| Surname | | Other Names | |
|---|---|---|---|
| Centre Number | | | Candidate Number | | | | |
| Candidate Signature | | | | | | | | | |

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General Certificate of Secondary Education
March 2003

ASSESSMENT and QUALIFICATIONS ALLIANCE

# MATHEMATICS (MODULAR) (SPECIFICATION B) 33003/HA
# MODULE 3 HIGHER TIER SECTION A

H

Tuesday 4 March 2003 9.00 am to 9.40 am

**In addition to this paper you will require:**
- a calculator
- a treasury tag.

Time allowed for Section A: 40 minutes

**Instructions**
- Use blue or black ink or ball-point pen. Diagrams should be drawn 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, make sure that you hand in **both** Section A and Section B securely tagged 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.

| For Examiner's Use | | | |
|---|---|---|---|
| Section A | | Section B | |
| Page | Mark | Page | Mark |
| 2-3 | | 2-3 | |
| 4-5 | | 4-5 | |
| 6-7 | | 6-7 | |
| 8 | | | |
| Total Section A | | | |
| Total Section B | | | |
| TOTAL | | | |
| Examiner's Initials | | | |

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

**1** In a class of 28 pupils, the ratio of girls to boys is 3 : 4

How many of the pupils are girls?

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

**2** Use your calculator to evaluate $\dfrac{(3.41 + 2.93)^2}{4.12}$

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

**3** Brian sends an e-mail of size 5 242 880 bytes.

(a) Write this number in standard form.

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

(b) Brian then sends a second e-mail of size $5.88 \times 10^6$ bytes.

Calculate how much larger his second e-mail is than his first e-mail.
Express your answer as a percentage of the size of the first e-mail.

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

**4** There are 10 windmills in a line up a hillside.
Each windmill produces 20% more energy than the one below it.
The first windmill, the lowest on the hillside, produces 1.7 megawatts of energy.

(a) How much energy does the second windmill produce?

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

(b) How many of the windmills each produce more than 3 megawatts of energy?

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

**TURN OVER FOR THE NEXT QUESTION**

12

**5** (a) Complete the table of values for $y = x^2 - 4x + 3$

| $x$ | –1 | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|
| $y$ | 8 | 3 | 0 | –1 | | 3 | 8 |

*(1 mark)*

(b) On the grid below, draw the graph of $y = x^2 - 4x + 3$ for values of $x$ between –1 and +5.


*(2 marks)*

(c) Write down the solutions of $x^2 - 4x + 3 = 0$

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

(d) By drawing an appropriate linear graph, write down the solutions of

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

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

**TURN OVER FOR THE NEXT QUESTION**

7

**6** In a circuit, the resistance, $R$ ohms, is inversely proportional to the current, $I$ amps. When the resistance is 12 ohms, the current in the circuit is 8 amps.

(a) Find an equation connecting $R$ and $I$.

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

(b) Find the current when the resistance in the circuit is 6.4 ohms.

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

LEAVE MARGIN BLANK

**7** Using $n^3 - n = n(n - 1)(n + 1)$, where $n$ is an integer greater than 1,

explain why

(a) $n^3 - n$ is divisible by 3,

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*(1 mark)*

(b) when $n$ is an odd integer greater than 1, $n^3 - n$ is divisible by 24.

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*(3 marks)*

**TURN OVER FOR THE NEXT QUESTION**

9

**8** Kim travels 9 miles to school each day.
This distance is correct to one significant figure.
She attends school on 180 days in a school year.
The number of days is correct to two significant figures.

Find the minimum number of **kilometres** Kim could travel going to and from school in one year.

You must use the exact conversions

1 mile = 5280 feet

1 foot = 12 inches

1 inch = 2.54 cm

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Answer ..... km *(4 marks)*

**END OF SECTION A**

4

| Surname | | Other Names | |
|---|---|---|---|
| Centre Number | | | Candidate Number | | | | |
| Candidate Signature | | | | | | | | | |

General Certificate of Secondary Education
March 2003

AQA
ASSESSMENT and QUALIFICATIONS ALLIANCE

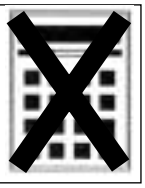
# MATHEMATICS (MODULAR) (SPECIFICATION B) 33003/HB
# MODULE 3 HIGHER TIER SECTION B

H

Tuesday 4 March 2003 9.45 am to 10.25 am

**No additional materials are required.**

You must **not** use a calculator.



Time allowed for Section B: 40 minutes

**Instructions**
- Use blue or black ink or ball-point pen. Diagrams should be drawn 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, make sure that you hand in **both** Section A and Section B securely tagged 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.

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

**9** Find an approximate value of $\dfrac{421 \times 2.9}{0.197}$

You **must** show all your working.

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

**10** Jenny buys a CD for £16.50
Six months later Jenny sells the CD for £13.20

What is the percentage decrease in the value of the CD?

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

**11** A bag of potatoes weighs 9 kg to the nearest kilogram.

Write down the least and the greatest possible weight of the bag of potatoes.

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Answer Least ..... kg

Greatest ..... kg

*(2 marks)*

**12** In a school one Monday morning, 20% of the pupils are in the hall for an assembly. The other 560 pupils present that morning are not in the assembly.

Find the total number of pupils present that morning.

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

11

**13** (a) Work out $3.2 \times 10^5 - 2.89 \times 10^4$

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

(b) Work out $3\frac{1}{4} - 1\frac{2}{5}$

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

(c) Find the value of $8^{\frac{2}{3}}$

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

(d) Express $128^{-\frac{3}{7}}$ as a fraction.

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

(e) Express $\sqrt{\frac{3^8}{3^{-4}}}$ in the form $3^p$

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

**14** The number of people waiting for an island ferry is 25% over the legal safety limit.

What percentage of the people waiting must the ferry leave behind so that it departs with the maximum number of passengers allowed?

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

**TURN OVER FOR THE NEXT QUESTION**

13

**15** (a) Write $\sqrt{600} + \sqrt{54}$ in the form $p\sqrt{6}$ where $p$ is an integer.

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

(b) Hence write $\dfrac{\sqrt{600} + \sqrt{54}}{\sqrt{338}}$ in the form $\sqrt{q}$.

You may use $338 = 2 \times 13^2$

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

**16** (a) Prove that $0.\dot{4}\dot{6} = \frac{46}{99}$

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*(2 marks)*

(b) Hence express $0.3\dot{4}\dot{6}$ as a fraction.

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

**END OF QUESTIONS**

8