Centre Number						Candidate Number				
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Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
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12	
TOTAL	

General Certificate of Secondary Education
Higher Tier
November 2011

Mathematics 43602H

Unit 2

Monday 14 November 2011 9.00 am to 10.15 am

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 7 and 11. 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 booklet.

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

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

1 $k = 9$ and $m = -4$

Work out the value of $\dfrac{5(2k-6)}{m}$

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

2 Given that $25.6 \times 32 = 819.2$

2 (a) work out $\dfrac{81.92}{32}$

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

2 (b) work out 0.256×320

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

3 a and b are different prime numbers less than 12.

Work out **three** pairs of numbers a and b such that $\sqrt{(2a + b)}$ is a whole number.

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Answer a = ... and b = ...

a = ... and b = ...

a = ... and b = ... *(3 marks)*

4 In May, a coat costs £64.
In June, the May price is rounded to the nearest £10.
In July, the June price is reduced by 20%.

Ian has £50.

Does he have enough money to buy the coat in July?

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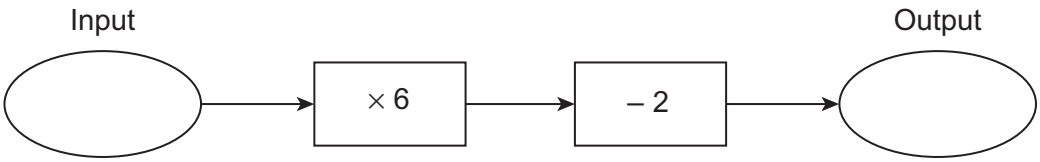
(3 marks)

11

5 Here is a number machine.



The output is twice the input.

Work out the input.

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

6 Julie works 20 hours each week.
She earns £7.50 per hour.
She saves one-fifth of her earnings.

She wants to buy an iPad costing £429.

How many weeks does it take her to save enough to buy this iPad?
You **must** show your working.

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

***7** Last year, 12 students went to the theatre.
The total cost of the tickets was £240.

This year, 8 students are going.
The cost of each ticket has increased by 15%.
They have a total of £200.

Is this enough to buy 8 tickets?
You **must** show your working.

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(5 marks)

8 (a) Simplify $y^4 \times y^7$

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

8 (b) Simplify $w^{12} \div w^4$

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

8 (c) Rearrange $y = 3x + 2$ to make x the subject.

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

16

9 Ali, Beth and Clare take a test.

The ratio of Ali's score to Beth's score is 5 : 3
Ali scored 10 more marks than Beth.

Clare scored 7 more marks than Ali.

Work out each of their scores.

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Answer Ali ..... marks

Beth ..... marks

Clare ..... marks

(3 marks)

10 (a) Expand $m(m + 4)$

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

10 (b) Factorise fully $12xy^2 - 6y$

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

***11** Solve the equation $\frac{2x - 3}{4} + \frac{x - 1}{3} = 2$

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Answer x = ... *(5 marks)*

12 (a) Factorise $n^2 + 7n + 6$

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

12 (b) Hence, or otherwise, write 176 as the product of its prime factors.
Give your answer in index form.

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

17

Turn over ▶

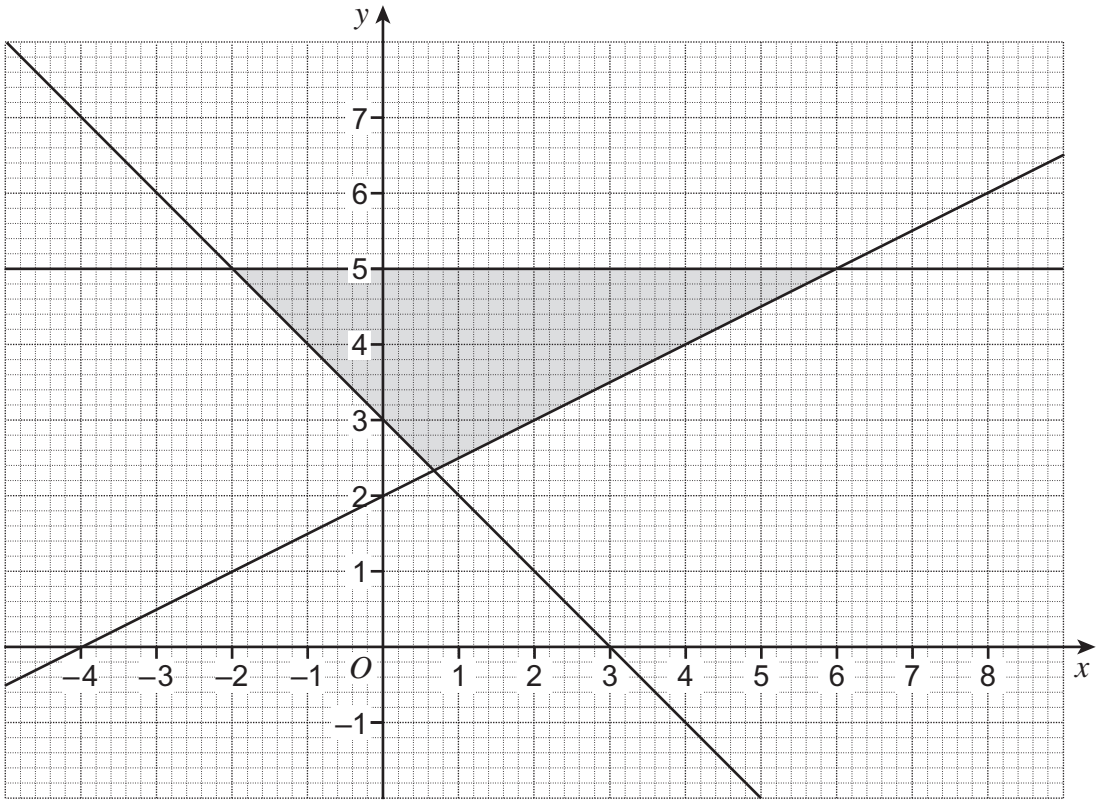
13 Points in the shaded region satisfy three inequalities.

One of the inequalities is $y \leqslant 5$

Which of these are the other **two** inequalities?

A $2y \geqslant x - 4$ B $x + y \geqslant 3$ C $y \geqslant 2x + 4$

D $2y \geqslant x + 4$ E $x + y \leqslant 3$



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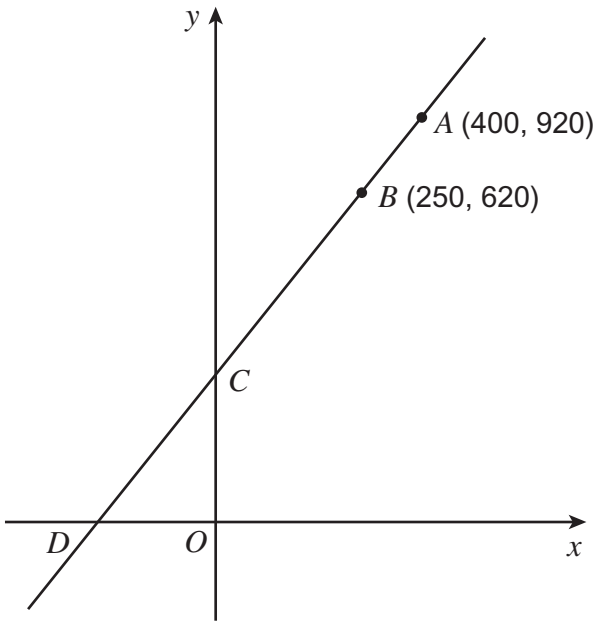
Answer ..... and ..... *(2 marks)*

14 The diagram shows a line $ABCD$.
A is the point (400, 920).
B is the point (250, 620).
The line cuts the y-axis at C and the x-axis at D.

Not drawn accurately



Work out the coordinates of C and D.

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Answer C (..... , ...)

D (..... , ...) *(4 marks)*

6

Turn over ▶

15 The first three terms of a sequence and the n^{th} term are

$$\frac{1}{2} \quad \frac{2}{3} \quad \frac{3}{4} \quad \ldots \quad \ldots \quad \frac{n}{n+1} \quad \ldots$$

15 (a) Explain clearly why the $(n + 1)^{th}$ term of the sequence is $\frac{n+1}{n+2}$

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(1 mark)

15 (b) Show that the difference between the $(n + 1)^{th}$ term and the n^{th} term is $\frac{1}{(n+1)(n+2)}$

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(3 marks)

15 (c) Two terms of the sequence have a difference of $\frac{1}{110}$

What are the **two** terms?

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

16 Given that $x^2 + ax + b \equiv (x - 7)^2 - a$

work out the values of a and b.

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Answer a = ... b = ... *(3 marks)*

17 Here is a formula $r = \sqrt{(w^2 - h^2)}$

Work out the value of r when $w = 9\sqrt{2}$ and $h = 5\sqrt{6}$

Give your answer in the form $a\sqrt{b}$ where a and b are integers greater than 1.

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

Turn over for the next question

18 Solve the simultaneous equations

$$y^2 = 2x + 29$$
$$y = x - 3$$

You **must** show your working.

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Answer ..... *(5 marks)*

END OF QUESTIONS

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