Surname

Other Names

Candidate Signature

AQA

General Certificate of Secondary Education
Higher Tier
November 2014

Methods in Mathematics (Linked Pair)

93651H/A

H

Unit 1   **Algebra and Probability**
Section A   **Calculator**

Monday 10 November 2014   9.00 am to 9.45 am

For this paper you must have:
- a calculator
- mathematical instruments.

Time allowed
- 45 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. Cross through any work that you do not want to be marked.
- This paper is divided into two sections: Section A and Section B.
- After the 45 minutes allowed for Section A, you must put your calculator on the floor under your seat. You will then be given Section B.
- When you have answered Section B you may work again on Section A but you must **not** use a calculator. It must remain on the floor under your seat.
- At the end of the examination tag Section A and Section B together with Section A on top.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 40.
- The quality of your written communication is specifically assessed in Question 3. This question is indicated with an asterisk (*).
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.
- You are expected to use a calculator where appropriate.

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

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Formulae Sheet: Higher Tier

Set notation

A
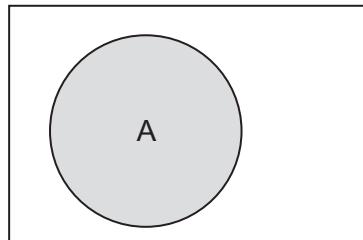
A′
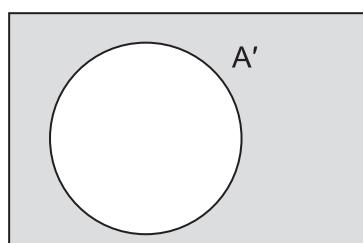
A ∩ B
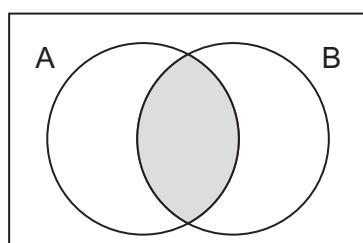
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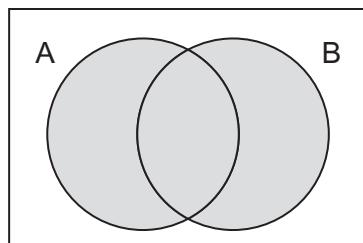
Answer **all** questions in the spaces provided.

1 (a) Complete the table of values for $y = x^2 - 3$

x	–3	–2	–1	0	1	2	3
y	6	1	–2		–2	1	6

[1 mark]

1 (b) Draw the graph of $y = x^2 - 3$ for values of x from –3 to 3

[2 marks]
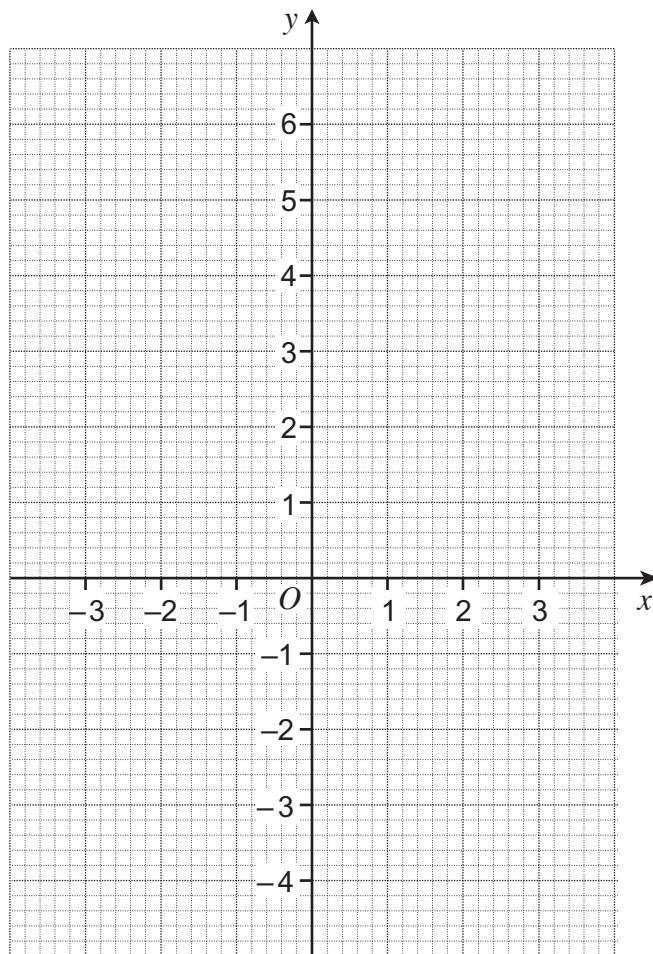
Turn over ▶

2 (a)   Factorise $x^2 + 5x$

[1 mark]

Answer ....

2 (b)   Factorise $8y - 14$

[1 mark]

Answer ....

3   The first of five consecutive integers is x.

3 (a)   Show that the formula for the sum, S, of the five consecutive integers is

$$S = 5x + 10$$

[1 mark]

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*3 (b)   Show that when $x = 2n$,   where n is a positive integer, S is a multiple of 10

[2 marks]

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Turn over for the next question

5

Turn over ▶

4 ξ = { 20, 40, 60, 80, 100, 120, 140, 160, 180, 200 }

Set A = multiples of 3
Set B = multiples of 8

4 (a) Put these ten numbers into the diagram.

20   40   60   80   100   120   140   160   180   200

[2 marks]
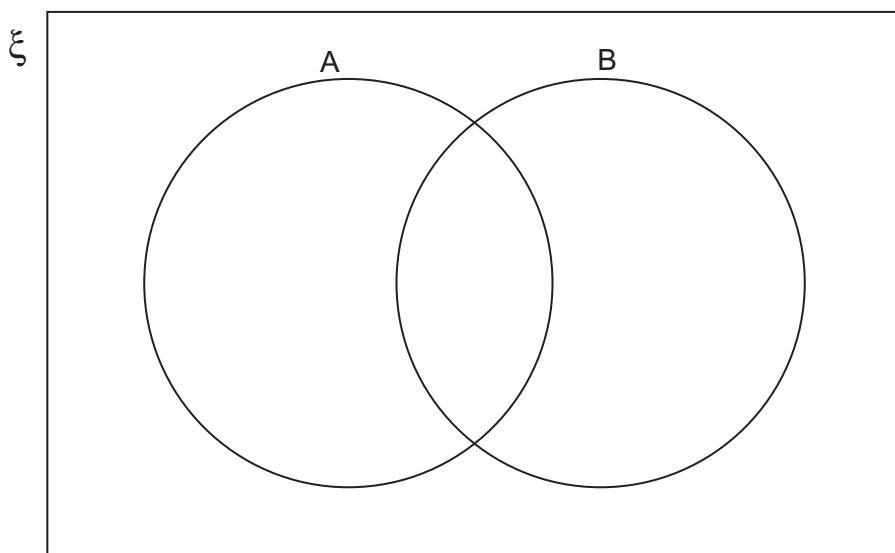
4 (b) One of the ten numbers is chosen at random.

Show that

the probability of **not** choosing a multiple of 3

is the same as

the probability of choosing a multiple of 3 or 8 or both.

[1 mark]

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5   An experiment has four possible outcomes, A, B, C and D.
The table shows the probabilities of the four outcomes.

A	B	C	D
x	$3x$	0.2	$6x$

5 (a)   Write and solve an equation to work out the value of x.

[2 marks]

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$x =$ ....

5 (b)   Hence, work out the value of P(A or B).

[2 marks]

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Answer ....

Turn over ▶

6 500 counters are either red or blue.
The ratio of red counters to blue counters is 3 : 7

How many **more** blue counters are there than red counters?

[3 marks]

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Answer ....

7   An amount of money is increased by 15% to £4715

Work out the original amount.

[3 marks]

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Turn over for the next question

6

Turn over ▶

8 (a) $x = 4$ satisfies the inequality $x < n$

What is the smallest possible **integer** value of n?

[1 mark]

Answer ....

8 (b) Four integer values of y satisfy the inequality $m \leqslant y \leqslant 1$

m is an integer.

What is the value of m?

[1 mark]

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Answer ....

8 (c) $-r \leqslant w \leqslant r$ where r is a positive integer.

Write an expression in r for the number of integer values of w that satisfy this inequality.

[1 mark]

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Answer ....

9   Solve the simultaneous equations

$$x - 3y = 16$$

$$5x + y = 8$$

Do **not** use trial and improvement.
You **must** show your working.

[4 marks]

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$x =$ .... $y =$ ....

7

Turn over ▶

10 Rearrange the formula $t = \dfrac{3x + 7}{2x + 1}$ to make x the subject.

[4 marks]

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Answer ....

11 The equation of a circle can be written as $y^2 - 13 = 36 - x^2$

Work out the radius of the circle.

[2 marks]

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Answer ....

12 (a) Write down the gradient of the line with equation $y = \frac{1}{2}x + 3$

[1 mark]

Answer ....

12 (b) The graphs of $y = \frac{1}{2}x + 3$ and $ax + y = 4$ intersect at right angles.

Work out the value of a.

[2 marks]

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Answer ....

Turn over for the next question

9

13 The graph of $y = ax^2 + b$ passes through the point (2, 5)
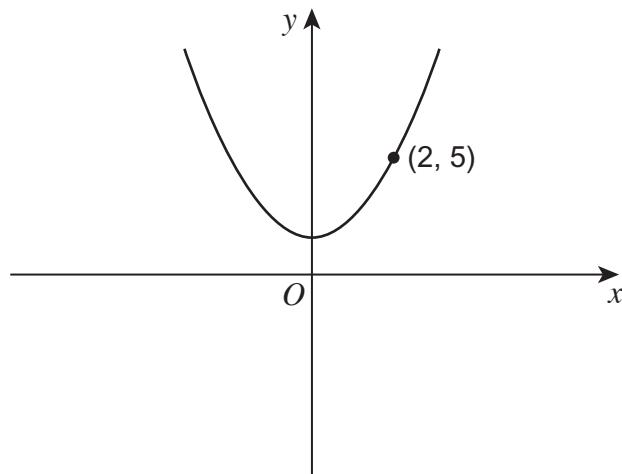
For each equation, complete the coordinates of a point the graph passes through.

[3 marks]

$y = ax^2 + b + 1$ passes through   (2 , ...)

$y = 2ax^2 + 2b$ passes through   (2 , ...)

$y = a(x - 1)^2 + b$ passes through   (............ , 5)

END OF SECTION A

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ANSWER IN THE SPACES PROVIDED**

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED