General Certificate of Secondary Education
March 2010

MATHEMATICS (MODULAR) (SPECIFICATION B) 　　**43053/HA**
Module 3　Higher Tier　Section A

H

Tuesday 2 March 2010　　9.00 am to 9.45 am

For this paper you must have:
- a calculator
- mathematical instruments
- a treasury tag.

Time allowed for Section A: 45 minutes

Instructions
- Use black ink or black ball-point pen.　Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided.　Answers written in margins or on blank pages will not be marked.
- Use a calculator where appropriate.
- Do all rough work in this book.
- This paper is divided into two sections: Section A and Section B.
- After the 45 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 35.
- The marks for questions are shown in brackets.
- You may ask for more answer paper and graph paper.　These must be tagged securely to this answer book.

Advice
- In all calculations, show clearly how you work out your answer.

43053/HA

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

1 A car journey is 165 miles.
The average speed is 55 miles per hour.

1 (a) How many hours does the journey take?

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

1 (b) There are roadworks on the return journey.
The average speed is reduced by 40%.

Work out the average speed on the return journey.

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Answer .... miles per hour *(3 marks)*

2 Circle the **two** expressions that are equivalent to $2x^2 + 4x$.

$6x^2$ $\qquad$ $2x(x + 2)$ $\qquad$ $2x(x + 4)$ $\qquad$ $x(2x + 4)$ $\qquad$ $8x^3$

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(2 marks)

3 T-shirts are sold at two different shops.

Trendy Togs
£6.50 each
4 for the price of 3

Style Guru
Normal price £7.50 each
$\frac{1}{3}$ off normal price

Asha wants to buy four T-shirts.

Show that it is cheaper for her to buy the T-shirts from Trendy Togs.

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(4 marks)

4 Calculate $0.85^3 + \sqrt{0.96}$

4 (a) Write down your full calculator display.

Answer .... *(1 mark)*

4 (b) Write down your answer to part (a) to two significant figures.

Answer .... *(1 mark)*

13

5 (a) Write down the least common multiple (LCM) of 3, 4 and 6.

....

Answer .... *(2 marks)*

5 (b) The highest common factor (HCF) of 70 and 112 is 14.

Work out the highest common factor of 140 and 224.

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Answer .... *(1 mark)*

5 (c) Write 92 as the product of prime factors.

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Answer .... *(2 marks)*

6 A cricketer scores exactly 500 runs during a season.
He says that this is exactly 20% more runs than he scored the previous season.

Show that he cannot be correct.

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(4 marks)

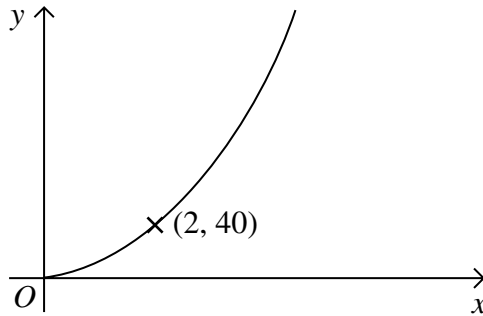**7** Here are three numbers.

$$0.00085 \qquad 6.2 \times 10^{-5} \qquad 4 \times 10^{-3}$$

Work out the difference between the largest number and the smallest number.
Give your answer in standard form.

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Answer .... *(3 marks)*

8 y is directly proportional to the square of x.
This sketch graph shows the connection between x and y.

8 (a) Work out an equation connecting x and y.

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Answer .... *(3 marks)*

8 (b) Work out the value of y when $x = 0.5$

....

Answer .... *(1 mark)*

16

Turn over ▶

9 (a) Write $0.\dot{2}$ as a fraction.

....

....

Answer .... *(1 mark)*

9 (b) You are given that $0.\dot{3}\dot{2} = \dfrac{32}{99}$

Show that $0.0\dot{3}\dot{2} = \dfrac{16}{495}$

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(1 mark)

10 Here is a formula.

$$t = \frac{2s}{u + v}$$

The values of *s*, *u* and *v* are given to two significant figures.

$$s = 440, \ u = 15 \text{ and } v = 75$$

Work out the maximum possible value of *t*.

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Answer .... *(4 marks)*

END OF SECTION A

6

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ANSWER IN THE SPACES PROVIDED

General Certificate of Secondary Education
March 2010

MATHEMATICS (MODULAR) (SPECIFICATION B)   **43053/HB**
Module 3   Higher Tier Section B

H

Tuesday 2 March 2010   9.50 am to 10.35 am

For this paper you must have:
* mathematical instruments.

You must **not** use a calculator.

Time allowed for Section B: 45 minutes

Instructions
* Use black ink or black ball-point pen. Draw diagrams in pencil.
* Fill in the boxes at the top of this page.
* Answer **all** questions.
* You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
* Do all rough work in this book.
* 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 35.
* The marks for questions are shown in brackets.
* You may ask for more answer paper and graph paper. These must be tagged securely to this answer book.

Advice
* In all calculations, show clearly how you work out your answer.

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

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11 To make Fizzy Delight, orange juice and lemonade are mixed in the ratio 1 : 3
Lottie has 200 ml of orange juice and 350 ml of lemonade.
She wants to use all her orange juice to make Fizzy Delight.

How much more lemonade is needed?

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

12 Estimate the total cost of 52 laptop computers at £297.50 each and 38 printers
at £61.75 each.

You **must** show your working.

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Answer £ .... *(3 marks)*

13 (a) Work out $\dfrac{5}{6} + \dfrac{1}{4}$

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Answer .... *(2 marks)*

13 (b) What is the reciprocal of 2?

Circle the correct answer.

–2   0.2 $\dfrac{1}{2}$ 2

(1 mark)

13 (c) A family has some chocolate eggs.

$\dfrac{1}{8}$ of the eggs are eaten on Saturday.

On Sunday, the remaining eggs are shared equally between three children.

What fraction of the eggs does each child receive on Sunday?

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Answer .... *(3 marks)*

12

Turn over ▶

14 (a)   Some points for the graph $y = x^2 + 2x - 2$ are plotted on the grid.
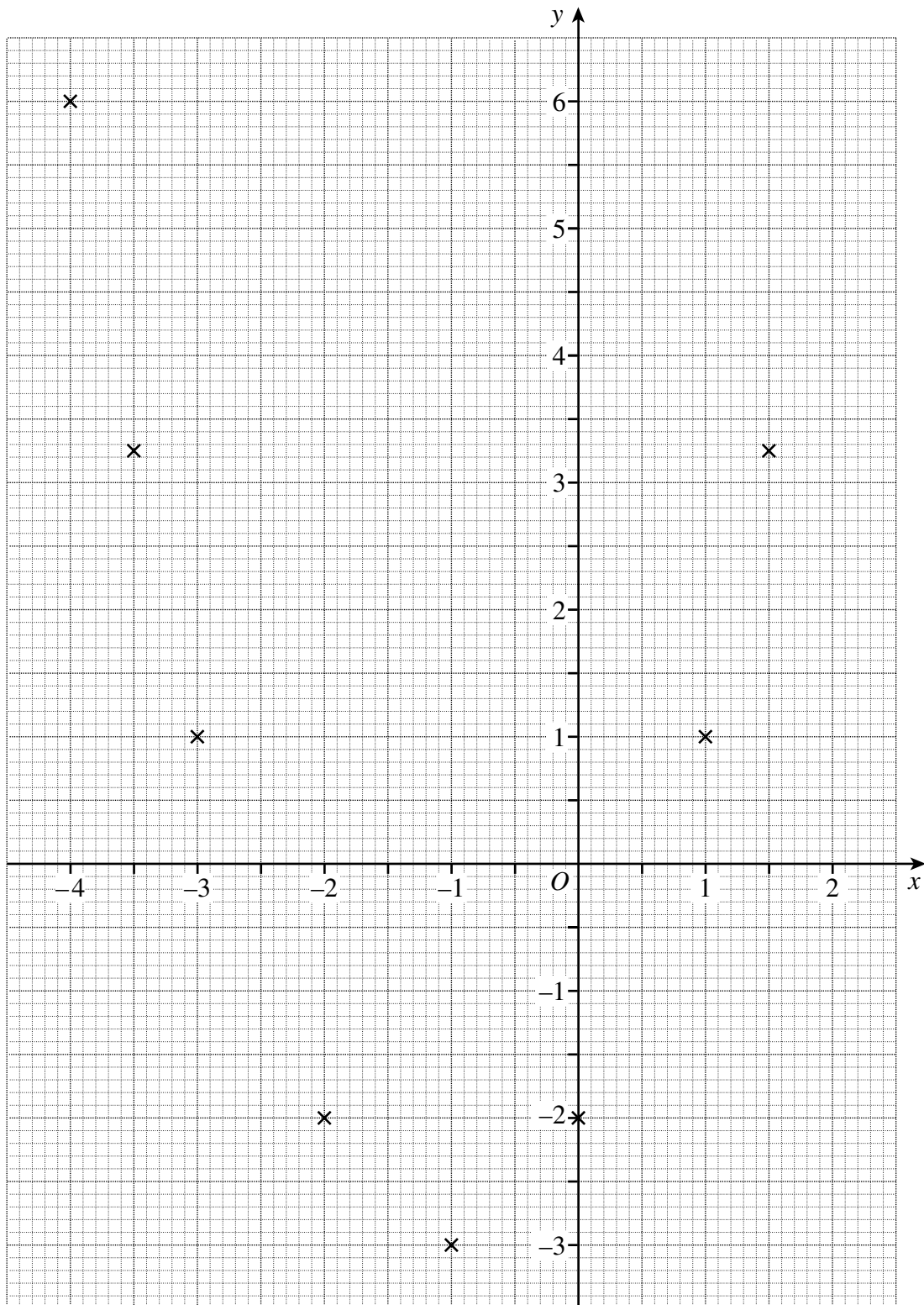
14 (a)   (i)   Plot the point that has *x*-coordinate 2.

(1 mark)

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14 (a) (ii) Draw the graph of $y = x^2 + 2x - 2$ for values of x from -4 to 2.

(1 mark)

14 (b) By drawing an appropriate straight line on the grid, solve $x^2 + x - 1 = 0$

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Answer .... *(3 marks)*

15 Sadiq buys a guitar for £150 and sells it for £210.

Work out his percentage profit.

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

Turn over for the next question

Turn over ▶

8

16 (a) Simplify $3^{15} \div (3^4 \times 3)$

Give your answer as a power of 3.

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Answer .... *(2 marks)*

16 (b) Work out 6^{-2}

Give your answer as a fraction.

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Answer .... *(1 mark)*

16 (c) Work out $100^{0.5}$

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Answer .... *(1 mark)*

16 (d) Work out $125^{\frac{2}{3}}$

Give your answer as an integer.

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Answer .... *(2 marks)*

17 (a) Factorise $m^2 + 7m + 6$

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Answer .... *(2 marks)*

17 (b) You are given that $y^2 - 66y - 1411 \equiv (y + 17)(y - 83)$

Work out the value of $y^2 - 66y - 1411$ when $y = 983$
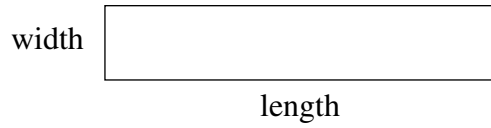You **must** show your working.

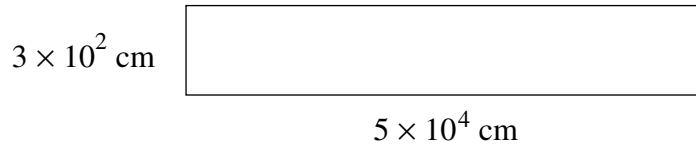..

....

Answer .... *(2 marks)*

Turn over for the next question

10

Turn over ▶

18 The area of a rectangle is found using the formula   area = length × width

width $\boxed{}$

length

18 (a) Work out the area of this rectangle.

3×10^2 cm $\boxed{}$

5×10^4 cm

Give your answer in standard form.

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

18 (b) The area of this rectangle is $(20 + 3\sqrt{2})$ cm^2.

$\sqrt{2}$ cm $\boxed{}$
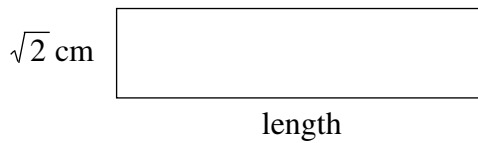
length

Work out the length of the rectangle.
Give your answer in the form $a\sqrt{2} + b$ where a and b are integers.

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

END OF QUESTIONS

$\boxed{5}$