

Centre Number						Candidate Number				
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Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14	
<b>TOTAL</b>	



General Certificate of Secondary Education  
Higher Tier  
June 2014

# Methods in Mathematics (Linked Pair Pilot)

93651H/A

**H**

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

Thursday 19 June 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 Questions 5, 6 and 10. These questions are 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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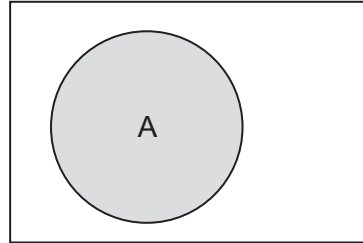
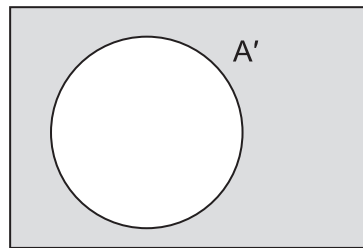
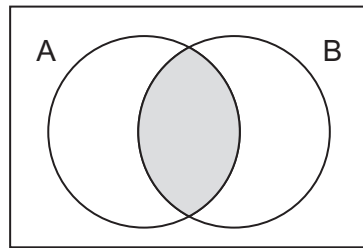
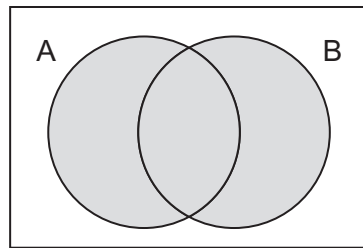
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**93651H/A**

## Formulae Sheet: Higher Tier

## Set notation

A

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

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

**1 (a)**      Multiply out       $10(3x + 1)$  **[1 mark]**

Answer .....

**1 (b)**      Factorise       $4x - 12$  **[1 mark]**

Answer .....

**1 (c)**      Factorise       $x^2 + 5x$  **[1 mark]**

Answer .....

**2**      Solve       $6x - 11 = 4x + 7$  **[3 marks]**

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.....  
.....  
.....

$x =$  .....

6
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Turn over ►



**3** 180 counters are red or blue.  
The ratio of red to blue is 4 : 1

**3 (a)** How many of the counters are red?

**[2 marks]**

.....  
.....

Answer .....

**3 (b)** What percentage of the counters are red?

**[2 marks]**

.....  
.....

Answer ..... %



4 Here are two calculations.

$$4 + 4 - 4 - 4 = 0$$

$$(4 + 4) \div (4 + 4) = 1$$

Use brackets and the signs +, -, × and ÷ to make the following calculations true.

**[2 marks]**

$$4 \quad 4 \quad 4 \quad 4 = 2$$

$$4 \quad 4 \quad 4 \quad 4 = 3$$

**Turn over for the next question**



5 (a) Put four **different** prime numbers into the boxes to make the calculation true.

[2 marks]

$$\square + \square + \square = \square$$

\*5 (b) Why can 2 never be one of the four prime numbers used in part (a)?

[2 marks]

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**\*6** Three people were born on the same date, but in different years.  
The second person was born 5 years after the first.  
The third person was born 7 years after the **first**.

Use algebra to prove that the sum of their ages will always be a multiple of 3 **[3 marks]**

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**Turn over for the next question**



**7 (a)** In a statistical experiment a fair, ordinary dice is rolled.

Tick a box to show the correct ending to the sentence below.

**[1 mark]**

When this statistical experiment is repeated you will

always get the same outcome

usually get the same outcome

usually get a different outcome

always get a different outcome

**7 (b)** Tick a box to show the correct ending to the sentence below.

**[1 mark]**

An estimate of probability based on a statistical experiment is more reliable with

more trials

fewer trials

more time between trials

less time between trials





**7 (c)** A statistical experiment has 400 trials.

After 300 trials the relative frequency of success is 0.38  
In the next 100 trials there are 42 successes.

Work out the relative frequency of success for all 400 trials.

**[3 marks]**

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Answer .....

**Turn over for the next question**

5

**Turn over ►**



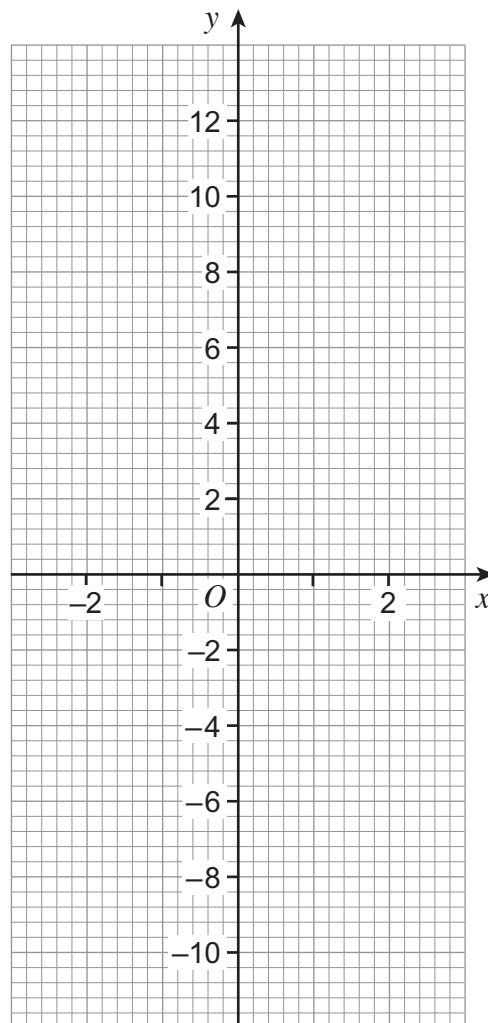
8 (a) Complete the table of values for  $y = x^3 + x + 1$

[1 mark]

$x$	-2	-1	0	1	2
$y$	-9		1	3	11

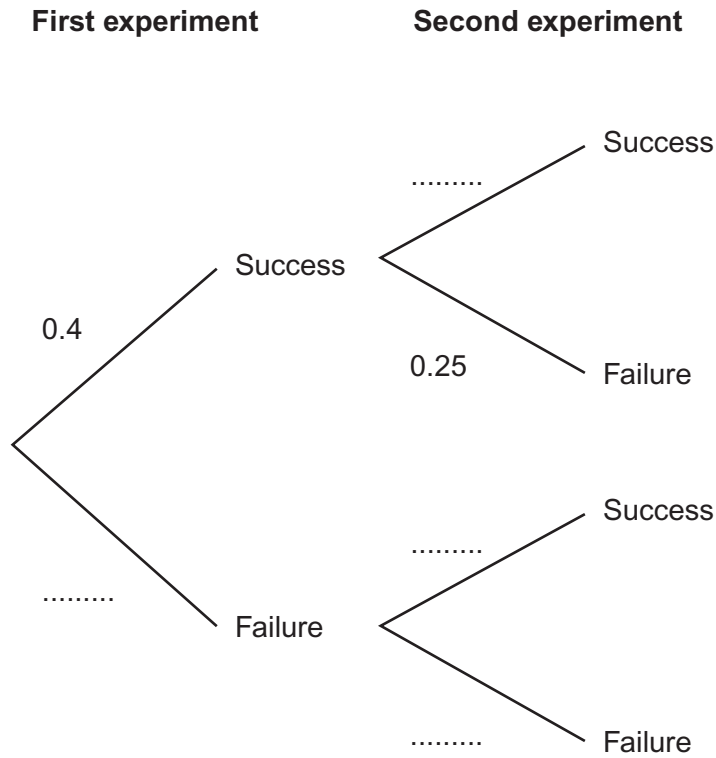
8 (b) Draw the graph of  $y = x^3 + x + 1$  for values of  $x$  from -2 to 2

[2 marks]



9 (a) The outcomes of two independent experiments are success and failure.  
Complete the tree diagram.

[2 marks]



9 (b) Work out the probability of success in **both** experiments.

[2 marks]

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Answer .....



**\*10** Show that  $x(2x + 5) = \frac{x}{3} + 4$

can be arranged as the quadratic equation  $3x^2 + 7x - 6 = 0$

**[3 marks]**

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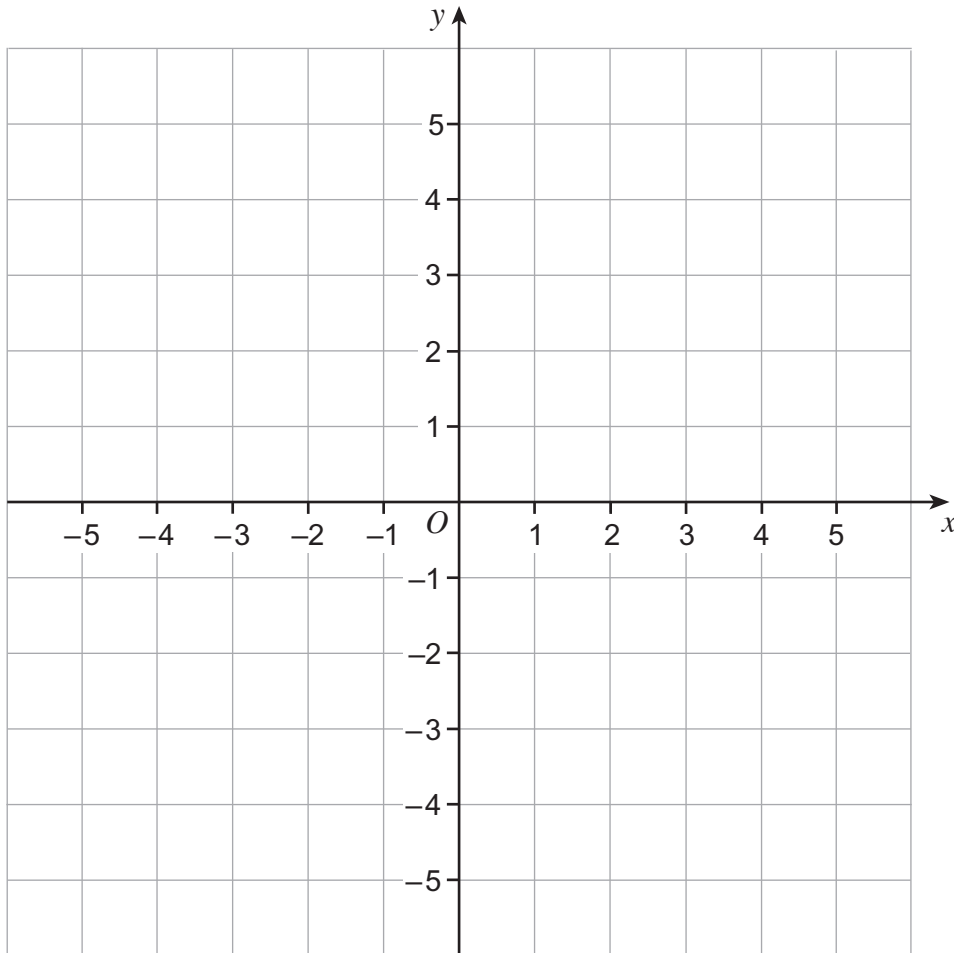
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11 (a) Draw the locus of all points on the grid which are 4 units from (0, 0)

[1 mark]



11 (b) Write down the equation of this locus.

[1 mark]

Answer .....

Turn over for the next question



**12** Two bags, A and B, contain beads.

Bag A contains 7 red beads and 2 yellow beads.  
Bag B contains 1 red bead and 4 yellow beads.

One bead is taken at random from bag A and put into bag B.  
One bead is then taken at random from bag B and put into Bag A.

Work out the probability that bag A still contains exactly 7 red beads.

**[4 marks]**

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Answer .....

**END OF SECTION A**

4
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