section B.
• After the 40 minutes allowed for Section A, you must put your calculator on the floor under your seat. You will then be given Section B.
• When you have answered Section B you may work again on Section A but you may **not** use your calculator. It must remain on the floor under your seat.
• At the end of the examination tag Section A and Section B together with Section A on top.

Information
• The maximum mark for Section A is 32.
• Mark allocations are shown in brackets.
• Additional answer paper and graph 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.

33003/HA

NO QUESTIONS APPEAR ON THIS PAGE

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

1 In a school, there are 750 pupils in total in years 9, 10 and 11.
The numbers of pupils in years 9, 10 and 11 are in the ratio 12:7:6

How many pupils are there in each year?

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Answer   Year 9 ....

Year 10 ....

Year 11 ....

(3 marks)

2 Calculate $\dfrac{35.6^2}{23.8 \times 22.6}$

(a) Write down your full calculator display.

Answer ....   *(1 mark)*

(b) Give your answer to 3 significant figures.

Answer ....   *(1 mark)*

5

Turn over ▶

3 Barbara put £15 000 in a savings account on January 1st 2001.
Interest of 2% is added to the account on December 31st each year.

(a) How much is in the account on December 31st 2001?

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Answer £ ....   *(2 marks)*

(b) Explain why the amount in the account after three years is £15 000 × 1.02^3

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(2 marks)

4 A shop is selling a hairdryer at a special price.

SPECIAL OFFER!

HAIRDRYER

$\frac{1}{3}$ OFF NORMAL PRICE

NOW ONLY £24.60

What is the normal price of the hairdryer?

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Answer £ ....   *(3 marks)*

5 The population of France is 5.83×10^7 people.

The area of France is 5.47×10^5 square kilometres.

$$\text{Mean number of people} = \frac{\text{Population}}{\text{Area}}$$

Calculate the mean number of people per square kilometre in France.
Give your answer to a suitable degree of accuracy.

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Answer .... *(3 marks)*

6 Items in a computer shop are priced to make a 37% profit.
In a sale, the prices are reduced by 12%.

Calculate the percentage profit on items sold in the sale.

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

7 Rugs are made in different sizes.
The price, £P, of a rug is proportional to the square of its width, w centimetres.
A rug costing £32 is 80 cm wide.

(a) Find an equation connecting P and w.

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Answer .... *(3 marks)*

(b) What is the cost of a rug with width 100 cm?

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Answer £ .... *(1 mark)*

(c) A rug costs £18.

Calculate the width of this rug.

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

(d)   Which of the graphs below, 1, 2 or 3, correctly represents the relationship between *P* and *w*?
Explain your reasoning.

Graph 1
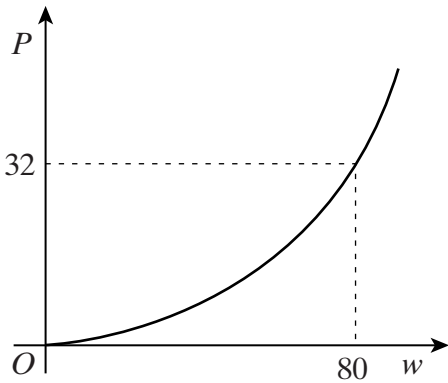
Graph 2
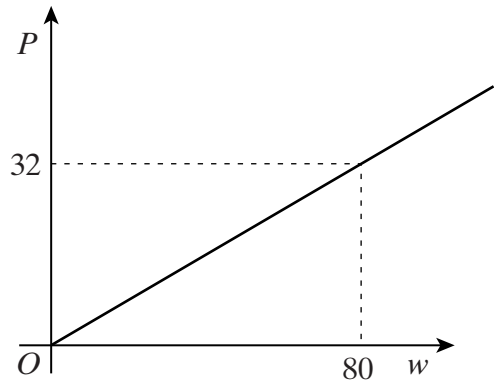
Graph 3
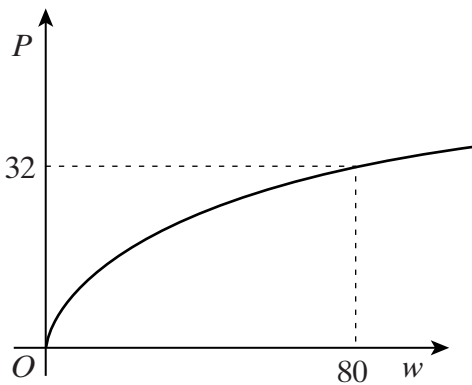
Answer ....

Reason ....

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(2 marks)

TURN OVER FOR THE NEXT QUESTION

Turn over ▶

8 (a) The numbers in this calculation are given to 3 significant figures.

Find the least possible value of $\dfrac{12.3}{15.6 - 7.20}$

You **must** show all your working.

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Answer .... *(3 marks)*

(b) The maximum safe load of a lift is 1500 kg, to the nearest 50 kg.
The lift is loaded with boxes weighing 141 kg and 150 kg, both weights given to the nearest kilogram.

Can the lift safely carry 3 boxes weighing 141 kg each and 7 boxes weighing 150 kg each?
You **must** show all your working.

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(3 marks)

END OF SECTION A

General Certificate of Secondary Education
November 2004

MATHEMATICS (MODULAR) (SPECIFICATION B)   **33003/HB**
Module 3 Higher Tier Section B

H

Wednesday 17 November 2004 9.45 am to 10.25 am

In addition to this paper you will require:
  mathematical instruments.
You must **not** use a calculator.

Time allowed for Section B: 40 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.
- You may **not** use your calculator in Section B. Your calculator must remain on the floor under your seat.
- When you have answered Section B you may work again on Section A but you may **not** use your calculator. It must remain on the floor under your seat.
- At the end of the examination tag Section A and Section B together with Section A on top.

Information
- The maximum mark for Section B is 32.
- Mark allocations are shown in brackets.
- Additional answer paper and graph 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.

33003/HB

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

9 Express 120 as the product of its prime factors.
Give your answer in index form.

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Answer .... *(3 marks)*

10 In 1974 the number of students in a college was 5000.
This year the number of students is 5750.

What is the percentage increase in the number of students in the college?

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

11 (a) Work out $\frac{1}{3} \div \frac{1}{9}$

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Answer .... *(2 marks)*

(b) Find the value of $\sqrt{169}$

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Answer .... *(1 mark)*

12 Kate is baking two loaves of bread.

One loaf needs $1\frac{1}{4}$ cups of milk.

Kate only has $1\frac{2}{3}$ cups of milk.

How much more milk does Kate need?
Give your answer as a fraction of a cup.

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Answer .... *(3 marks)*

$\frac{}{12}$

Turn over ▶

13 The table shows values for the equation $y = x^2 - 2x - 4$.

x	–3	–2	–1	0	1	2	3	4	5
y	11	4	–1	–4	–5	–4	–1	4	11

(a) On the grid opposite, draw the graph of $y = x^2 - 2x - 4$ for values of x from –3 to +5.

(b) Use the graph to write down the solutions of the equation $x^2 - 2x - 4 = 0$.

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Answer .... *(2 marks)*

(c) Write down the value of k for which the equation $x^2 - 2x - 4 = k$ has just one solution.

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Answer $k =$ .... *(1 mark)*

(d) By drawing an appropriate straight line graph on the grid, solve the equation

$$x^2 - x - 5 = 0$$

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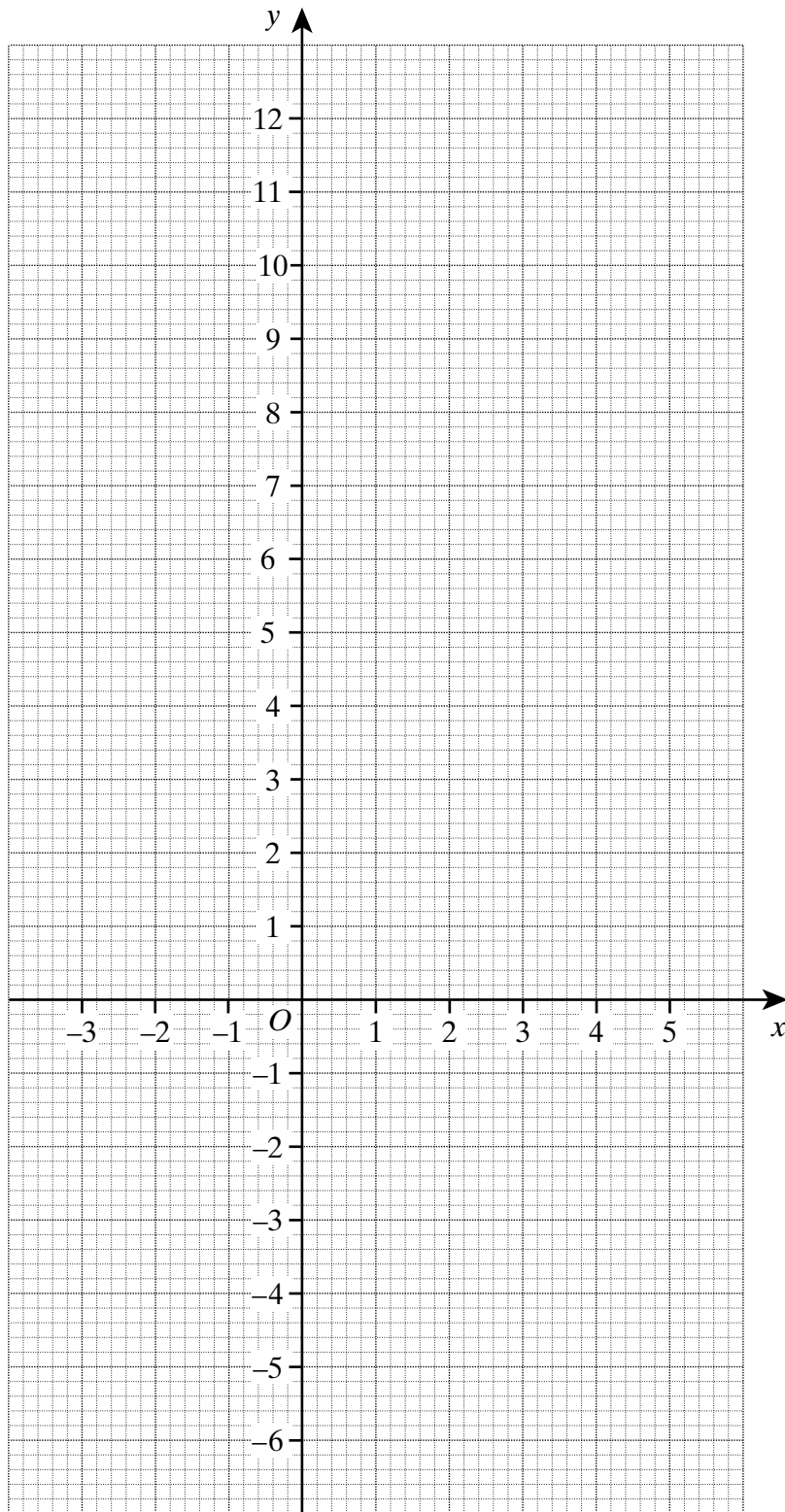
(2 marks)

Turn over ▶

14 (a) Express $0.5\dot{1}$ as a fraction in its simplest form.

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Answer .... *(2 marks)*

(b) Express $0.4\dot{5}\dot{1}$ as a fraction in its simplest form.

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Answer .... *(3 marks)*

15 (a) Write $27^{-\frac{2}{3}}$ in the form $\frac{1}{n}$ where *n* is an integer.

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Answer .... *(2 marks)*

(b) Simplify $\frac{10}{\sqrt{5}}$ by rationalising the denominator.

Give your answer in its simplest form.

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Answer .... *(2 marks)*

(c) Show that $\dfrac{\sqrt{125} - \sqrt{45}}{\sqrt{125} + \sqrt{45}} = \dfrac{1}{4}$

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(3 marks)

END OF QUESTIONS