

Centre Number						Candidate Number				
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For Examiner's Use	
Examiner's Initials	
Pages	Mark
3	
4–5	
6–7	
8–9	
10	
TOTAL	



General Certificate of Secondary Education  
Higher Tier  
June 2012

# Methods in Mathematics (Linked Pair Pilot)

# 93651H/A

Unit 1 Algebra and Probability  
Section A Calculator

# H

Monday 11 June 2012 1.30 pm to 2.15 pm

**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 space 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 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 your 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 4 and 9. 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 booklet.
- You are expected to use a calculator where appropriate.

**Advice**

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



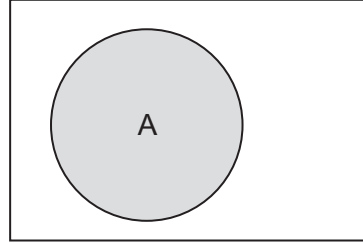
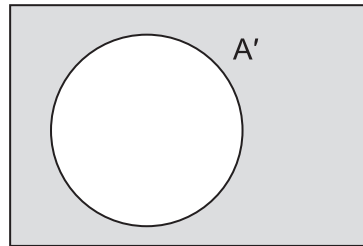
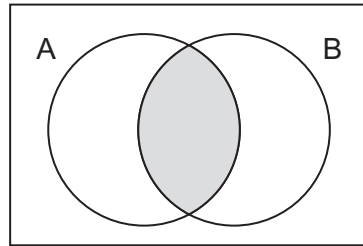
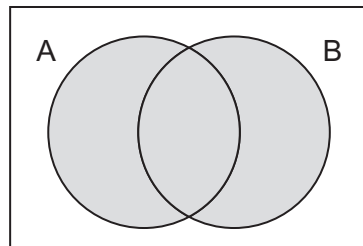
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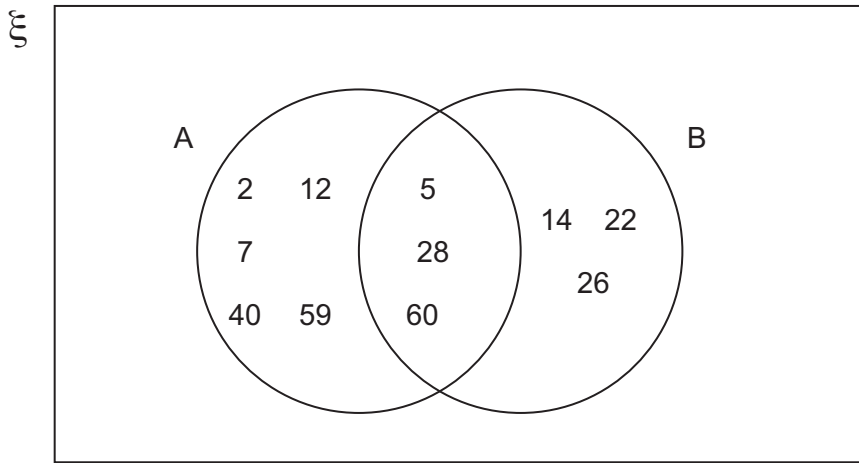
## Formulae Sheet: Higher Tier

## Set notation

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

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

1 The Venn Diagram shows two sets, A and B.



1 (a) A number is selected at random from **set A**.

1 (a) (i) What is the probability that it is an odd number?

Answer ..... (1 mark)

1 (a) (ii) What is the probability that it is a factor of 120?

.....

Answer ..... (1 mark)

1 (b) A number is selected at random from  $A \cap B$ .

What is the probability that it is a multiple of 4?

.....

Answer ..... (2 marks)



2 Here are four piles of coins.



Not drawn accurately

Each pile has 4 more coins than the pile before it.  
Altogether there are 100 coins.

How many coins are there in the smallest pile?

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Answer ..... (3 marks)

3 (a) You are given that  $7r - 2s = 8$

3 (a) (i) Work out the value of  $14r - 4s$

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Answer ..... (1 mark)

3 (a) (ii) Work out the value of  $2s - 7r$

.....

Answer ..... (1 mark)

3 (b) You are given that  $7r - 2s = 8$  and  $r + t = 5$

Write down an expression using  $r$ ,  $s$  and  $t$  which is equal to 18.  
Write your expression as simply as possible.

.....

.....

Answer ..... (2 marks)



4 (a) An amount increases **from** 1600 **to** 2200.

Work out the percentage increase.

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.....  
.....

Answer ..... % (3 marks)

\*4 (b) Olivia bought a car for £ 8000.  
The value of the car decreased by 35% each year.  
Olivia sold the car when its value dropped below £ 1000.

After how many years did she sell the car?  
Give your answer to the nearest year.  
You **must** show your working.

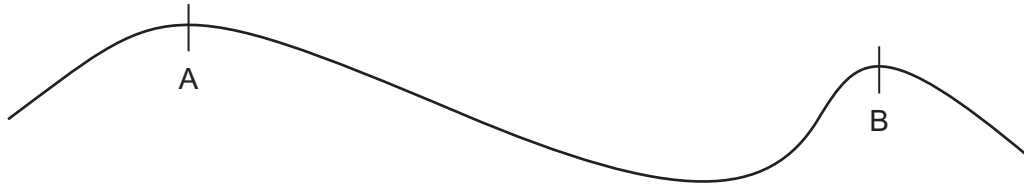
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Answer ..... years (4 marks)

**Turn over for the next question**



5 On a bus route there are two stops, A and B.



A bus can hold up to 72 passengers.

When the bus leaves A, the probability that a passenger chosen at random is male is  $\frac{13}{31}$

At B, one male passenger gets off the bus and three female passengers get on.

How many female passengers are on the bus when it leaves B?  
Give **both** possible answers.

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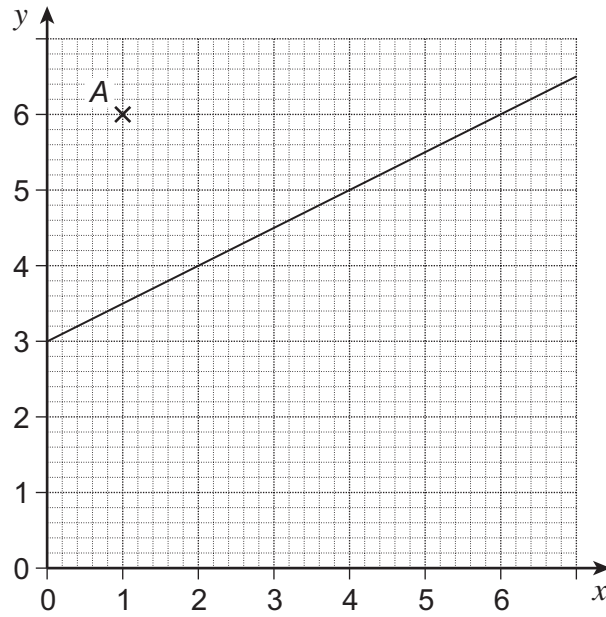
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Answer ..... or ..... (3 marks)



6 Here is a grid with a line drawn and the point  $A (1, 6)$  marked.



6 (a) Work out the gradient of the line.

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Answer ..... (2 marks)

6 (b) The line is the locus of a point.  
The point is always the same distance from  $A$  as it is from another point,  $B$ .

Work out the coordinates of  $B$ .

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Answer ( ..... , ..... ) (2 marks)



7 (a) Solve  $6x - 5 > 2x + 7$

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Answer ..... (2 marks)

7 (b) Write down the smallest integer value of  $n$  which satisfies  $n > -1.2$

.....

Answer ..... (1 mark)

8 Asif has  $n$  sweets.  
Shaun has 20 fewer sweets than Asif.  
Rafa has no sweets.

Asif and Shaun each give some of their sweets to Rafa.  
Each of the three boys now has the same number of sweets.

8 (a) Show that each boy now has  $\frac{2n - 20}{3}$  sweets.

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(2 marks)

8 (b) How many sweets did Asif give to Rafa?  
Give your answer as an expression in  $n$  in its simplest form.

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Answer ..... (3 marks)





\*9  $y$  is directly proportional to the square of  $x$ .  
 $y = 28$  when  $x = 2$

9 (a) Obtain an equation connecting  $y$  and  $x$ .

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Answer ..... (3 marks)

9 (b)  $y$  is directly proportional to the square of  $x$ .  
 $x$  is inversely proportional to  $w$ .

Tick a box to show which **one** of the statements below is correct.

- $y$  is directly proportional to  $w$
- $y$  is directly proportional to the square of  $w$
- $y$  is inversely proportional to  $w$
- $y$  is inversely proportional to the square of  $w$

.....  
.....

(1 mark)

Turn over for the next question

12

Turn over ►



**10** Each time Peter and John play a game of table tennis, the probability that Peter wins is 0.4  
In a game of table tennis a draw is not possible.

One day they decide to play until one of them has won two games.

Work out the probability that Peter is the first to win two games.

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Answer ..... (3 marks)

**END OF SECTION A**

3
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ANSWER IN THE SPACES PROVIDED**



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