Centre Number						Candidate Number				
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Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
3	
4–5	
6–7	
8–9	
10	
TOTAL	

General Certificate of Secondary Education
Higher Tier
June 2012

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

Unit 1 Algebra and Probability
Section B Non-calculator

H

Monday 11 June 2012 2.20 pm to 3.05 pm

For this paper you must have:
- mathematical instruments.

You must **not** use a calculator.

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.
- You must **not** use your calculator in Section B. Your calculator must remain on the floor under your seat.
- 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.

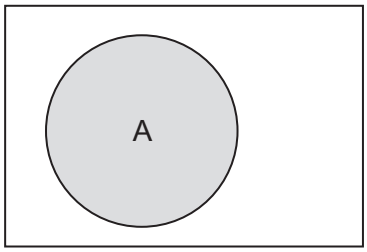
Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 40.
- The quality of your written communication is specifically assessed in Section A only.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer booklet.

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

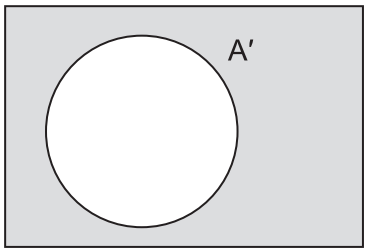
Formulae Sheet: Higher Tier

Set notation

A



A′



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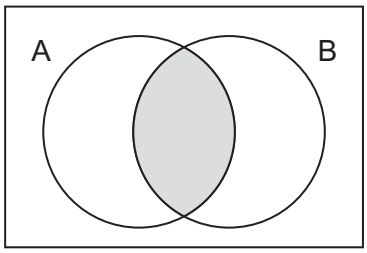

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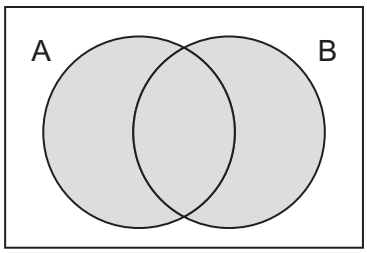

Answer **all** questions in the spaces provided.

11 (a) You are given that

1 pound = $\frac{5}{11}$ kg

Use this to change 9 pounds into kilograms.
Give your answer as a mixed number.

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.....

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

11 (b) Is $\frac{5}{11}$ greater than $\frac{9}{20}$?

You **must** show your working.

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(1 mark)

12 (a) Factorise $12x - 10$

.....

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

12 (b) Factorise $x^2 - 7x$

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

12 (c) Rearrange $r = 4p + 3$ to make p the subject.

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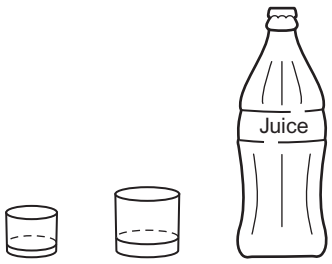
Answer ..... *(2 marks)*

8

13 A bottle of juice fills **either** 12 small glasses **or** 9 large glasses.



Four small glasses are filled from the bottle.

How many large glasses can be filled from the rest of the bottle?

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

14 (a) Solve $3(4y + 11) = 24$

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y = ... *(3 marks)*

14 (b) $x = 5$ is the solution to the equation $a(x - 3) = 4x - b$

a and b are integers.

Work out **two** possible pairs of values for a and b.

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a = ... b = ...

a = ... b = ... *(3 marks)*

8

15 A six-sided dice is numbered 1 to 6.
Gary, Lynn and Michael want to know if the dice is fair.

15 (a) Gary rolls the dice 200 times.
Here are his results.
The relative frequency for **1** is missing.

Number rolled	**1**	**2**	**3**	**4**	**5**	**6**
Relative frequency		0.15	0.1	0.1	0.3	0.15

How many times did Gary roll the number **1**?

.....

.....

.....

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

15 (b) Lynn says

> If I roll the dice 200 times I am certain to get the same results as Gary.

Is she correct?
Tick the correct box.

Yes ☐ No ☐

Give a reason for your answer.

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(1 mark)

15 (c) Michael also rolls the dice 200 times.

He says to Gary

> To see if the dice is fair it will be better if we put our results together.

Is he correct?
Tick the correct box.

Yes ☐ No ☐

Give a reason for your answer.

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(1 mark)

16 a is the number 4×10^3

16 (a) Write a as an ordinary number.

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

16 (b) Work out the value of a^2.
Give your answer in standard form.

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

16 (c) Work out the reciprocal of a.
Give your answer in standard form.

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

11

17 (a) Complete the table of values for $y = x^3 - 3x + 5$

x	–2	–1	0	1	2
y	3	7	5	3	

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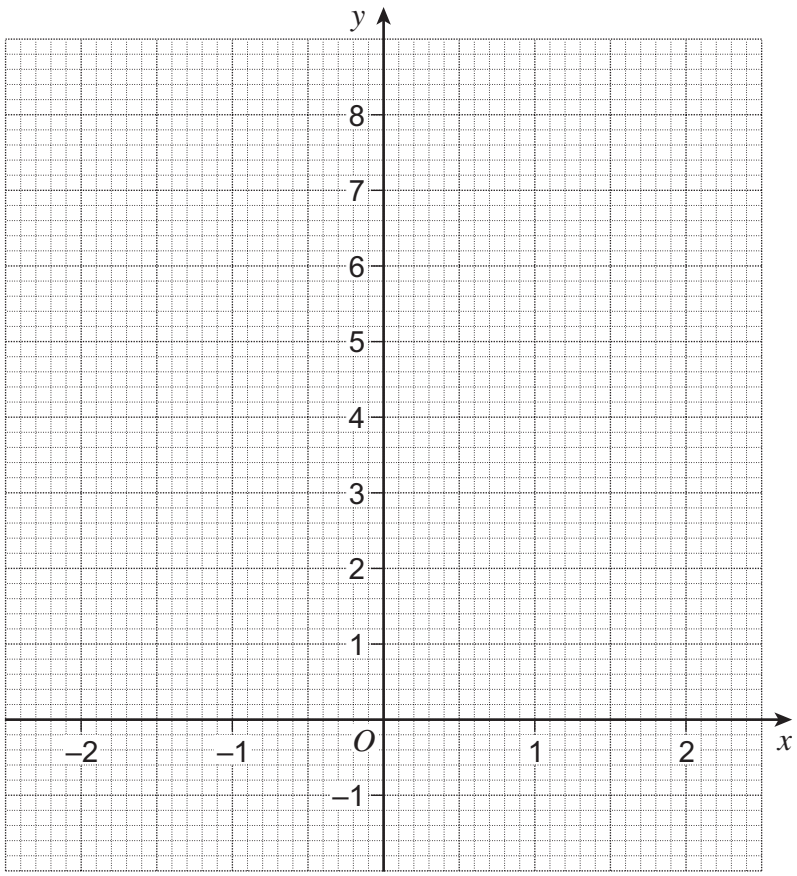
(1 mark)

17 (b) Draw the graph of $y = x^3 - 3x + 5$ for values of x from –2 to 2.



(2 marks)

18 x is a number greater than 1.

Write the following in numerical order starting with the smallest.

$\frac{1}{x}$ x^{-2} $x^{\frac{1}{2}}$ x^{3}

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

19 Show that $\sqrt{3}\left(\sqrt{12} + \sqrt{3}\right) = 9$

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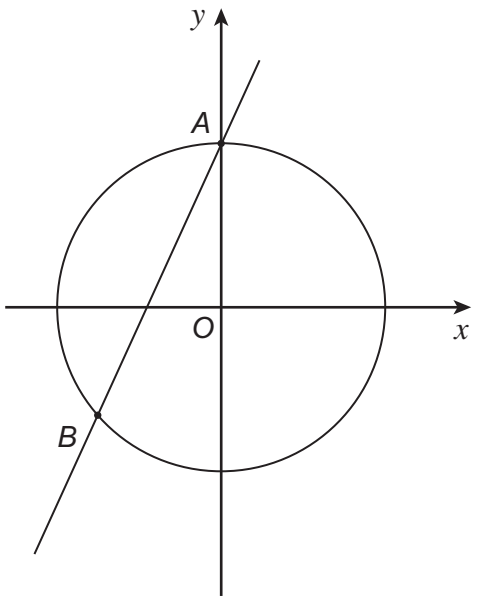
(2 marks)

Turn over for the next question

7

20 The line $y = 2x + c$ intersects the circle $x^2 + y^2 = 25$ at points A and B.



Work out the coordinates of B.

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Answer (..... , ...) *(6 marks)*

END OF SECTION B

6

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