AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

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.

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

6

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 *A*	Train *B*
Leave Derby	0900	1030
Arrive York	1100	1200

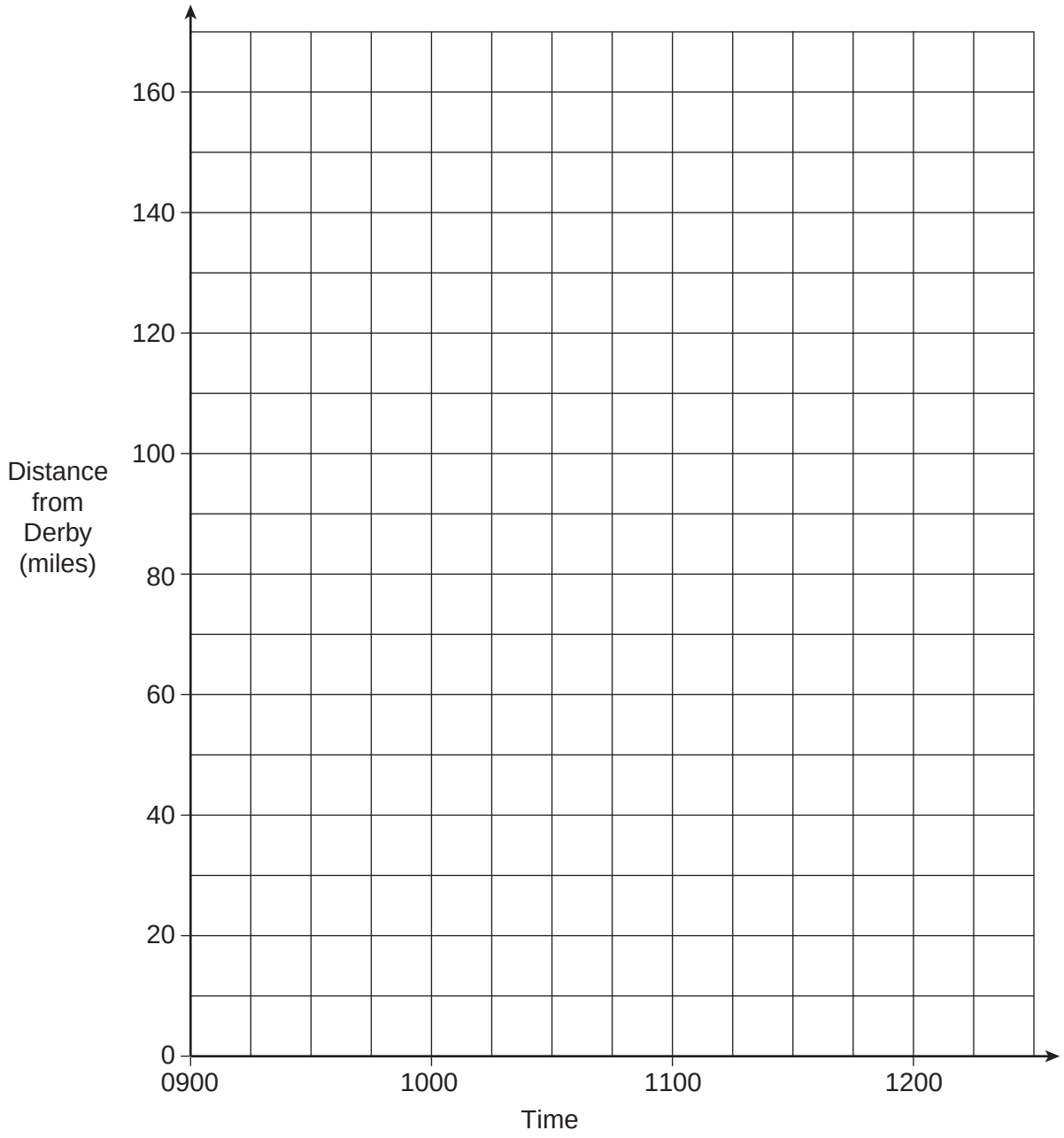
3 (a) Train *A* travels at 60 mph

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

***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	**Cars over £1800**
Sale price	Sale price
20% off the normal 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

8

6 Factorise fully $6x^2 - 14x$

[2 marks]

Answer _____

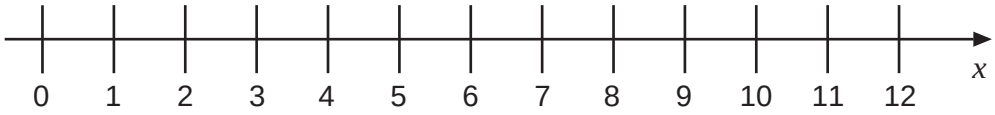
7 (a) Write down **all** the integers that satisfy $-3 \leqslant n < 2$

[1 mark]

Answer _____

7 (b) Show $2 < x \leqslant 10$ 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

8

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

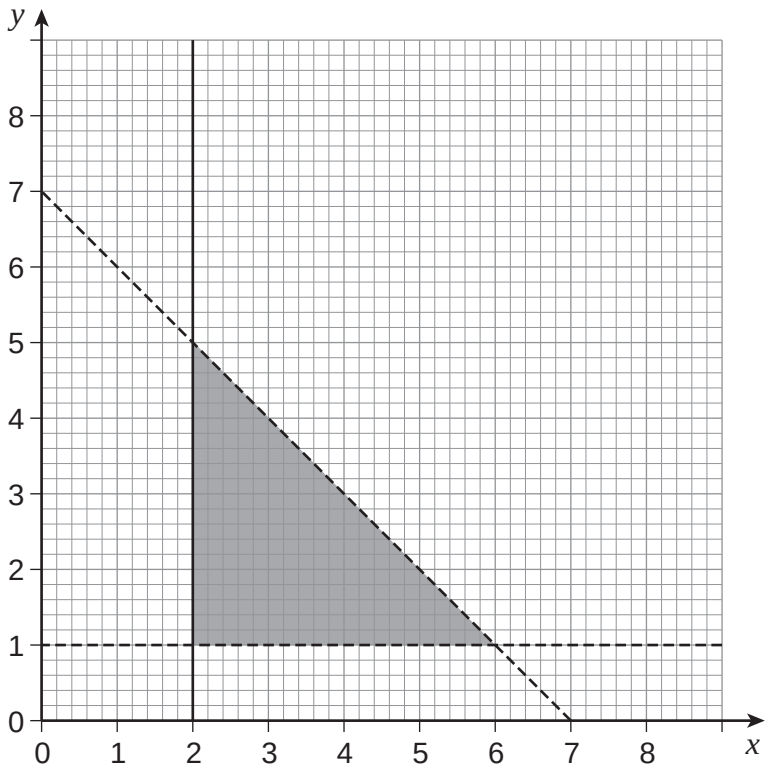
9 (c) Work out $27^{\frac{1}{3}} \times 7^{-2}$

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]

8

Turn over ▶

11 Work out the value of x when

$x - 20 : x + 280$ simplifies to $1 : 4$

[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

9

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

Line 1 $1 \times 6 + 2 \times 4 = 2 \times 7$

Line 2 $2 \times 7 + 2 \times 5 = 3 \times 8$

Line 3 $3 \times 8 + 2 \times 6 = 4 \times 9$

Line 4 $4 \times 9 + 2 \times 7 = 5 \times 10$

13 (a) Complete Line 10

[1 mark]

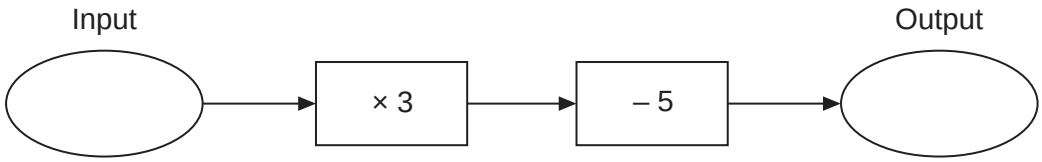
Line 10 $10 \times$ _____ $+ \quad 2 \times$ _____ $= 11 \times 16$

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]

$a =$ _____ $b =$ _____

8

15 Simplify $\dfrac{4x^2 - 1}{4x^2 + 12x + 5}$

[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

7

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

9

There are no questions printed on this page

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