Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
3	
4–5	
6–7	
8	
TOTAL	

General Certificate of Secondary Education
Higher Tier
June 2011

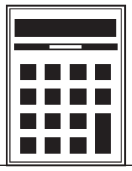
Methods in Mathematics (Linked Pair Pilot) 93651H/A

Unit 1 Algebra and Probability
Section A Calculator

H

Monday 13 June 2011 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 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 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 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.

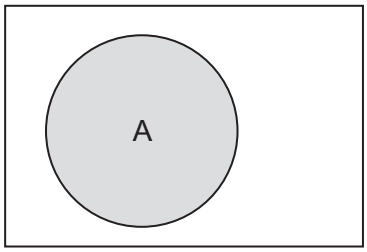
Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 40.
- The quality of your written communication is specifically assessed in Questions 4 and 8. These questions are indicated with an asterisk (*)
- You may ask for more answer paper, graph paper and tracing 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.

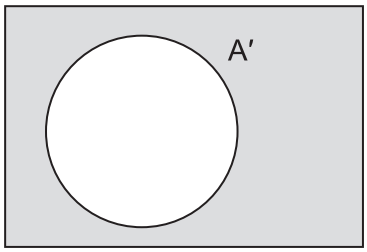
Formulae Sheet: Higher Tier

Set notation

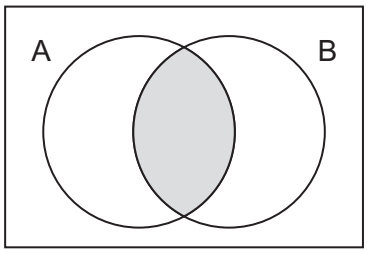
A



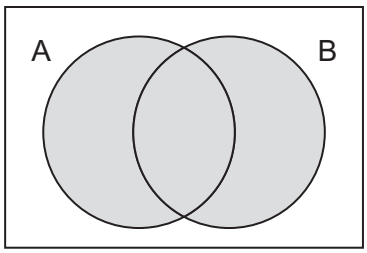
A′



$A \cap B$



$A \cup B$



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

1 (a) Share £24 in the ratio 4 : 1

.....

.....

Answer ..... : ..... *(2 marks)*

1 (b) Two friends share some money in the ratio 5 : 3

What fraction of the money does the first friend receive?

.....

Answer ..... *(1 mark)*

1 (c) Harry and Sunil each have the same amount of money.
Harry wants Sunil to have £5 more than him.

How much money should he give to Sunil?

.....

.....

Answer £ ..... *(1 mark)*

2 A chemistry examination consists of two sections.
Section A has 80 marks.
Section B has 70 marks.

Alec scores 55% in Section A.

What is the greatest percentage Alec can get in the whole examination?

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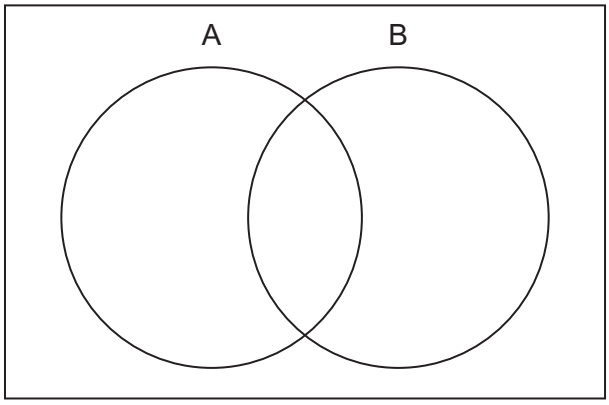
.....

Answer ..... % *(4 marks)*

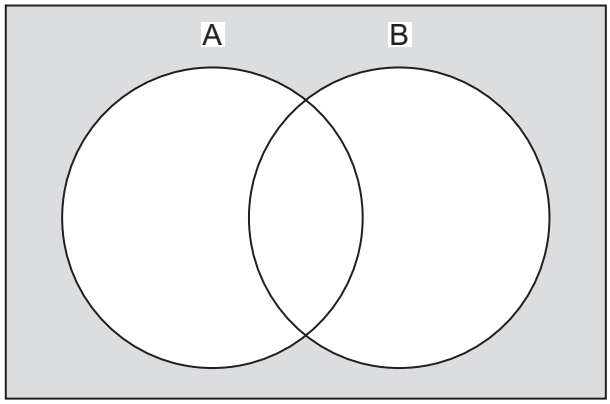
8

3 (a) Shade the Venn diagram to show the region $A' \cap B$



(1 mark)

3 (b) Use set notation to describe the shaded area in this Venn diagram.



Answer ..... *(1 mark)*

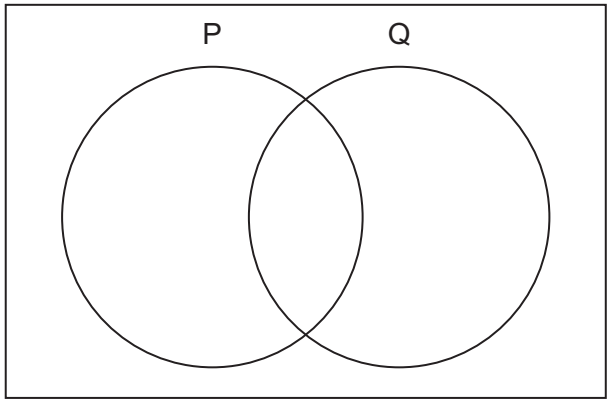
3 (c) The ten letters a, b, c, d, e, f, g, h, i and j are put into the Venn diagram below.

One letter is picked at random.

The probability that it is in set P is $\frac{6}{10}$

The probability that it is in set Q is $\frac{7}{10}$

Show **one** correct way to put in the letters.



(2 marks)

***4** Year 7 boys choose their favourite sport.

$\frac{1}{3}$ of the boys choose rugby.

$\frac{2}{5}$ of the boys choose football.

The rest of the boys choose hockey.
44 boys choose hockey.

How many boys choose football?

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Answer ..... *(4 marks)*

5 Solve the simultaneous equations

$$6x + 5y = 35$$
$$8x - 3y = 8$$

Do **not** use a trial and improvement method.

You **must** show your working.

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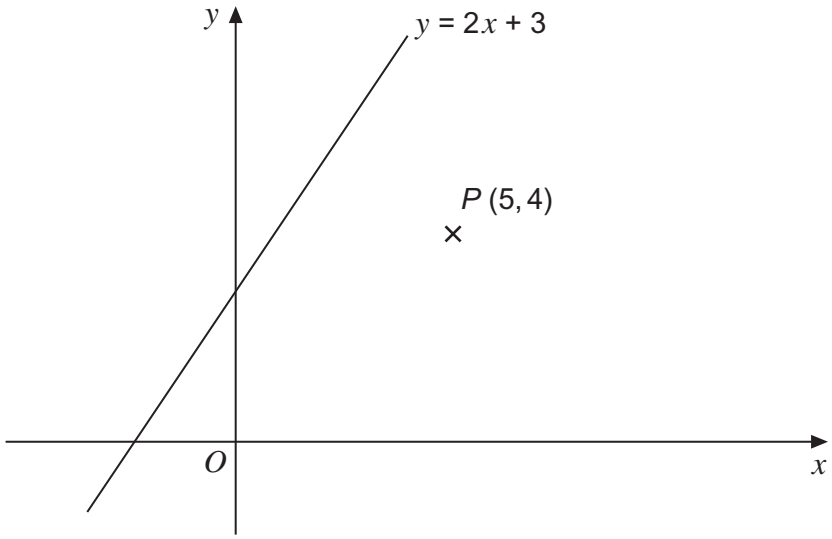
Answer x = ... y = ... *(4 marks)*

12

6 The diagram shows the line $y = 2x + 3$ and the point P (5, 4).



Not drawn accurately

6 (a) Write down the coordinates of the point where the line crosses the y-axis.

Answer (....., ...) *(1 mark)*

6 (b) A line parallel to $y = 2x + 3$ is drawn through the point P.

Work out the equation of this line.

.....

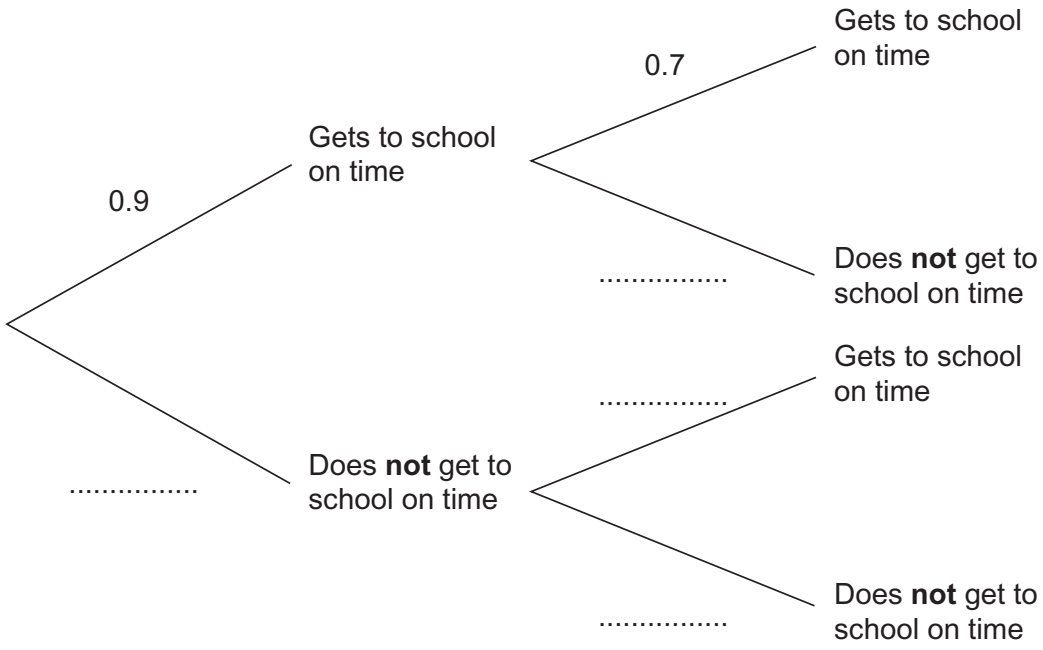
.....

.....

Answer ..... *(3 marks)*

7 The probability that Martin gets to school on time is 0.9
The probability that Brodie gets to school on time is 0.7

7 (a) Complete the tree diagram to show this information.



(1 mark)

7 (b) Work out the probability that at least one of the students gets to school on time.

.....

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Answer ..... *(3 marks)*

7 (c) The tree diagram above is for two students getting to school on time.
It has six branches in total.

How many branches in total would a tree diagram for five students have?

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.....

Answer ..... *(2 marks)*

Turn over for the next question

10

***8** An odd number can always be expressed in the form $2n + 1$, where n is an integer.

Prove that the square of an odd number is always 1 more than a multiple of 4.

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(4 marks)

9 (a) A bag contains d discs.
y discs are yellow.
Two discs are picked at random without replacement.

Show that the probability of picking two yellow discs is $\frac{y^2 - y}{d^2 - d}$

.....

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.....

(2 marks)

9 (b) A bag contains coloured discs.
Seven of the discs are blue.
Two discs are picked at random from the bag without replacement.

The probability of picking two blue discs is $\frac{42}{110}$

What is the probability that neither of the two discs chosen is blue?

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Answer ..... *(4 marks)*

END OF SECTION A

10