

Surname					Other Names				
Centre Number					Candidate Number				
Candidate Signature									

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General Certificate of Secondary Education  
November 2005



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

Monday 14 November 2005 9.00 am to 9.40 am

**H**

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

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

1 Find the value of  $\sqrt{58 - 7.41^2}$

(a) (i) Write down your full calculator display.

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Answer ..... (1 mark)

(ii) Write your answer to 3 significant figures.

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Answer ..... (1 mark)

(b) Evaluate  $5^8$

Write your answer in standard form.

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Answer ..... (2 marks)

2 Simon weighed 3.7 kg when he was born.  
One year later he weighed 10.9 kg.

Calculate the percentage increase in his weight.

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Answer ..... % (3 marks)

- 3 In 2000, a motorway was used by 70 000 vehicles each day.  
Since 2000, the number of vehicles which used the motorway increased by 6% every year.

How many vehicles used the motorway each day in 2005?  
Give your answer to an appropriate degree of accuracy.

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Answer ..... (4 marks)

- 4 Gotland is an island which forms part of Sweden.  
The area of Gotland is 3140 square kilometres.  
This area is 0.8% of the total area of Sweden.

What is the total area of Sweden?

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Answer ..... square kilometres (3 marks)

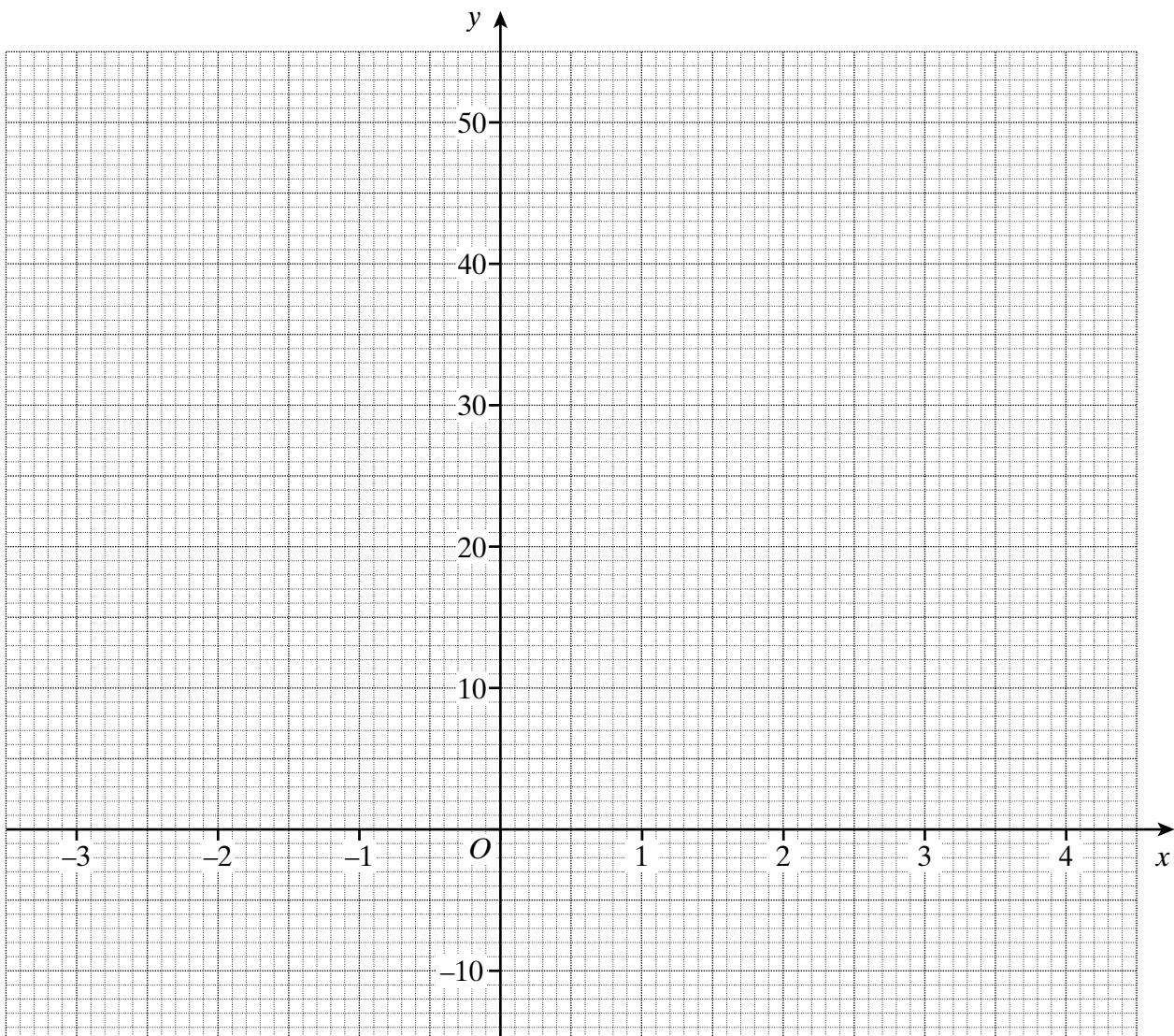
**TURN OVER FOR THE NEXT QUESTION**

5 (a) Complete the table of values for  $y = 3x^2 - 2x + 1$

$x$	-3	-2	-1	0	1	2	3	4
$y$	34	17	6	1	2		22	41

(1 mark)

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



(2 marks)

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

$$3x^2 - 6x + 2 = 0$$

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Answer ..... (3 marks)

6 Hack’s Law states that the area draining into a river,  $A$ , is proportional to the square of the distance from its start,  $d$ .

At Minneapolis, the area draining into the Mississippi river is 20 000 square miles. Minneapolis is 200 miles from the start of the river.

(a) Find an equation connecting  $A$  and  $d$ .

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Answer ..... (3 marks)

(b) Memphis is 1400 miles from the start of the Mississippi river.

Find the area draining into the river at Memphis.

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Answer ..... square miles (2 marks)

Turn over ►

7 Prove that

$$0.3\dot{4}\dot{2} = \frac{113}{330}$$

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(3 marks)

8 Karen saw a laptop for sale in 2004.

In March 2005, the price of this laptop was reduced by 20%.

In June 2005, the price of this laptop was reduced by one sixth of the March 2005 price.

Compared with the 2004 price, what percentage discount would Karen obtain by buying this laptop in June 2005?

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Answer ..... % (4 marks)

**END OF SECTION A**



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General Certificate of Secondary Education  
November 2005



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

Monday 14 November 2005 9.45 am to 10.25 am

**H**

<p><b>In addition to this paper you will require:</b> mathematical instruments. You must <b>not</b> 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 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.

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

- 9 (a) Express 60 as a product of its prime factors.  
Give your answer in index form.

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Answer ..... (3 marks)

- (b) Find the Highest Common Factor (HCF) of 120 and 32.

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Answer ..... (2 marks)



- 10 (a) Find an approximate value of

$$\frac{391 \times 3.08}{0.613}$$

You **must** show all your working.

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Answer ..... (3 marks)

- (b) Write 0.000 002 4 in standard form.

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Answer ..... (1 mark)

- (c) Work out  $64^{0.5} \times 3^{-2}$

Give your answer as a fraction.

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Answer ..... (3 marks)

Turn over 

11 Explain why the sum of three consecutive integers is divisible by three.

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(2 marks)

12 (a) Multiply  $2.3 \times 10^5$  by  $5 \times 10^7$

Give your answer in standard form.

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Answer ..... (2 marks)

(b) Divide  $2.3 \times 10^5$  by  $5 \times 10^7$

Give your answer in standard form.

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Answer ..... (2 marks)

- 13** Tim fits television aerials in houses.  
He buys 100 metres of television cable.  
Each house needs 10 metres of television cable.

The length of cable which Tim buys is correct to the nearest metre.  
The length of cable needed for each house is correct to the nearest half metre.

After working on nine houses, what is the minimum length of cable which Tim could have left?

You **must** show your working.

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Answer ..... metres (5 marks)

**TURN OVER FOR THE NEXT QUESTION**

14 (a) Work out  $125^{\frac{1}{3}}$

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Answer ..... (1 mark)

(b) Write 162 in the form  $2 \times 3^b$

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Answer ..... (2 marks)

(c) Express  $32^{-\frac{3}{5}}$  as a fraction.

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Answer ..... (2 marks)

15 Simplify fully  $\frac{\sqrt{150} - \sqrt{6}}{\sqrt{12}}$

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Answer ..... (4 marks)

**END OF QUESTIONS**

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