AQA

General Certificate of Secondary Education
Higher Tier
November 2013

Methods in Mathematics (Linked Pair Pilot)

93651H/A

H

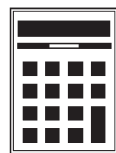| Unit 1	Algebra and Probability
Section A	Calculator

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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Formulae Sheet: Higher Tier

Set notation

A
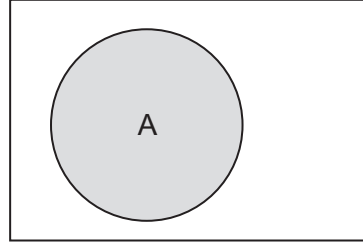
A′
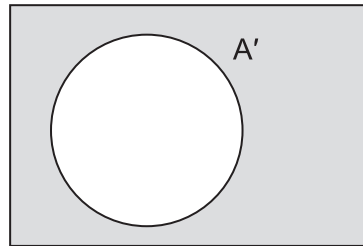
A ∩ B
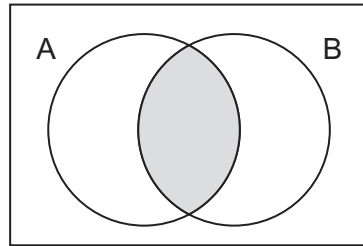
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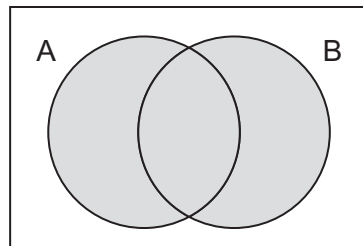
Answer **all** questions in the spaces provided.

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

Turn over ▶

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 $\longrightarrow$ • 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

0 5

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
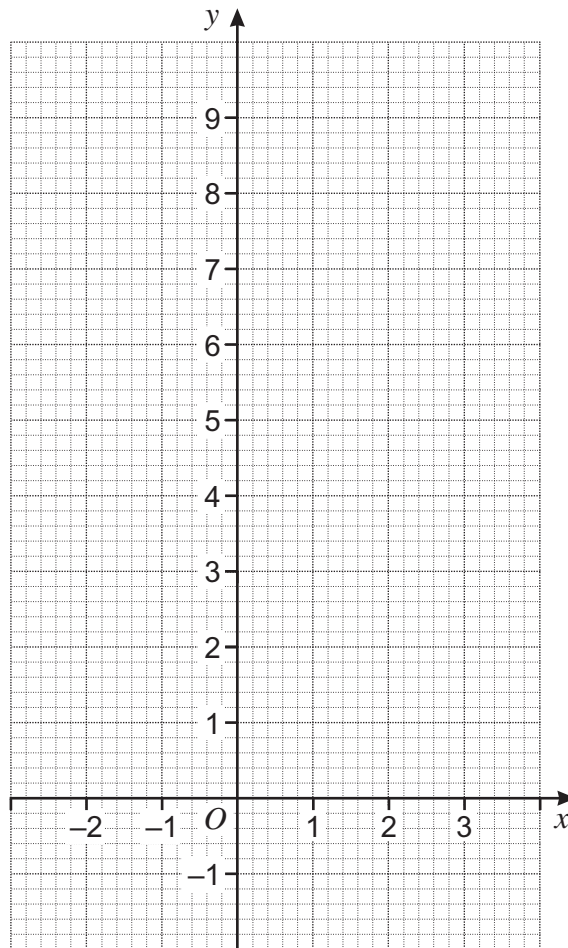
(2 marks)

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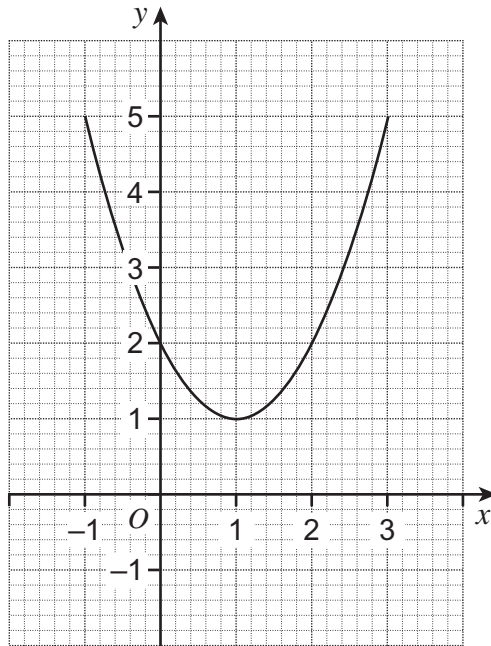
Write down the equation of the line of symmetry of the graph of $y = x^2 - 2x + 2$

Answer .... *(1 mark)*

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

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

Turn over ▶

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.
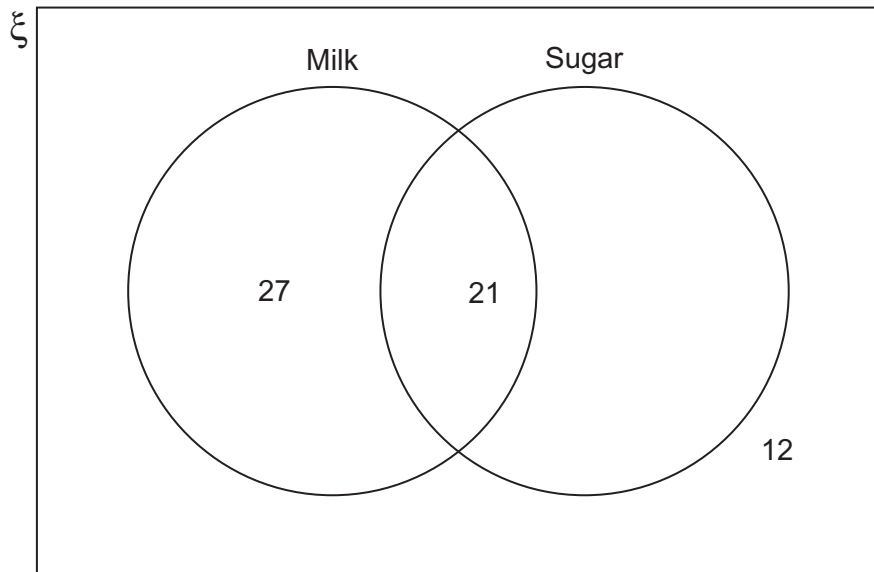
7 (a)   Complete the Venn diagram.

(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 $\dfrac{n^6}{n^2}$

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)*

Turn over ▶

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

Complete the tree diagram.

First event   Second event   Probability of
both events

0.3

....   0.15

....

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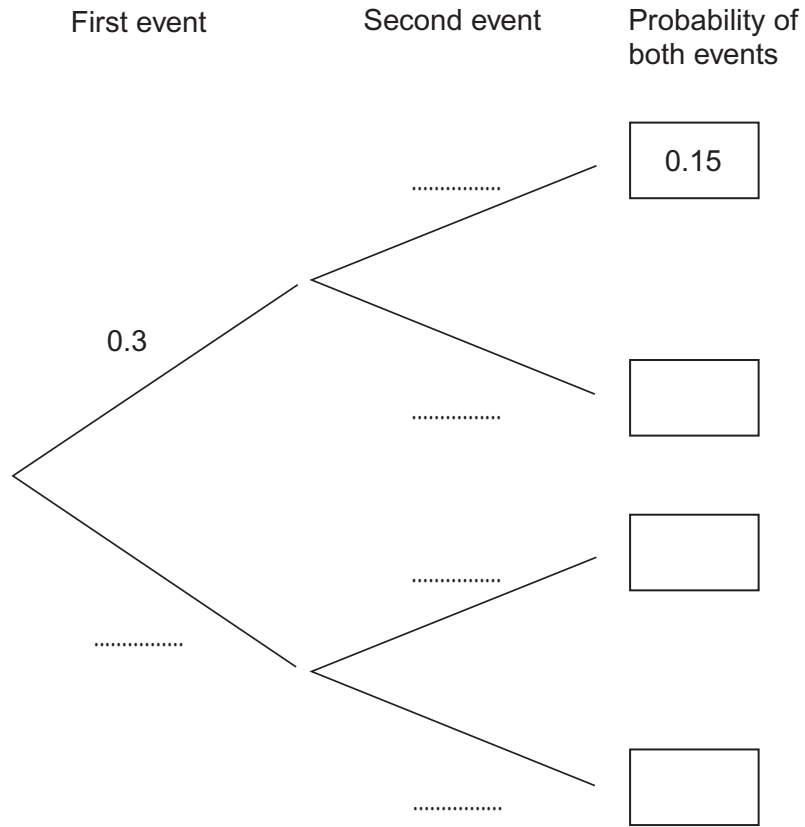
(4 marks)

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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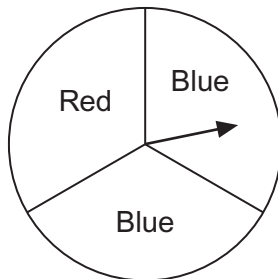
$n =$ ....   *(2 marks)*

*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 $0° \leqslant x \leqslant 360°$
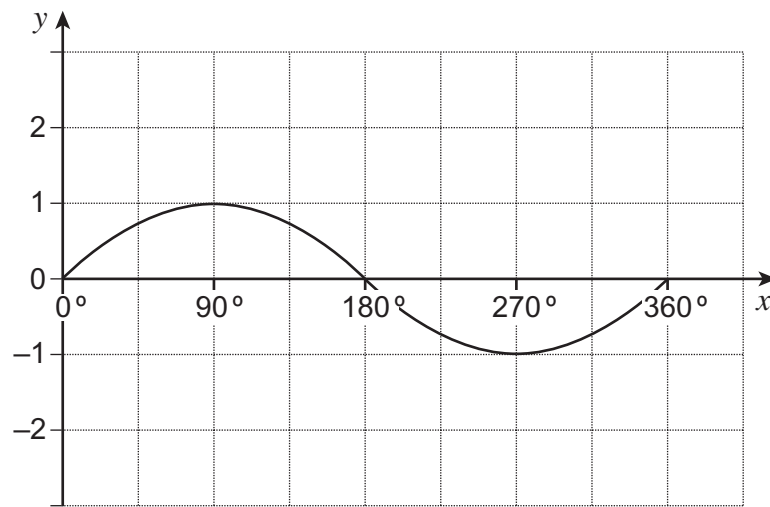
13 (a) Draw the graph of $y = 2\sin x$ for $0° \leqslant x \leqslant 360°$
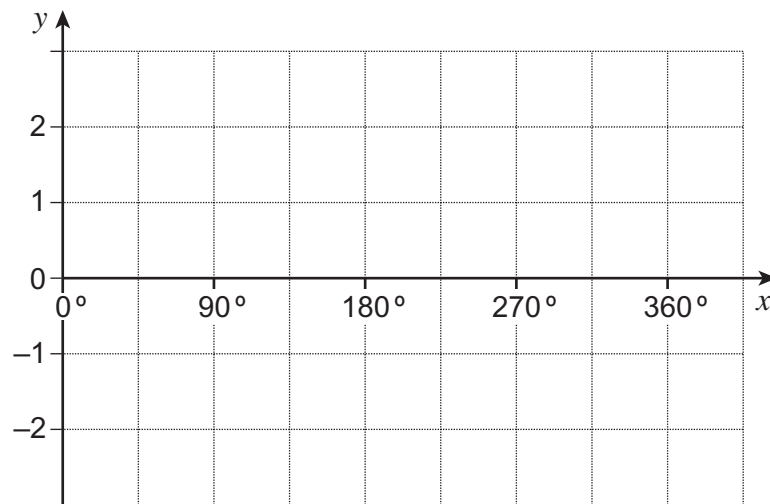
(1 mark)

13 (b)   Draw the graph of $y = \cos x$ for $0° \leqslant x \leqslant 360°$
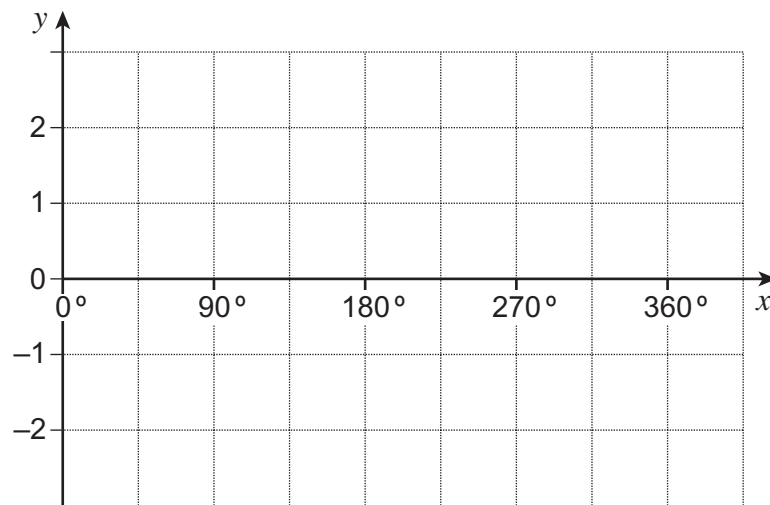
(1 mark)

13 (c)   Draw the graph of $y = \cos x + 1$ for $0° \leqslant x \leqslant 360°$

(1 mark)

Turn over for the next question

Turn over ▶

13
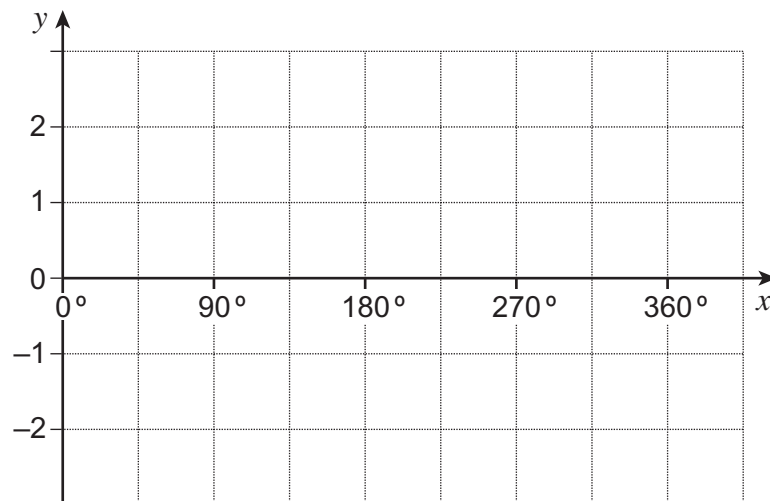
14 P is directly proportional to Q.

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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ANSWER IN THE SPACES PROVIDED

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