Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
2–3	
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14	
TOTAL	

General Certificate of Secondary Education
Higher Tier
November 2012

Mathematics 43602H

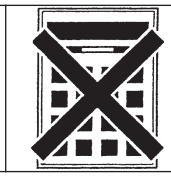
Unit 2

Thursday 8 November 2012 1.30 pm to 2.45 pm

H

For this paper you must have:
- mathematical instruments.

You must **not** use a calculator.



Time allowed
- 1 hour 15 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. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 66.
- The quality of your written communication is specifically assessed in Questions 3 and 16. These questions are indicated with an asterisk (*).
- 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.

1 (a) Multiply out $8(y + 3)$

.....

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

1 (b) Factorise $4x - x^2$

.....

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

2 On Sunday I earn £50 more than on Saturday.
Altogether I earn £600.

Work out how much I earn on Saturday.

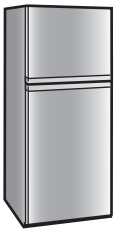
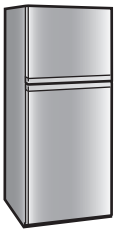
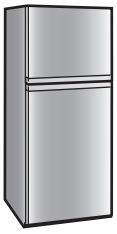
.....

.....

.....

Answer £ ..... *(3 marks)*

***3** Here are three offers for a fridge freezer.

Electric Supplies	**New Homes**	**Fridges for Us**
		
Usual price £250 30% off	Usual price £240 $\frac{1}{3}$ off	£50 deposit plus £20 a month for 6 months

Which offer is the cheapest?
You **must** show your working.

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Answer ..... *(6 marks)*

11

4 The number 39 can be written as the product of two prime numbers.

$$39 = 3 \times 13$$

Write **three** other numbers between 30 and 40 as the product of two prime numbers.

.....

.....

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.....

.....

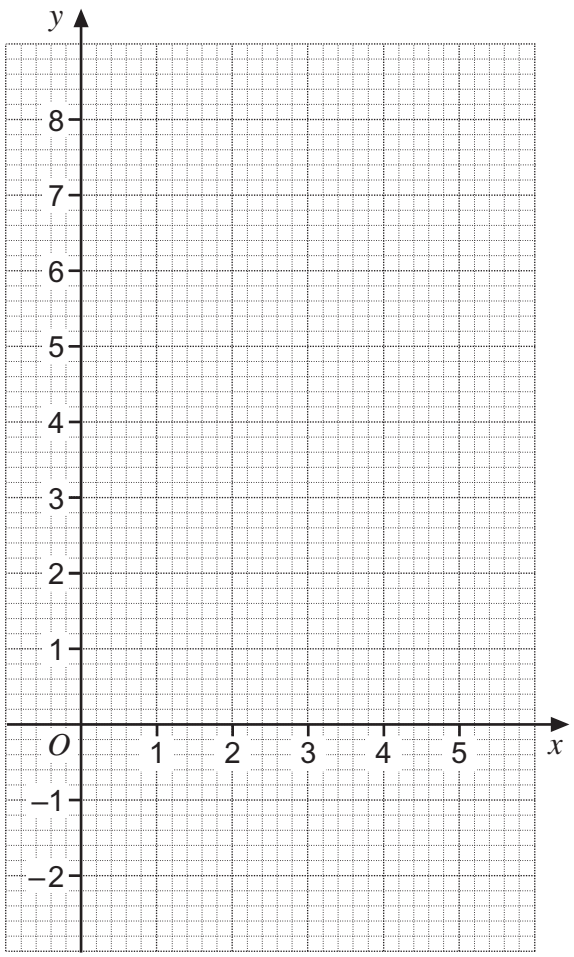
Answer ..... = ... × .....

..... = ... × .....

..... = ... × .....

(3 marks)

5 On the grid below draw the graph of $y = 8 - 2x$ for values of x between 0 and 5.



(3 marks)

6

6 (a) The nth term of a sequence is $\frac{n^2}{2}$

Which term in the sequence is the first to have a value greater than 50?

.....

.....

.....

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

6 (b) Here is a different sequence.

7 10 13 16 ...

Work out the nth term for this sequence.

.....

.....

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

7 One day 460 people visit a zoo.

280 are adults.
The ratio of women to men is 4 : 3

180 are children.
$\frac{3}{5}$ of them are boys.

Jane says that altogether there were more females.

Show that she is correct.

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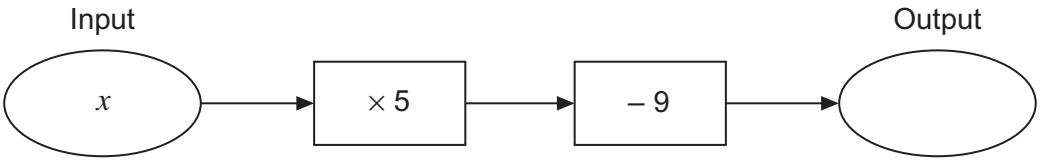
(5 marks)

Turn over for the next question

9

8 Here is a number machine.



The output is three times the input.

Work out the input x.

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.....

x = ... *(4 marks)*

9 Work out $2\frac{1}{8} - \frac{2}{3}$

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

10 (a) Simplify fully $2a^3b \times a^2b^6$

.....

.....

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

10 (b) Simplify fully $\frac{4c^3d^2}{8cd^2}$

.....

.....

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

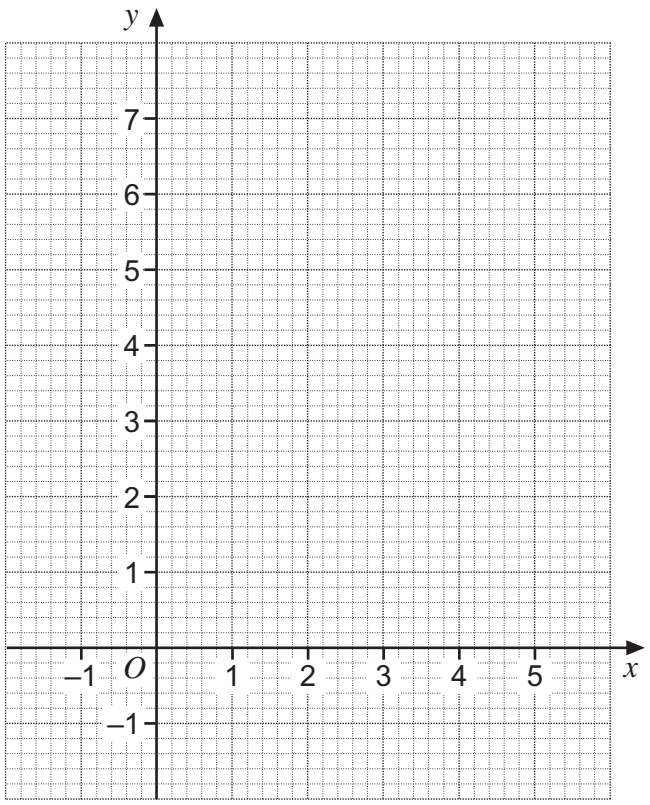
11

11 Put a label, R, in the region on the grid satisfied by all three of these inequalities.

$x \leqslant 3$

$y \geqslant x$

$y \leqslant 2x - 1$



(4 marks)

12 (a) A human cell nucleus has a diameter of 0.000 001 metres.

Write this number in standard form.

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

12 (b) There are up to 5×10^{13} cells in a human body.

Write 5×10^{13} as an ordinary number.

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

12 (c) A patient has a disease.
She has 4^3 body cells affected on day 1.

The number of affected cells doubles every day.
The disease becomes serious when 2^{10} body cells are affected.

On which day does the disease become serious?
You **must** show your working.

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.....

Day ..... *(3 marks)*

Turn over for the next question

9

13 (a) Expand and simplify $(2x + 1)(x - 2)$

.....

.....

.....

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

13 (b) Factorise fully $3x^2 - 48y^2$

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

14 Make x the subject of $\frac{w - x}{y} = 2x - 3$

.....

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.....

.....

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

15 (a) $\sqrt{75} = a\sqrt{3}$

Work out the value of a.

.....

.....

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

15 (b) Evaluate $27^{-\frac{2}{3}}$

.....

.....

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

15

***16(a)** Show that $x^2 - 8x + 20$

can be written in the form $(x - a)^2 + a$

where a is an integer.

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(3 marks)

16 (b) Hence explain how you know that $x^2 - 8x + 20$ is always positive.

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(2 marks)

END OF QUESTIONS

5

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