

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

GCSE MATHEMATICS

H

Higher Tier Unit 2 Number and Algebra

Thursday 9 June 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, 10 and 14. 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.



J U N 1 6 4 3 6 0 2 H 0 1

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

1 Solve $7x - 9 = 3x + 23$

[3 marks]

$x =$ _____



2 The term-to-term rule for a sequence is

multiply by 2

The sequence starts

a $2a$ — —

The total value of the first three terms is 63

Work out the total value of the first four terms.

[3 marks]

Answer _____

Turn over for the next question



3 Two trains, *A* and *B*, travel from Derby to York.

Both trains travel at a constant speed.

Here is the timetable for the trains.

	Train <i>A</i>	Train <i>B</i>
Leave Derby	0900	1030
Arrive York	1100	1200

3 (a) Train *A* travels at 60 mph

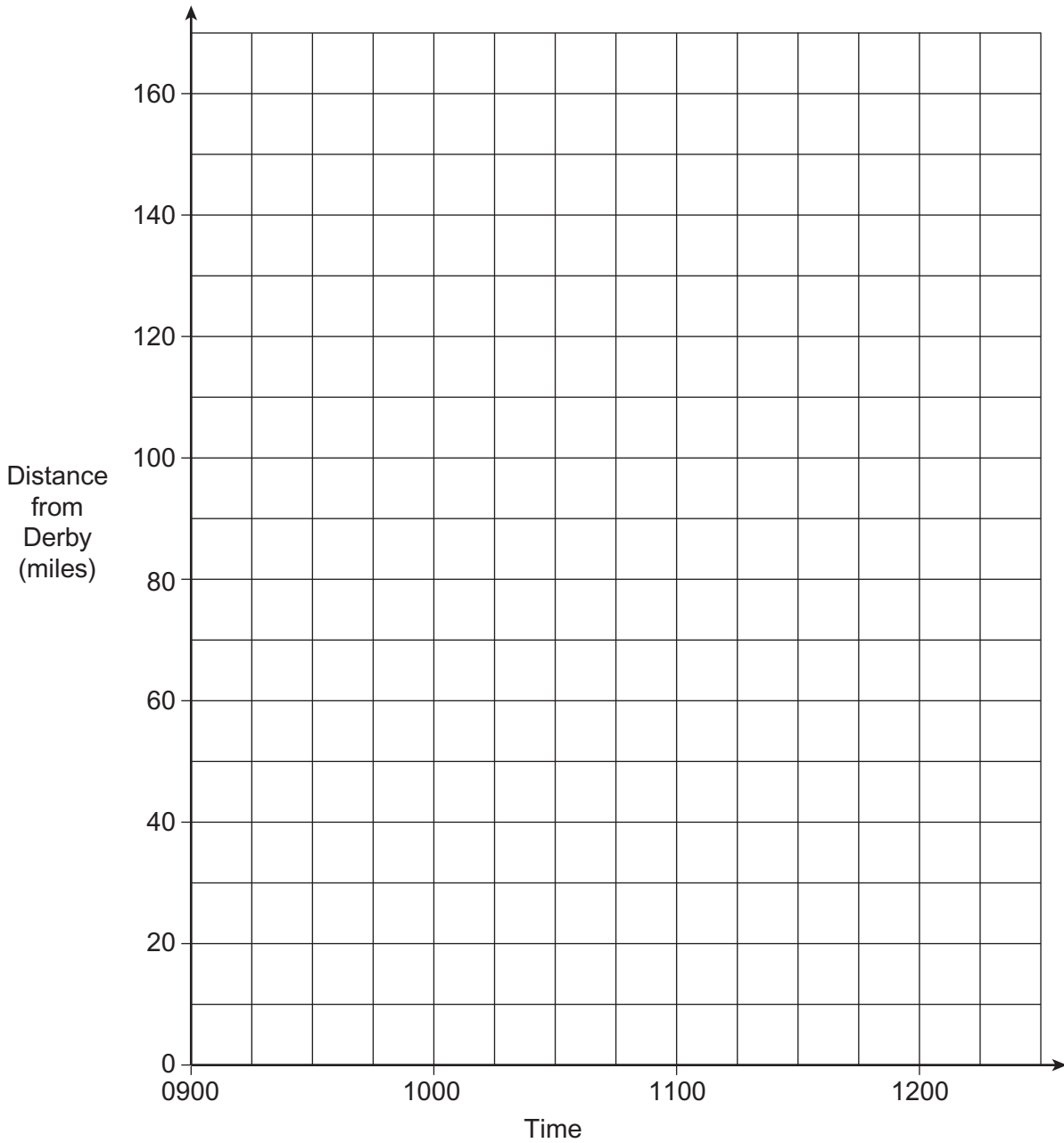
On the grid opposite, draw the distance-time graph for Train *A*.

[1 mark]

3 (b) On the grid opposite, draw the distance-time graph for Train *B*.

[1 mark]





3 (c) Use your graph to work out the speed of Train B.

[1 mark]

Answer _____ mph

3

Turn over ►



***4** Kamil looks at two cars.

The normal price of Car A is £1550
The normal price of Car B is £1950

The cars are part of this offer.

Cars up to £1800
Sale price
20% off the normal price

Cars over £1800
Sale price
 $\frac{1}{3}$ off the normal price

Special Offer
When the sale price is over £1250
Get an extra 5% off the sale price

After all reductions, which car is cheaper, Car A or Car B?
You **must** show your working.

[5 marks]

Answer _____



5 A bag contains red discs, white discs and blue discs.

$\frac{1}{4}$ of the discs are red.

$\frac{1}{6}$ of the discs are white.

What is the **smallest** possible number of **blue** discs in the bag?

[3 marks]

Answer _____

Turn over for the next question



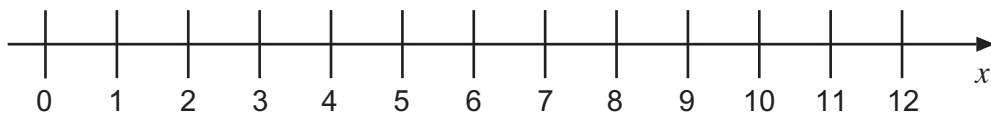
6 Factorise fully $6x^2 - 14x$ [2 marks]

Answer _____

7 (a) Write down **all** the integers that satisfy $-3 \leq n < 2$ [1 mark]

Answer _____

7 (b) Show $2 < x \leq 10$ on the number line. [2 marks]



- 8 Jon and Nik share some money in the ratio 5 : 2
Jon gets £150 more than Nik.

How much money do they share altogether?

[3 marks]

Answer £ _____

Turn over for the next question



9 (a) Circle the value of the reciprocal of 0.2

[1 mark]

$\frac{2}{10}$

$\frac{1}{2}$

$\frac{1}{20}$

0.8

5

9 (b) Circle the value of 8.5^0

[1 mark]

0

1

8.1

8.5

9 (c) Work out $27^{\frac{1}{3}} \times 7^{-2}$

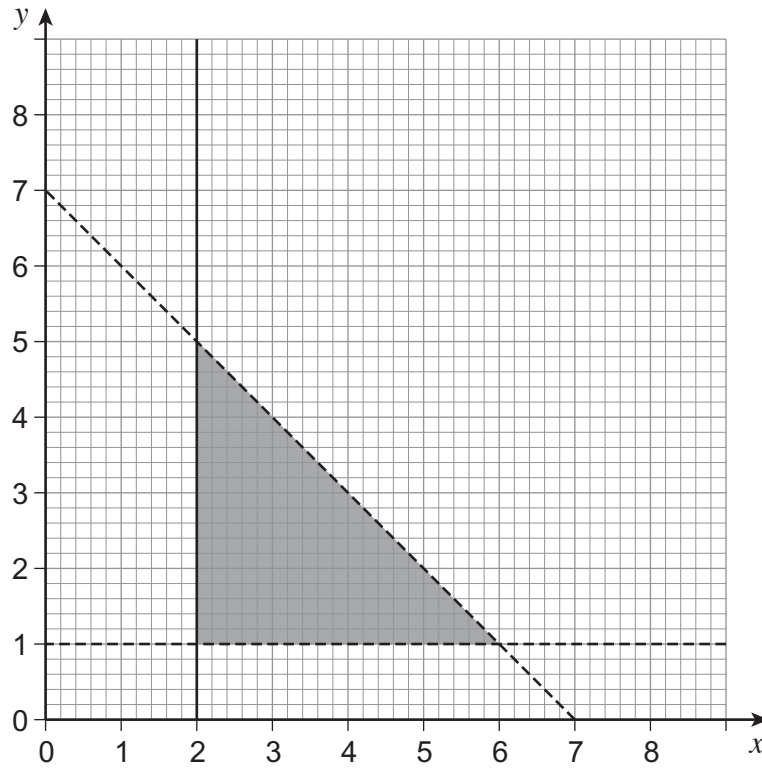
Give your answer as a fraction.

[3 marks]

Answer _____



***10** Points in the shaded region satisfy three inequalities.



Use inequalities to describe the shaded region.

[3 marks]



11 Work out the value of x when

$$x - 20 : x + 280 \quad \text{simplifies to} \quad 1 : 4$$

[4 marks]

Answer _____



12 (a) Write 0.000 583 in standard form.

[1 mark]

Answer _____

12 (b) Write 9.416×10^5 as an ordinary number.

[1 mark]

Answer _____

12 (c) Divide 7200 million by 300
Give your answer in standard form.

[3 marks]

Answer _____

Turn over for the next question



13 Here are the first four lines of a number pattern.

$$\text{Line 1} \quad 1 \times 6 \quad + \quad 2 \times 4 \quad = \quad 2 \times 7$$

$$\text{Line 2} \quad 2 \times 7 \quad + \quad 2 \times 5 \quad = \quad 3 \times 8$$

$$\text{Line 3} \quad 3 \times 8 \quad + \quad 2 \times 6 \quad = \quad 4 \times 9$$

$$\text{Line 4} \quad 4 \times 9 \quad + \quad 2 \times 7 \quad = \quad 5 \times 10$$

13 (a) Complete Line 10

[1 mark]

$$\text{Line 10} \quad 10 \times \underline{\quad} + 2 \times \underline{\quad} = 11 \times 16$$

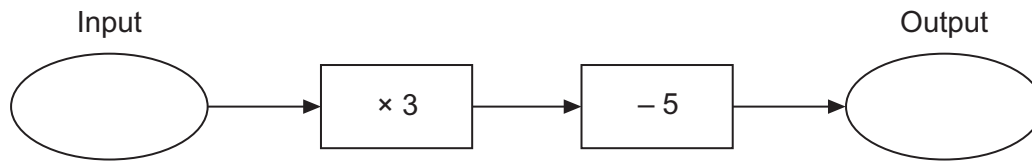
13 (b) Prove that $n(n + 5) + 2(n + 3)$

is always the product of two numbers with a difference of 5

[3 marks]



*14 Here is a number machine.



When the input is a the output is b .

When the input is $a + b$ the output is 64

Work out the values of a and b .
Do **not** use trial and improvement.
You **must** show your working.

[4 marks]

$a =$ _____ $b =$ _____



15

Simplify

$$\frac{4x^2 - 1}{4x^2 + 12x + 5}$$

[3 marks]

Answer _____



16 (a) $x^2 + ax + b \equiv (x - 3)^2 - a$ where a and b are integers.

Work out the values of a and b .

[3 marks]

$a =$ _____ $b =$ _____

16 (b) Circle the smallest possible value of $(x - 7)^2 + 2$

[1 mark]

-7

-2

2

7

Turn over for the next question



17 (a) Rationalise the denominator and simplify $\frac{16}{\sqrt{2}}$

[2 marks]

Answer _____

17 (b) Expand and simplify $(5 - \sqrt{3})^2$

Give your answer in the form $a - b\sqrt{3}$

[2 marks]

Answer _____



18 Solve $\frac{6}{x-2} - \frac{2}{x+3} = 1$

[5 marks]

Answer _____

END OF QUESTIONS

There are no questions printed on this page

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