Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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

General Certificate of Secondary Education
Higher Tier
January 2012

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

Unit 1 Algebra and Probability
Section A Calculator

H

Wednesday 11 January 2012 9.00am 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.

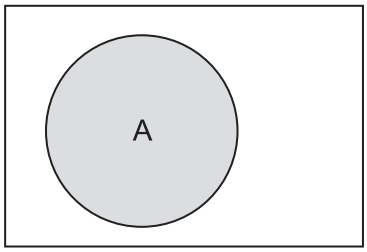
Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 40.
- The quality of your written communication is specifically assessed in Questions 3 and 9. These questions are indicated with an asterisk (*)
- You may ask for more answer paper, graph paper and tracing 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.

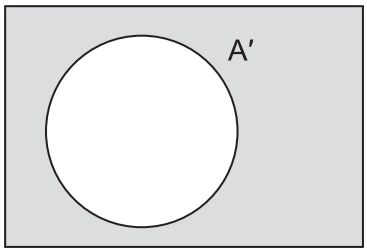
Formulae Sheet: Higher Tier

Set notation

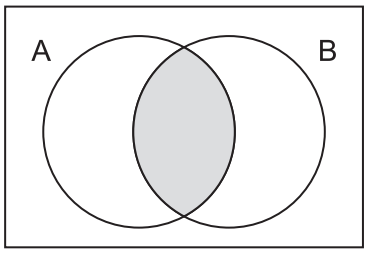
A



A′



$A \cap B$



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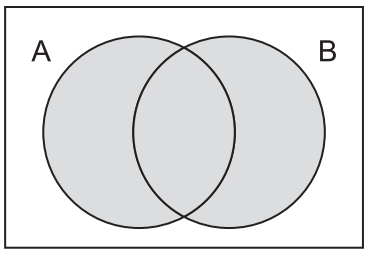

Answer **all** questions in the spaces provided.

1 (a) Solve $\frac{10}{x} = 2$

Answer x = ... *(1 mark)*

1 (b) Solve $8x + 5 = 21 - 2x$

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Answer x = ... *(3 marks)*

2 Harry has been alive for one million minutes.

How old is Harry?
Give your answer in years and months.

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Answer ..... year(s) ..... months *(4 marks)*

8

***3** Serena follows these instructions.

Think of a number
Add 4
Multiply by 4
Write down the answer

Thomas follows these instructions.

Think of a number
Multiply by 4
Add 4
Write down the answer

If they both think of the same number, show that the difference between their answers will **always** be 12.

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(3 marks)

4 (a) Complete the table of values for $y = x^2 + 2x - 5$

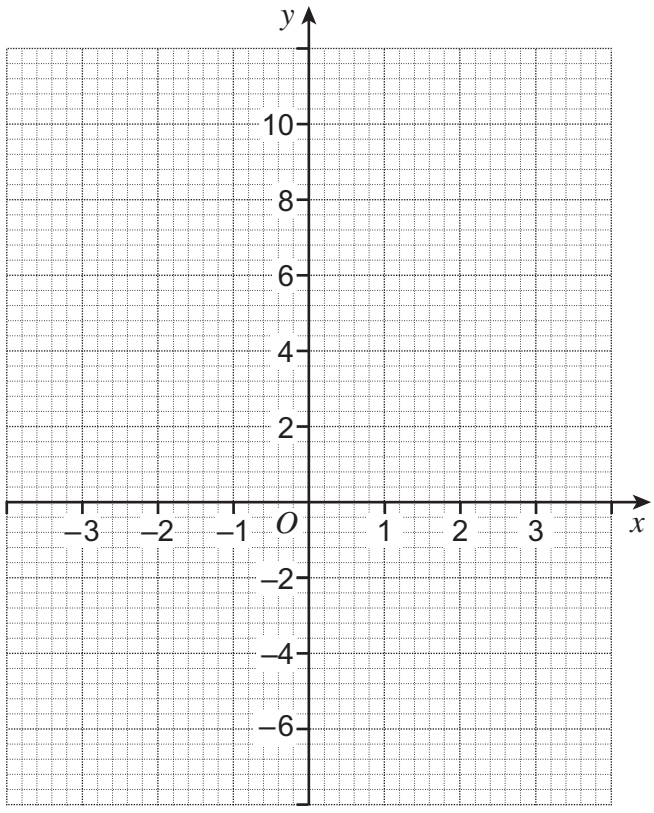
x	–3	–2	–1	0	1	2	3
y	–2	–5		–5	–2	3	

.....

.....

(2 marks)

4 (b) Draw the graph of $y = x^2 + 2x - 5$ for values of x between –3 and 3.



(2 marks)

4 (c) Use your graph to find the positive value of x when $x^2 + 2x - 5 = 0$

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

8

Turn over ▶

5 Solve the simultaneous equations.

$$4x + 3y = 34$$
$$3x - 5y = 11$$

Do **not** use trial and improvement.
You **must** show your working.

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

6 (a) Expand and simplify $(x + 4)(2x - 9)$

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

6 (b) Factorise $x^2 - 4$

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

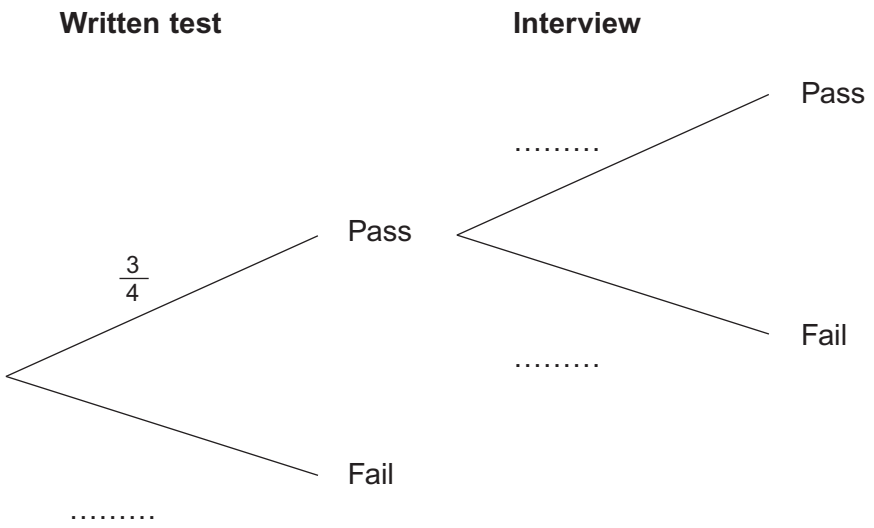
7 To join a club, applicants have to pass a written test and an interview.

$\frac{3}{4}$ of applicants pass the written test.

Those who pass go on to have the interview.

$\frac{5}{8}$ of applicants who have an interview are successful.

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



(1 mark)

7 (b) Work out the probability that an applicant, chosen at random, will fail to join the club.

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

11

8 A is proportional to the square of L.
When $A = 4$, $L = 4$

Work out the value of A when $L = 25$

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

***9** The equation of line M is $2y = 11x + 4$

The equation of line N is $5y = 10 - x$

Show that the gradient of line M is greater than the gradient of a line **perpendicular** to line N.

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(4 marks)

10 C and D are independent events.

The probability of C happening is p.
The probability of D happening is $2p$.

The probability that both C and D happen is 0.045

What is the probability that both C and D do **not** happen?

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Answer ..... *(5 marks)*

END OF SECTION A

13

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