

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

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Forename(s)

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Candidate signature

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# GCSE MATHEMATICS

# H

Higher Tier Unit 2 Number and Algebra

Friday 4 November 2016

Morning

Time allowed: 1 hour 15 minutes

## Materials

For this paper you must have:

- mathematical instruments.

You must **not** use a calculator.



## Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- 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 4 and 19. 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** Use approximations to estimate the value of  $\frac{37 \times 304}{58}$  **[2 marks]**

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Answer \_\_\_\_\_

**2 (a)** Multiply out  $3(2x - 7)$  **[1 mark]**

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Answer \_\_\_\_\_

**2 (b)** Factorise  $x^2 + 8x$  **[1 mark]**

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Answer \_\_\_\_\_



3 Work out the value of  $2a^2 + b^3$  when  $a = 5$  and  $b = -3$  [3 marks]

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Answer \_\_\_\_\_

Turn over for the next question

7
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Turn over ►



\*4 Lisa wants to hire a car.

**Company A**

No charge for mileage

Normal price   £66 each day

**Offer**   Now  $\frac{1}{3}$  off

**Company B**

No daily charge

Normal price   75p each mile

**Offer**   Now 20% off

Which company is cheaper  
to hire a car for 15 days  
**and**  
drive 1000 miles?

You **must** show your working.

[5 marks]

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Answer \_\_\_\_\_



5 Write 56 as a product of prime factors.

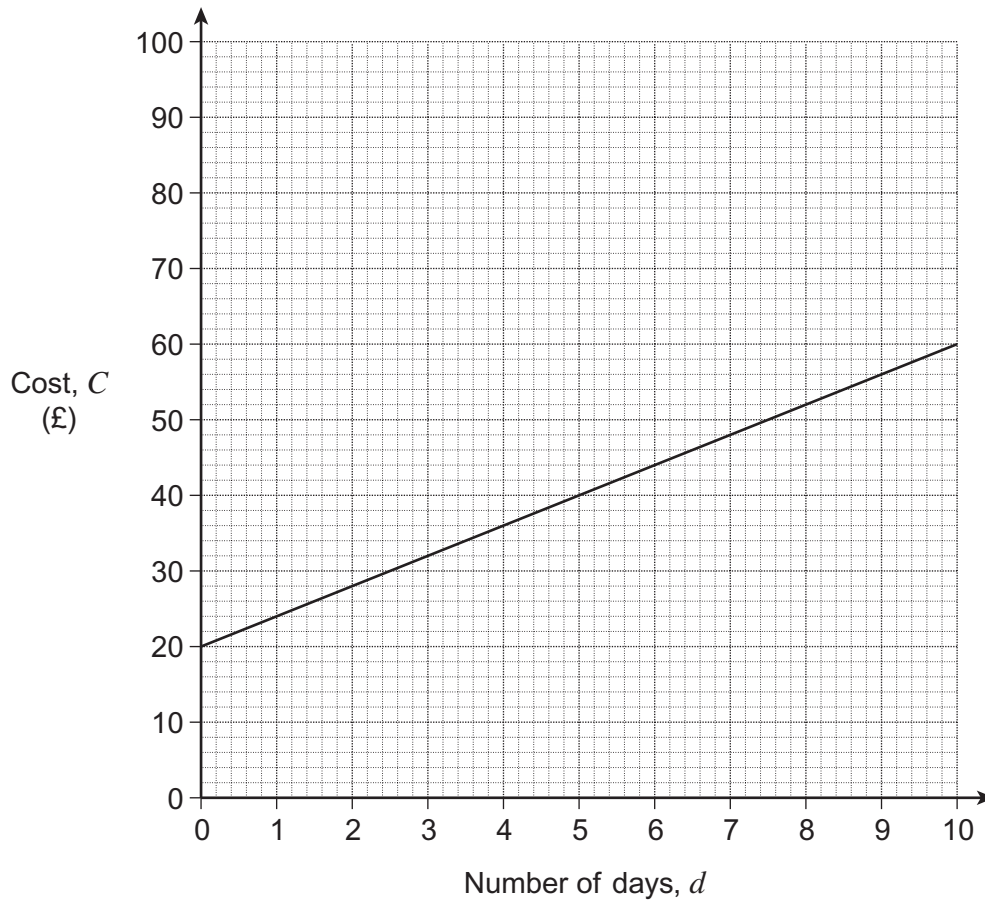
[2 marks]

Answer \_\_\_\_\_

**Turn over for the next question**



- 6 This graph is used to work out the cost,  $C$  (£), to hire a drill for a number of days,  $d$ .



- 6 (a) Circle the correct formula for the cost,  $C$ , to hire a drill.

[1 mark]

$$C = 20d + 4$$

$$C = 4d + 24$$

$$C = 4d + 20$$

$$C = 24d - 4$$



6 (b) The cost of hiring a sander is given by the formula

$$C = 6d + 10$$

Dev hires a drill and a sander for the **same** number of days.  
The **total** cost is £90

Work out the number of days that he hires the drill and sander.

[3 marks]

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Answer \_\_\_\_\_ days

7 Solve  $4(x - 5) = x + 7$

[3 marks]

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$x =$  \_\_\_\_\_

7
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Turn over ►



**8** A shop makes juice by mixing cranberry and orange in the ratio

$$\text{cranberry} : \text{orange} = 1 : 3$$

1 litre of cranberry costs 60p

1 litre of orange costs 40p

**8 (a)** Show that the cost of 20 litres of juice is £9

**[2 marks]**

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**8 (b)** The shop sells 1 litre of juice for 80p

Work out the profit for selling 60 litres of juice.

**[3 marks]**

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Answer £ \_\_\_\_\_





9 (a)  $x$  is an integer

$$-7 \leq x < 9$$

Work out the **largest** possible value of  $x^2$

[1 mark]

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Answer \_\_\_\_\_

9 (b)  $y$  is an integer

$$-4 < y < 3$$

Work out the **smallest** possible value of  $y^3$

[1 mark]

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Answer \_\_\_\_\_

Turn over for the next question

7
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Turn over ►





**11 (a)** Circle the answer to  $9.6 \times 10^8 \div 4$

**[1 mark]**

$9.6 \times 10^2$

$2.4 \times 10^2$

$2.4 \times 10^8$

$9.6 \times 10^4$

**11 (b)** Work out  $(4 \times 10^{-3}) \times (9 \times 10^{14})$

Give your answer in standard form.

**[2 marks]**

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Answer \_\_\_\_\_

**Turn over for the next question**





13 (a) Simplify fully  $(5x^2y^4)^3$

[2 marks]

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Answer \_\_\_\_\_

13 (b) Simplify fully  $\frac{32x^{12}y^2}{24x^3y^6}$

[2 marks]

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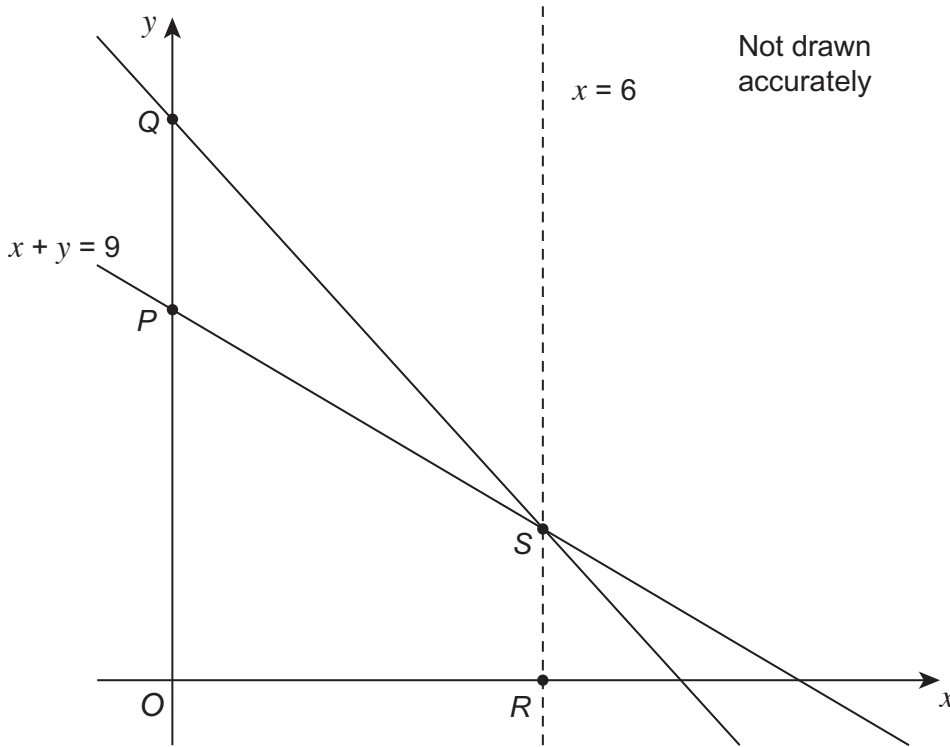
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Answer \_\_\_\_\_

Turn over for the next question



14 On the diagram, line  $PS$  is  $x + y = 9$  and line  $RS$  is  $x = 6$



The gradient of line  $QS$  is twice the gradient of line  $PS$ .

Work out the ratio of lengths  $OQ : RS$

[3 marks]

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Answer \_\_\_\_\_ : \_\_\_\_\_





16 (a) Circle the value of  $3^{-2}$

[1 mark]

-6

$\frac{1}{6}$

$\frac{1}{9}$

-9

16 (b) Work out the value of  $(-8)^0 + 8^{-\frac{2}{3}}$

[3 marks]

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Answer \_\_\_\_\_





**17 (a)** Show clearly that  $(2x - 3y)(2x + 3y) \equiv 4x^2 - 9y^2$  **[1 mark]**

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**17 (b)** Show clearly that  $\frac{3}{\sqrt{2}} \equiv \frac{3\sqrt{2}}{2}$  **[1 mark]**

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**17 (c)** Work out the value of  $\left(2\sqrt{3} - \frac{3}{\sqrt{2}}\right)\left(2\sqrt{3} + \frac{3}{\sqrt{2}}\right)$  **[3 marks]**

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Answer \_\_\_\_\_



18 Simplify  $\frac{5x^2 + 11x - 12}{x^2 + 3x}$

[3 marks]

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Answer \_\_\_\_\_



**\*19** Prove that  $(4x - 5)^2 - 5x(3x - 8)$  is positive for all values of  $x$ .

**[4 marks]**

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**END OF QUESTIONS**



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