

Centre Number						Candidate Number				
Surname										
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**

<p><b>For this paper you must have:</b></p> <ul style="list-style-type: none"> <li>mathematical instruments.</li> </ul> <p>You must <b>not</b> use a calculator.</p>	
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### 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  $\frac{5(2k-6)}{m}$

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Answer ..... (3 marks)

**2** Given that  $25.6 \times 32 = 819.2$

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

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Answer ..... (1 mark)

**2 (b)** work out  $0.256 \times 320$

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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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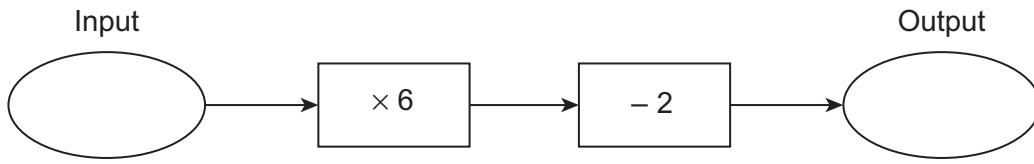
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(3 marks)



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)



**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)

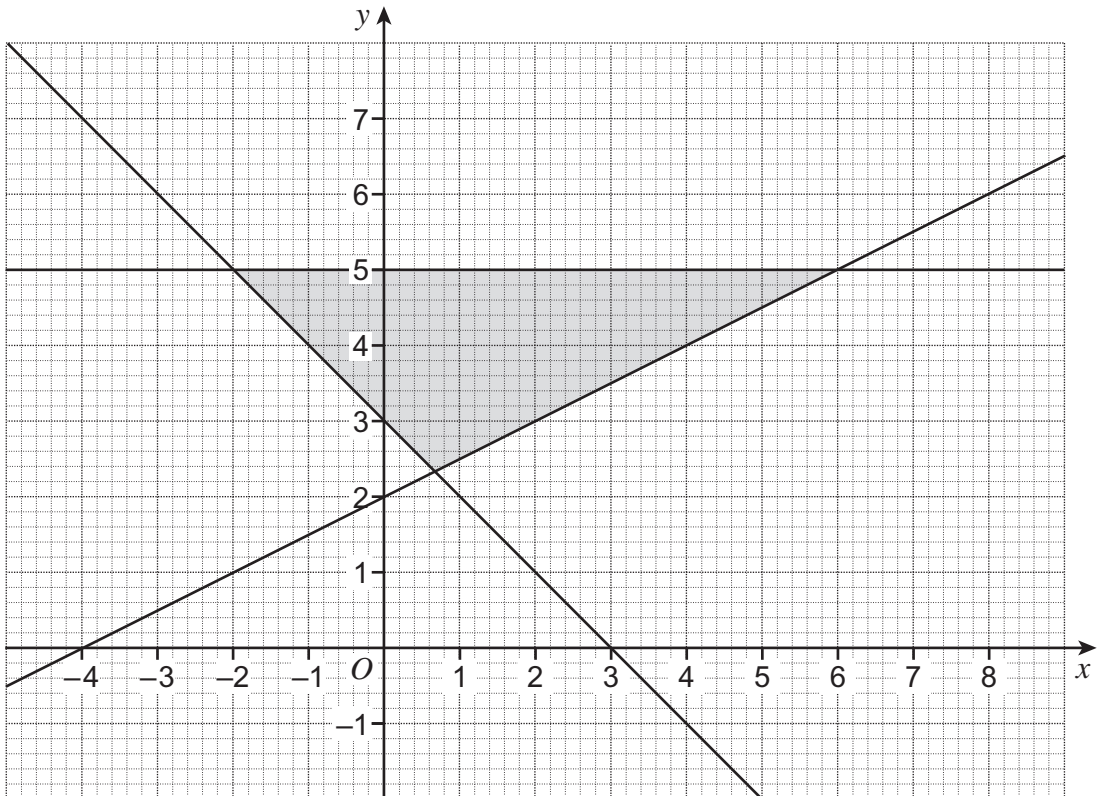


13 Points in the shaded region satisfy three inequalities.

One of the inequalities is  $y \leq 5$

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

- A  $2y \geq x - 4$       B  $x + y \geq 3$       C  $y \geq 2x + 4$   
D  $2y \geq x + 4$       E  $x + y \leq 3$



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

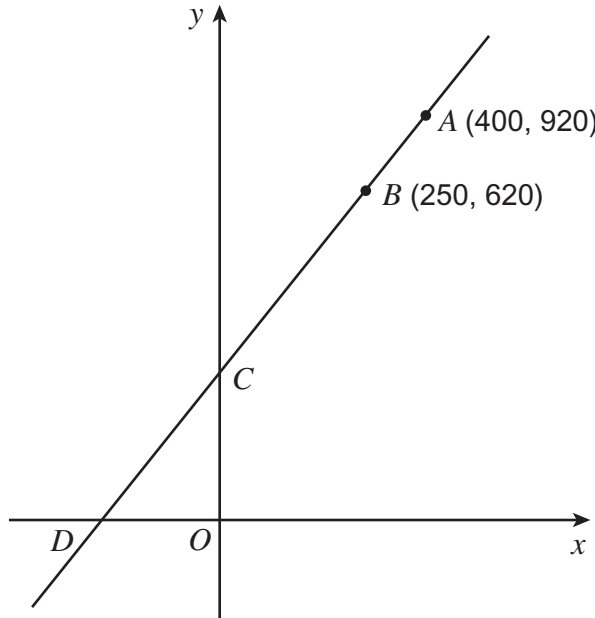




14

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
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Turn over ►



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

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

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

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(1 mark)

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

