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| Centre Number | | | | | | Candidate Number | | | | |
| Surname | | | | | | | | | | |
| Other Names | | | | | | | | | | |
| Candidate Signature | | | | | | | | | | |

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|---------------------|------|
| For Examiner's Use | |
| Examiner's Initials | |
| Pages | Mark |
| 3 | |
| 4 – 5 | |
| 6 – 7 | |
| 8 – 9 | |
| 10 – 11 | |
| 12 – 13 | |
| 14 | |
| TOTAL | |



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

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|---|--|
| <p>For this paper you must have:</p> <ul style="list-style-type: none"> • 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.

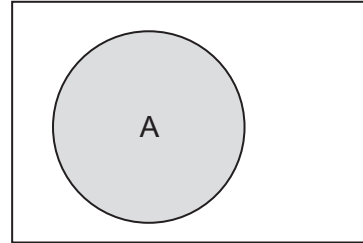
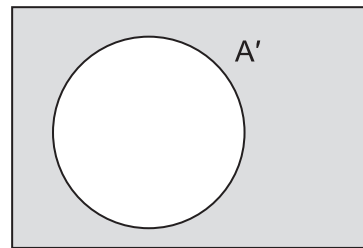
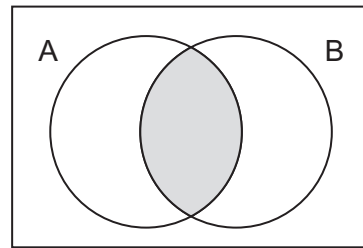
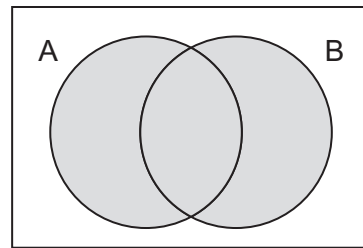


N 0 V 1 4 9 3 6 5 1 H A 0 1

Formulae Sheet: Higher Tier

Set notation

A

 A'  $A \cap B$  $A \cup B$ 

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

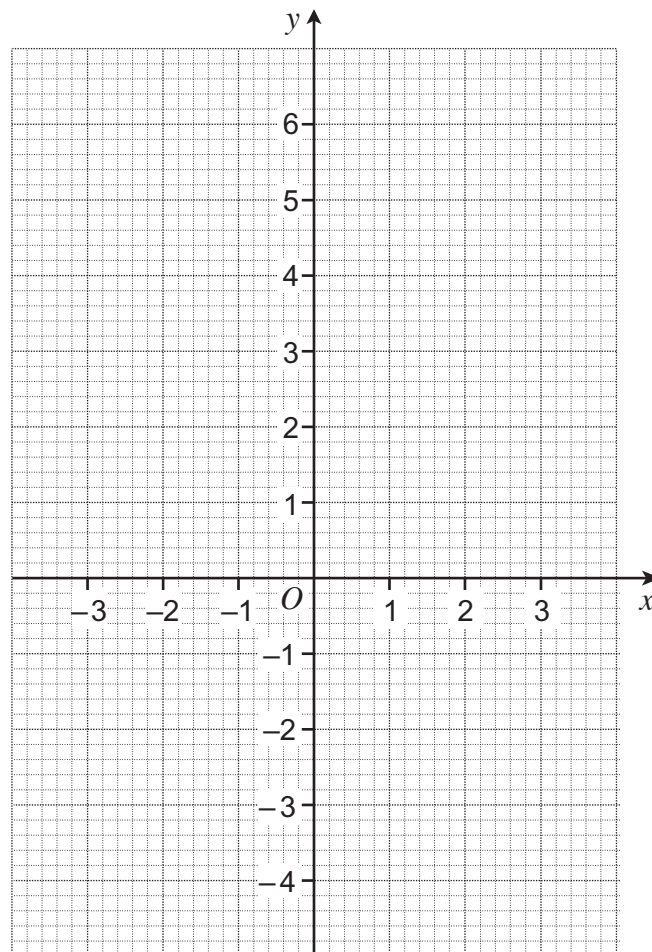
1 (a) Complete the table of values for $y = x^2 - 3$

| | | | | | | | |
|-----|----|----|----|---|----|---|---|
| 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]



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



4 $\xi = \{ 20, 40, 60, 80, 100, 120, 140, 160, 180, 200 \}$

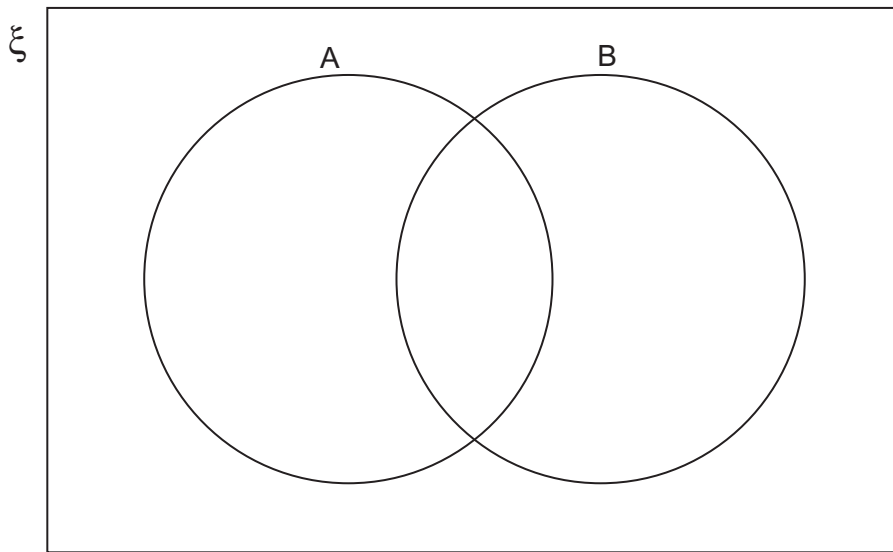
Set A = multiples of 3

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 $P(A \text{ or } B)$.

[2 marks]

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Answer



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 $m \leq y \leq 1$

m is an integer.

What is the value of m ?

[1 mark]

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Answer

8 (c) $-r \leq w \leq r$ 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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$x = \dots\dots\dots y = \dots\dots\dots$

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| 7 |
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Turn over ►



10 Rearrange the formula $t = \frac{3x + 7}{2x + 1}$ 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]**

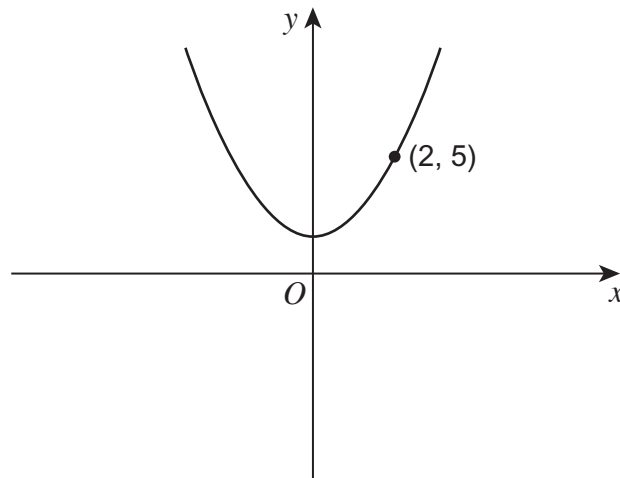
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Answer

Turn over for the next question



- 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**



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