

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
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12 – 13	
14	
TOTAL	



General Certificate of Secondary Education
Higher Tier
November 2013

Methods in Mathematics (Linked Pair Pilot)

93651H/A

H

Unit 1 Algebra and Probability
Section A Calculator

Wednesday 6 November 2013 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 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 12.
This 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 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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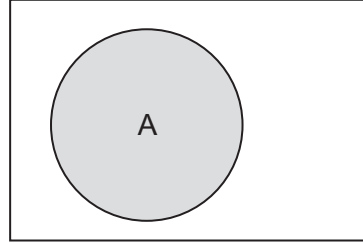
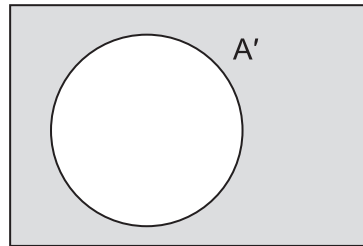
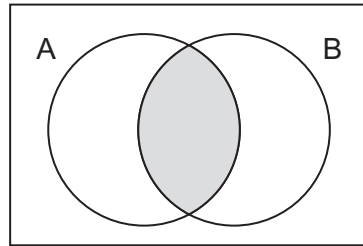
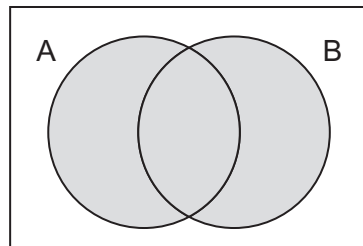
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Formulae Sheet: Higher Tier

Set notation

A

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

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

1 Circle the equivalent expression to $5(x + 4)$

$5x + 4$

$x^5 + 20$

$5x + 20$

$x^5 + 4$

(1 mark)

2 (a) Factorise $3x - 21$

Answer (1 mark)

2 (b) Factorise $x^2 + 6x$

Answer (1 mark)

Turn over for the next question



3 A, B, C and D are the four possible outcomes of an experiment.

$$P(A) = 0.12$$

D is twice as likely as A.

B and C are equally likely.

Complete the table.

Outcome	A	B	C	D
Probability	0.12			

(3 marks)



- 4 Match each box on the left with the correct word.
The first one has been done for you.

$$x^2$$

→ • Term

$$x^2 + 4x - 7$$

• Equation

$$x^2 + 4x - 7 > 14$$

• Expression

$$x^2 + 4x - 7 = 14$$

• Formula

$$A = x^2 + 4x - 7$$

• Inequality

(2 marks)

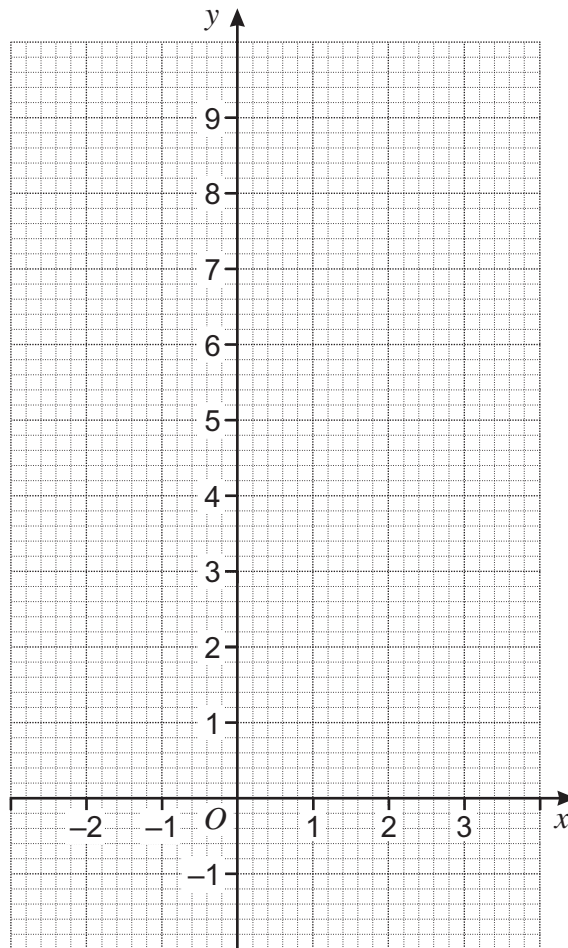


5 (a) Complete the table of values for $y = x^2 - 1$

x	-2	-1	0	1	2	3
y	3	0	-1	0	3	

(1 mark)

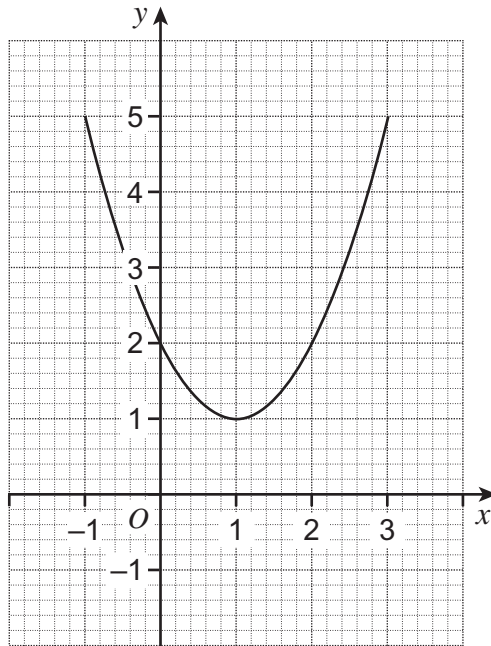
5 (b) On the grid, draw the graph of $y = x^2 - 1$ for values of x from -2 to 3



(2 marks)



5 (c) Here is the graph of $y = x^2 - 2x + 2$ for values of x from -1 to 3



Write down the equation of the line of symmetry of the graph of $y = x^2 - 2x + 2$

Answer (1 mark)

6 Solve $9x - 6 = 5x + 22$

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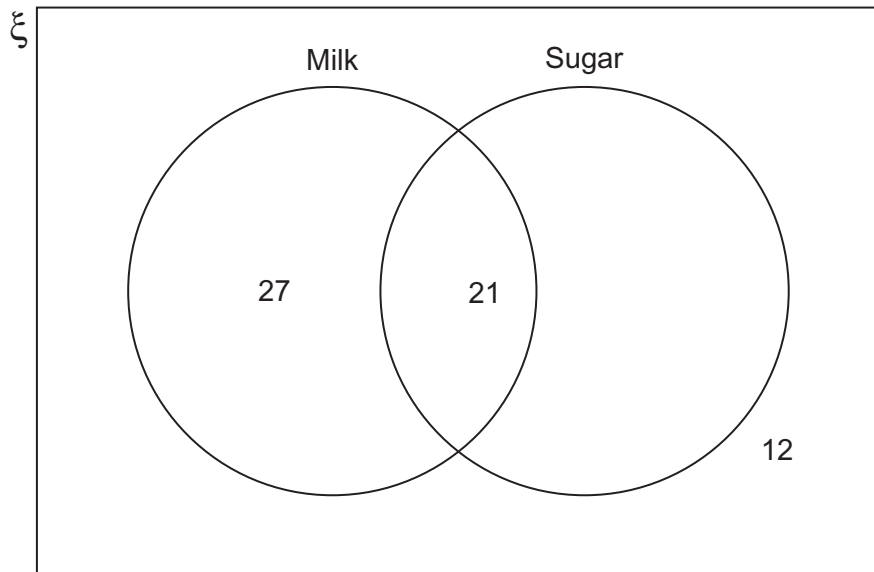
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$x =$ (3 marks)



- 7 100 men who drink coffee were asked if they have milk and sugar in their coffee. Some of the results are shown in the Venn diagram.



- 7 (a) Complete the Venn diagram. (1 mark)

- 7 (b) What is the probability that one of the men, chosen at random, has milk but **no** sugar in his coffee?

Answer (1 mark)

- 7 (c) What is the probability that one of the men, chosen at random, has **no** milk and **no** sugar in his coffee?

Answer (1 mark)



8 (a) Simplify $n^2 \times n^6$

Answer (1 mark)

8 (b) Simplify $\frac{n^6}{n^2}$

Answer (1 mark)

8 (c) Simplify $(n^6)^2$

Answer (1 mark)

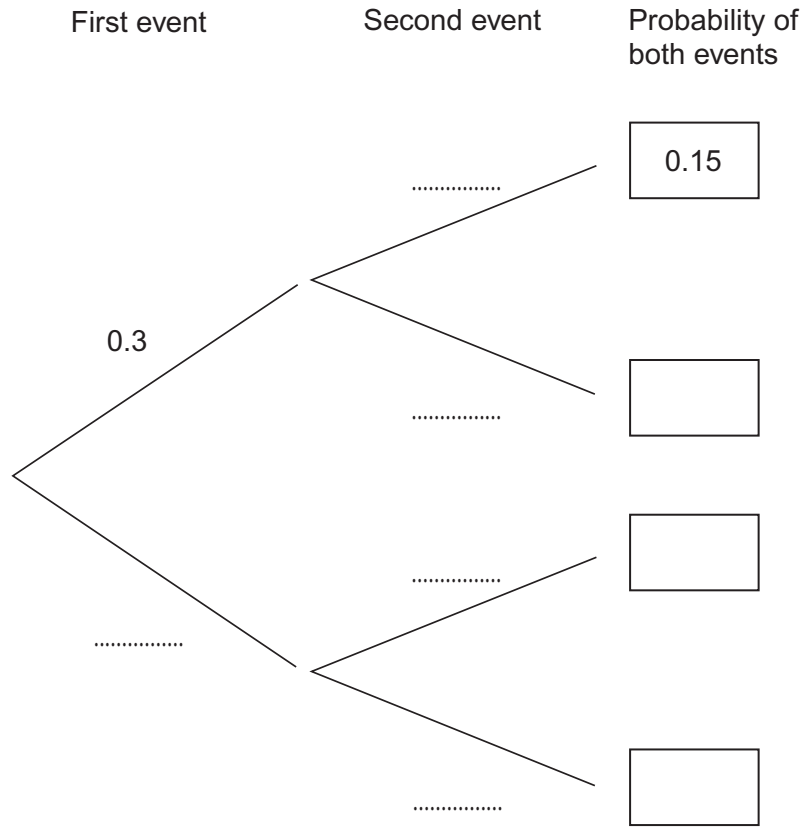
9 A straight line passes through the points $(-2, 0)$ and $(0, 6)$.

Work out the equation of the line.

Answer (3 marks)



10 The tree diagram shows the probabilities of two **independent** events.
Complete the tree diagram.



(4 marks)



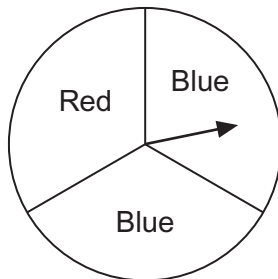
11 n is a positive integer.
 $n \times 10^n$ is a square number.

What is the lowest possible value of n ?
You **must** show your working.

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$n =$ (2 marks)

***12** A fair spinner has three equal sections.
The spinner is spun twice.



Show that the probability of two blues is the same as the probability of one red and one blue.

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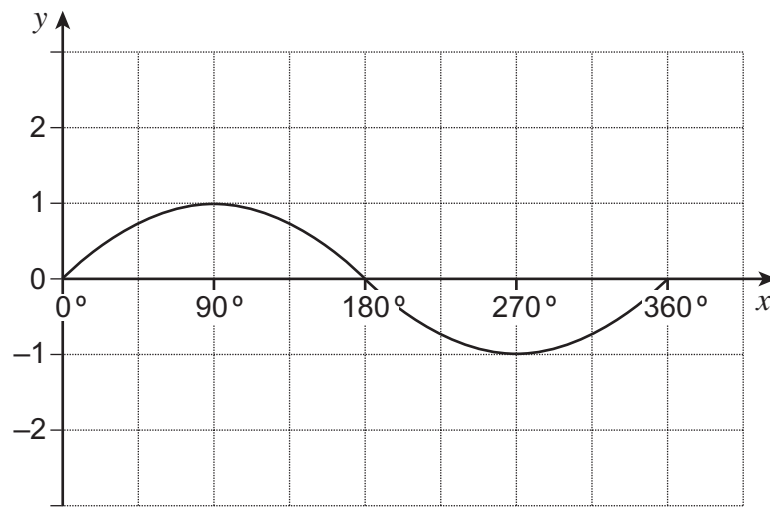
(4 marks)

10

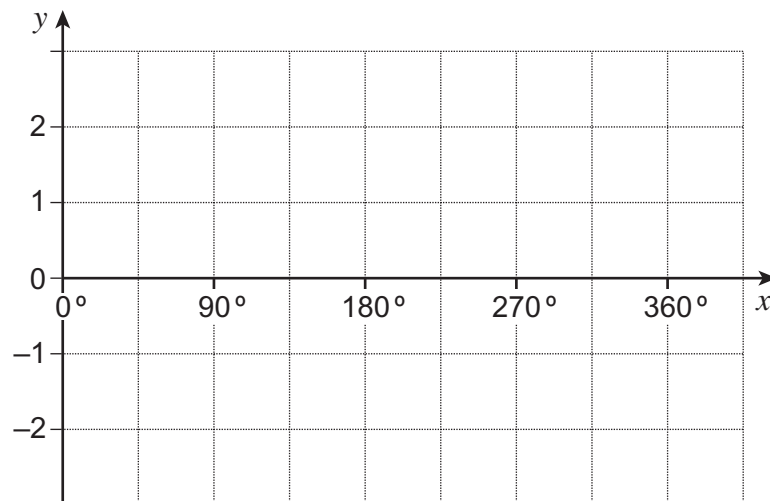
Turn over ►



13 Here is the graph of $y = \sin x$ for $0^\circ \leq x \leq 360^\circ$



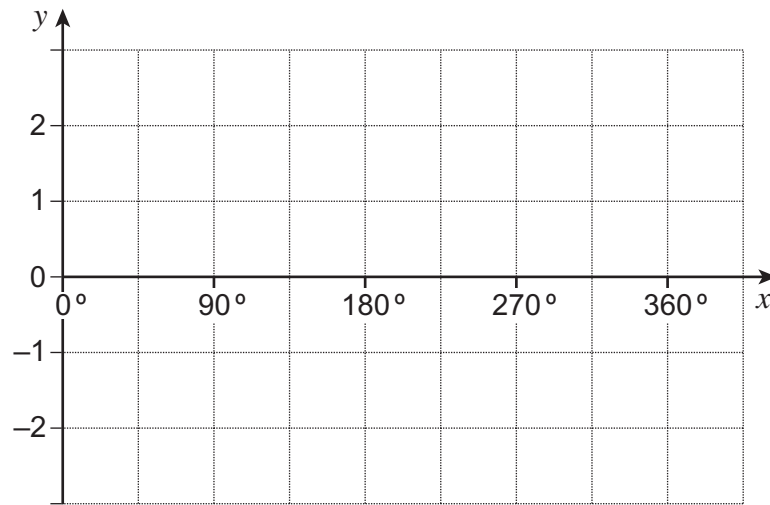
13 (a) Draw the graph of $y = 2\sin x$ for $0^\circ \leq x \leq 360^\circ$



(1 mark)

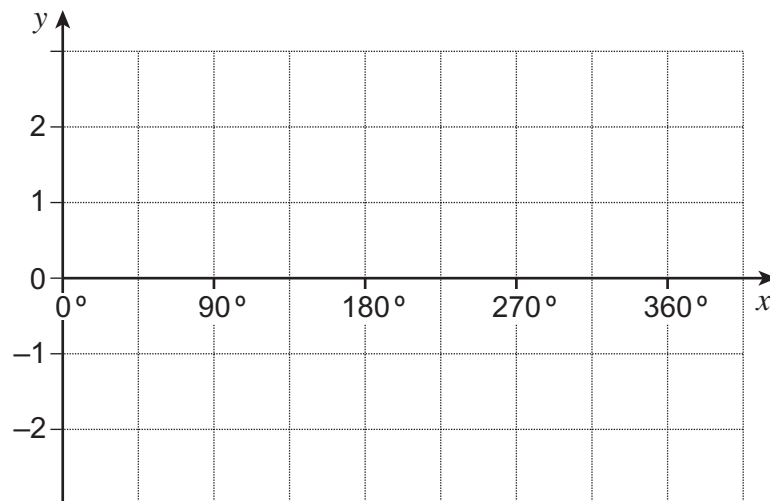


13 (b) Draw the graph of $y = \cos x$ for $0^\circ \leq x \leq 360^\circ$



(1 mark)

13 (c) Draw the graph of $y = \cos x + 1$ for $0^\circ \leq x \leq 360^\circ$



(1 mark)

Turn over for the next question



14 P is directly proportional to Q .
 Q is inversely proportional to R .

When $P = 20$, $Q = 5$ and $R = 6$

Work out the value of P when $R = 10$

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$P =$ (3 marks)

END OF SECTION A

3



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