

Centre Number						Candidate Number				
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Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
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TOTAL	



General Certificate of Secondary Education
Higher Tier
January 2011

Methods in Mathematics (Linked Pair Pilot)

93651H/A

Unit 1 Algebra and Probability Section A

H

Tuesday 11 January 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 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 Question 1.

The 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 booklet.
- You are expected to use a calculator where appropriate.

Advice

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



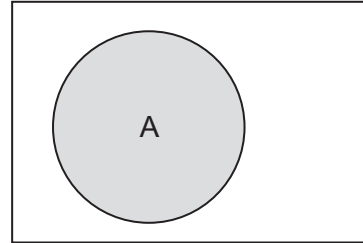
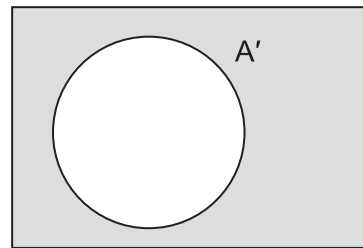
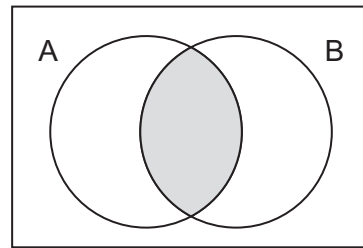
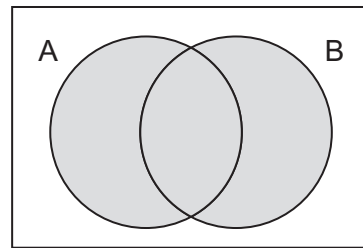
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93651H/A

Formulae Sheet: Higher Tier

Set notation

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

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

*1

Work out $\frac{1}{2} + \frac{1}{4} + \frac{5}{6}$

Give your answer as a decimal.

.....

.....

Answer (2 marks)

2

Bag A and bag B each contain only **blue** marbles.

Oliver adds ten **red** marbles to each bag.

$\frac{1}{2}$ of the marbles in bag A are now red.

$\frac{1}{4}$ of the marbles in bag B are now red.

Oliver puts all the marbles into one bag.

He picks a marble at random from the bag.

What is the probability that he picks a **blue** marble?

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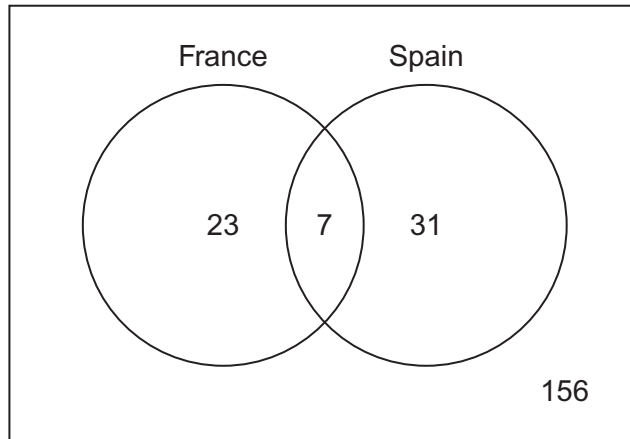
Answer (4 marks)

6

Turn over ►



3 The Venn diagram shows the number of students in a year group who visited France and Spain last summer.



3 (a) What does the number 156 represent in the diagram?

.....
.....

(1 mark)

3 (b) How many students are there in the year group?

.....
.....

Answer (1 mark)

3 (c) One student from the year group is chosen at random.
What is the probability that the student visited both Spain and France last summer?

.....

Answer (1 mark)

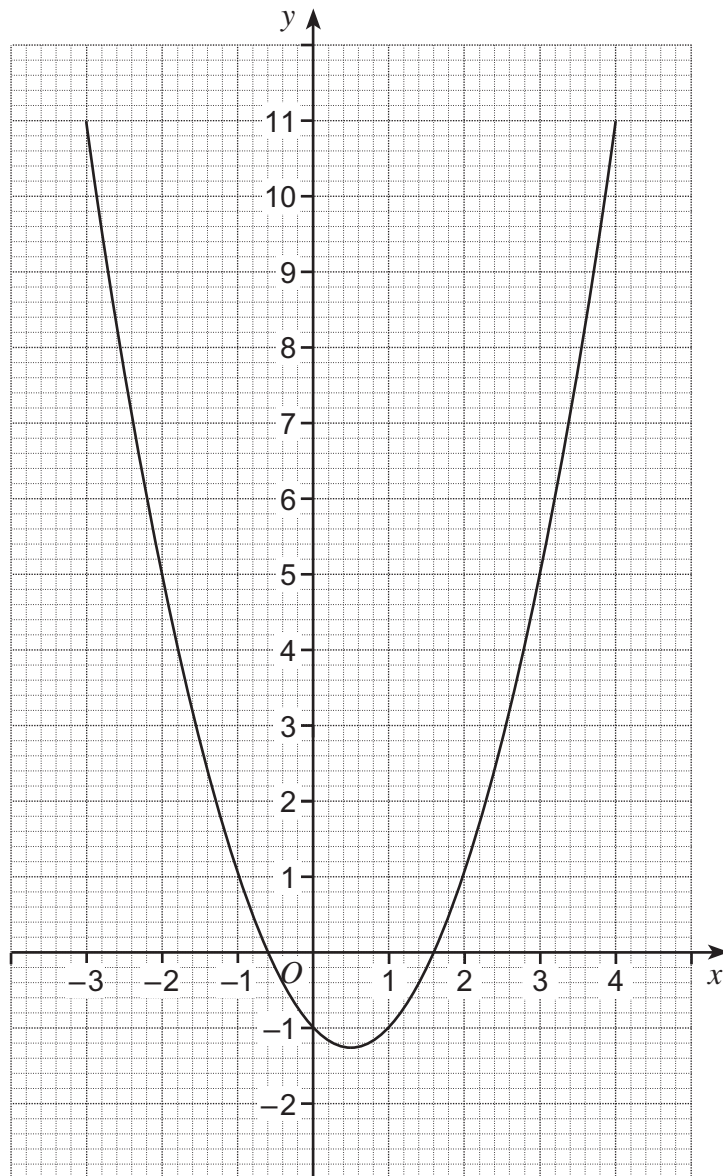
3 (d) A student from the year group visited Spain last summer.
What is the probability that this student also visited France?

.....
.....

Answer (2 marks)



- 4 The graph of $y = x^2 - x - 1$ is shown for values of x from -3 to 4 .



- 4 (a) Use the graph to find the approximate solutions to the equation $x^2 - x - 1 = 0$

Answer (2 marks)

- 4 (b) Write down one value of x when y is negative.

Answer (1 mark)



- 5** The table shows the possible outcomes of an experiment.
Three of the probabilities are missing.
C is twice as likely as B.
D is three times as likely as B.
Complete the table.

Outcome	Probability
A	0.1
B	
C	
D	

.....

 (3 marks)

- 6 (a)** Rearrange the formula $y = \frac{9x + 7}{2}$ to make x the subject.

.....

 Answer (3 marks)

- 6 (b)** Show that $\frac{x^2 + 4x + 3}{2} - \frac{3x^2 + 1}{6} \equiv \frac{6x + 4}{3}$

.....

 (4 marks)



7 Use your calculator to work out $\frac{(2.8 \times 10^7) + (8 \times 10^6)}{4.5 \times 10^8}$

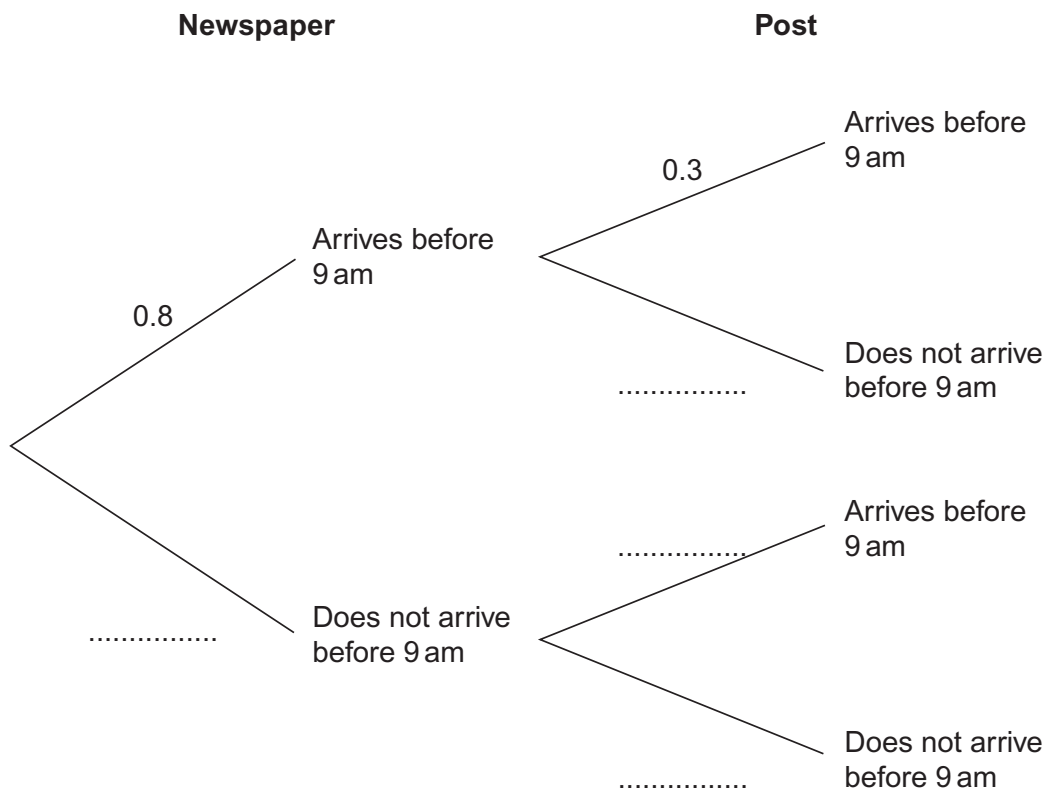
Give your answer in standard form.

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Answer (2 marks)

8 The probability that Mr Smith's newspaper arrives before 9 am is 0.8
The probability that his post arrives before 9 am is 0.3

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



(2 marks)

8 (b) Work out the probability that both arrive before 9 am.

.....

Answer (2 marks)



9 A is directly proportional to the square of R .
When $R = 30$, $A = 2826$

9 (a) Form an equation connecting A and R .

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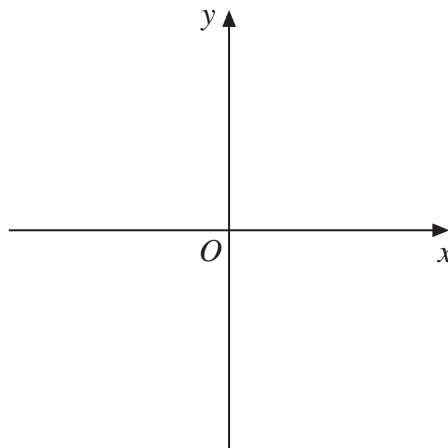
Answer (3 marks)

9 (b) Work out the value of A when $R = 15$

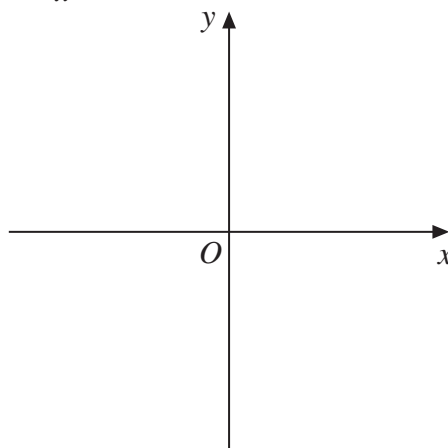
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Answer (2 marks)

10 (a) Sketch the graph of $y = x^2$



10 (b) Sketch the graph of $y = \frac{1}{x}$ where $x \neq 0$

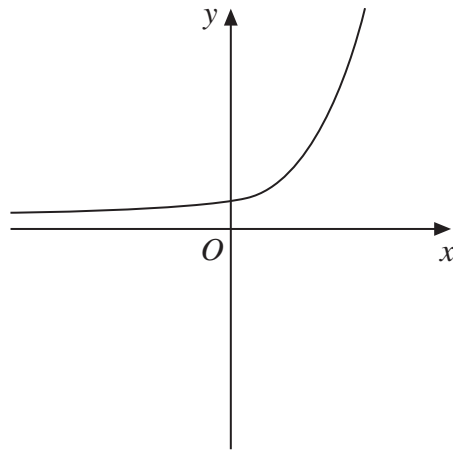


(1 mark)

(2 marks)

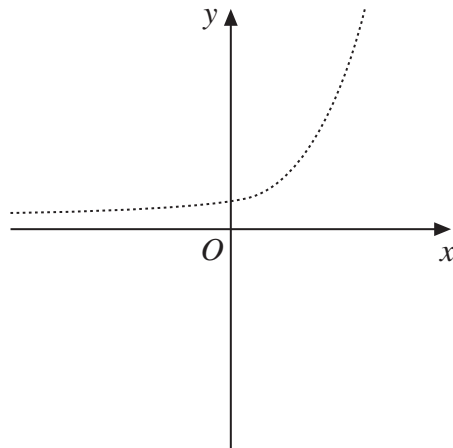


10 (c) This is a sketch of the graph of $y = 2^x$



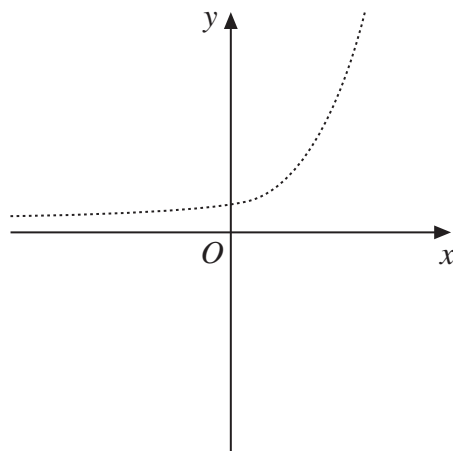
Sketch the graphs indicated on the grids below.
In each case the graph of $y = 2^x$ is drawn to help you.

10 (c) (i) $y = 2^x + 3$



(1 mark)

10 (c) (ii) $y = -2^x$



(1 mark)

END OF SECTION A

10



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