

Surname					Other Names				
Centre Number					Candidate Number				
Candidate Signature									

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General Certificate of Secondary Education
June 2003



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

Wednesday 25 June 2003 9.00 am to 9.40 am

H

<p>In addition to this paper you will require:</p> <ul style="list-style-type: none"> • a calculator • mathematical instruments • a treasury tag. 	
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For Examiner's Use			
Section A		Section B	
Pages	Mark	Pages	Mark
3		2-3	
4-5		4-5	
6-7		6-7	
8			
Total Section A			
Total Section B			
TOTAL			
Examiner's Initials			

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, 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.

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

1 A shop has a special offer.

SPECIAL OFFER
This Week Only

**BUY THREE ITEMS
AND
GET THE CHEAPEST ONE FREE**

(a) Ian buys the following items:

A bottle of shampoo priced at	£1.75
A bar of soap priced at	£1.15
An aftershave spray priced at	£2.85

What is Ian's percentage saving using this special offer?

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Answer % (3 marks)

(b) The greatest possible percentage saving is when the three items are all the same price.

Calculate this percentage saving.

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Answer % (2 marks)

Turn over 



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

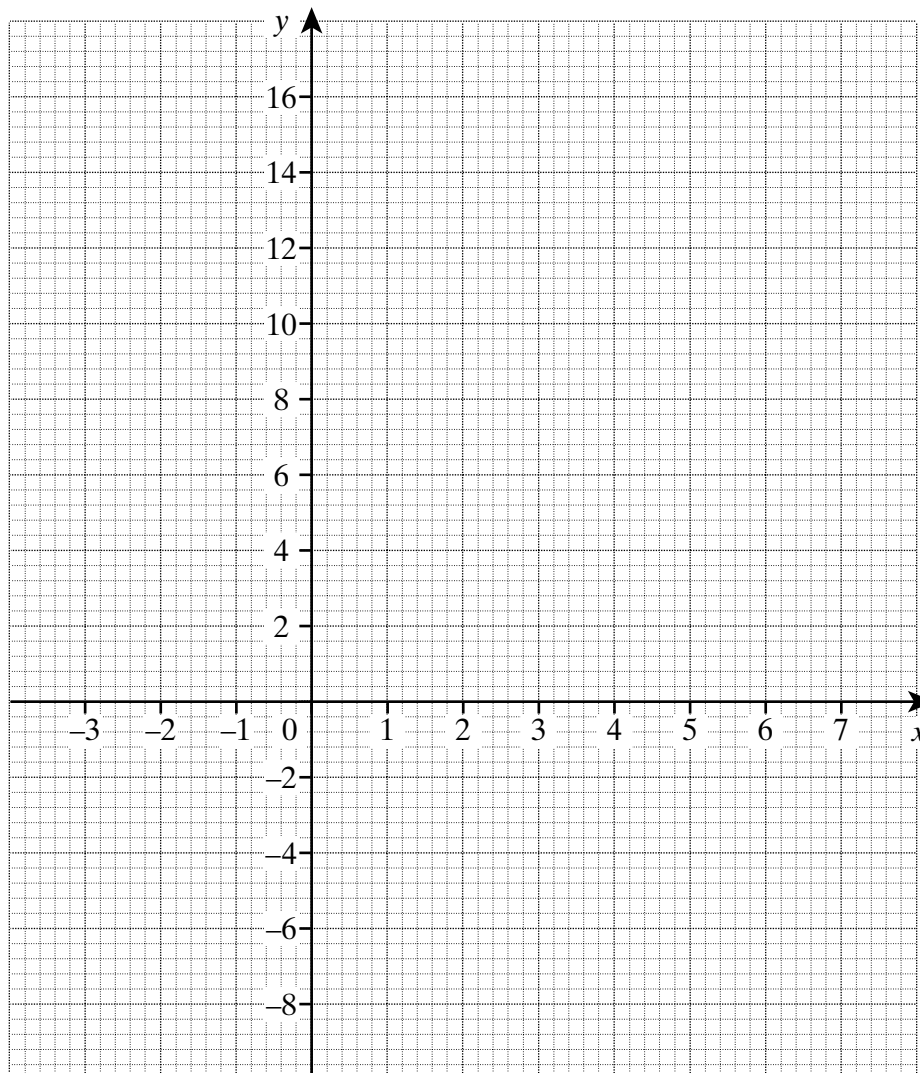
x	-2	-1	0	1	2	3	4	5	6
y	10	3	-2	-5		-5	-2	3	10

(1 mark)

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- (b) On the grid below, draw the graph $y = x^2 - 4x - 2$ for values of x between -2 and 6.



(2 marks)

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

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Answer (2 marks)

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

$$x^2 - 5x - 3 = 0$$

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Answer (3 marks)

TURN OVER FOR THE NEXT QUESTION

Turn over 



- 3 Anne buys a printer costing £90.
This cost includes VAT at a rate of 17.5%.

How much is the VAT?

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Answer £ (3 marks)

- 4 Cobalt-60 is a radioactive substance that decays with time.
The mass of the cobalt reduces by 12% each year.

How many years will it take for 200 kg of cobalt-60 to decay to a mass of less than 120 kg?

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Answer years (3 marks)

5 The number of days, D , to complete a project is inversely proportional to the number of people, P , who work on the project.

(a) The project takes 18 days to complete if 150 people work on it.

(i) Find an equation connecting D and P .

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Answer $D = \dots\dots\dots$ (3 marks)

(ii) How many people are needed to complete the project in 10 days?

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Answer (2 marks)

(b) Sketch a graph which shows that D is inversely proportional to P .



(2 marks)

Turn over ►

- 6 (a) Find the greatest possible value of $\frac{12.3 (18.5 + 9.41)}{15.8}$

All the numbers are given correct to three significant figures.
Write down your full calculator display.

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Answer (3 marks)

- (b) A trailer can safely carry weights up to 5200 kg, correct to two significant figures.
It is loaded with boxes weighing 115 kg, correct to the nearest kilogram.

Calculate the greatest number of boxes that the trailer can carry safely.
You **must** show all your working.

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Answer (3 marks)

END OF SECTION A

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General Certificate of Secondary Education
June 2003



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

H

Wednesday 25 June 2003 9.45 am to 10.25 am

<p>In addition to this paper you will require: mathematical instruments. You must not use a calculator.</p>	
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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, 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 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.

7 (a) Work out $2\frac{4}{5} + 3\frac{2}{3}$

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Answer (3 marks)

(b) Write down the value of $\sqrt[3]{27}$

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Answer (1 mark)

8 Brass is made from the metals copper, zinc and tin in the ratio 7:3:2

How much copper is needed to make 60 kg of brass?

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Answer kg (2 marks)

- 9 (a) Express 144 as the product of its prime factors.
Write your answer in index form.

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Answer (3 marks)

- (b) Find the Highest Common Factor (HCF) of 60 and 144.

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Answer (2 marks)

TURN OVER FOR THE NEXT QUESTION

Turn over 

10 (a) Work out $4 \times 10^7 \times 3 \times 10^4$

Give your answer in standard form.

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Answer (2 marks)

(b) Work out $\frac{4 \times 10^9}{8 \times 10^5}$

Give your answer in standard form.

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Answer (3 marks)

11 (a) Write $0.\dot{1}\dot{8}$ as a fraction in its simplest form.

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Answer (2 marks)

(b) Hence or otherwise express $0.5\dot{1}\dot{8}$ as a fraction.

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Answer (2 marks)

TURN OVER FOR THE NEXT QUESTION

Turn over 



12 (a) By rationalising the denominator, simplify $\frac{15}{\sqrt{5}}$

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Answer (2 marks)

(b) Show that $(\sqrt{3} + \sqrt{12})^2 = 27$

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(2 marks)

13 Prove that the product of two odd numbers is always an odd number.

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(2 marks)

14 Simplify fully

(a) $8 \times 8^0 \times 8^{-1}$

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Answer (2 marks)

(b) $5^{-2} \times (5^{\frac{1}{3}})^3$

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Answer (2 marks)

(c) $15^{\frac{1}{2}} \times 3^{\frac{1}{2}} \times 5^{\frac{1}{2}}$

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Answer (2 marks)

END OF QUESTIONS