

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
3	
4 – 5	
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12 – 13	
14 – 15	
TOTAL	



General Certificate of Secondary Education
Higher Tier
November 2014

Methods in Mathematics (Linked Pair)

93651H/B

H

Unit 1 Algebra and Probability
Section B Non-Calculator

Monday 10 November 2014 9.50 am to 10.35 am

<p>For this paper you must have:</p> <ul style="list-style-type: none"> mathematical instruments. <p>You may not use a calculator.</p>	
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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 that 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 Questions 16 and 18. 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 book.

Advice

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

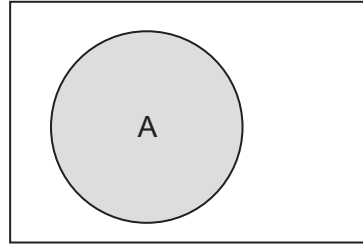
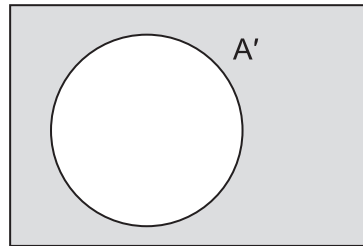
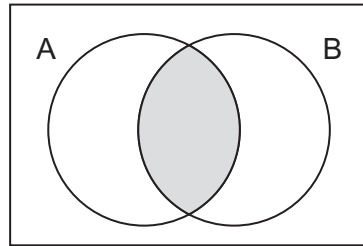
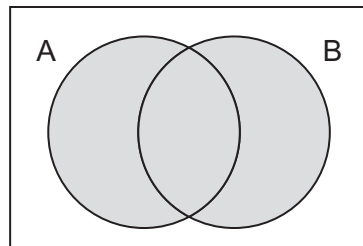


N 0 V 1 4 9 3 6 5 1 H B 0 1

Formulae Sheet: Higher Tier

Set notation

A

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

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

14 Solve $10x + 3 = 6x + 17$

[3 marks]

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$x =$

Turn over for the next question

3

Turn over ►



15 Some people are at a concert.

Half are women.

One-sixth are men.

The rest are children.

There are 40 children.

How many **men** are at the concert?

[4 marks]

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Answer



***16** Is 80% of $0.2 \times 4\frac{1}{2}$ greater than $\frac{3}{4}$?

You **must** show your working.

[3 marks]

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Turn over for the next question

7

Turn over ►



17 A spinner has three sections.
One is black, one is white and one is yellow.

17 (a) Luke says the probability of the spinner landing on black is $\frac{1}{3}$

Give a reason why Luke may **not** be correct.

[1 mark]

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17 (b) Anna spins the spinner 50 times.
Here are her results.

Black	White	Yellow
20	23	7

Write down the relative frequency of the spinner landing on **black**.

[1 mark]

Answer

17 (c) Anna wants the results for 100 spins.

She says,

“I don’t need to do another 50 spins.
I can double my results from the first 50”

Is Anna correct?
Give a reason for your answer.

[1 mark]

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- 17 (d)** Jack, Emily and Katy spin the spinner.
They each do a different number of spins.
Here are their relative frequencies for landing on white.

	Jack	Emily	Katy
Number of spins	80	120	200
Relative frequency	0.475	0.45	0.44

Whose relative frequency gives the best estimate of the probability of landing on white?
Give a reason for your answer.

[1 mark]

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Turn over for the next question



18 $K = 2^n + n^2$ where n is a positive integer.

***18 (a)** Show that K is a prime number when $n = 1$

[1 mark]

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18 (b) What is the next value of n that makes K a prime number?

[1 mark]

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Answer

18 (c) What is the lowest value of n that makes K a square number?
You **must** show your working.

[2 marks]

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Answer



19 In a game, a player chooses a card at random from an ordinary pack of cards.

If the player chooses a spade, they lose.

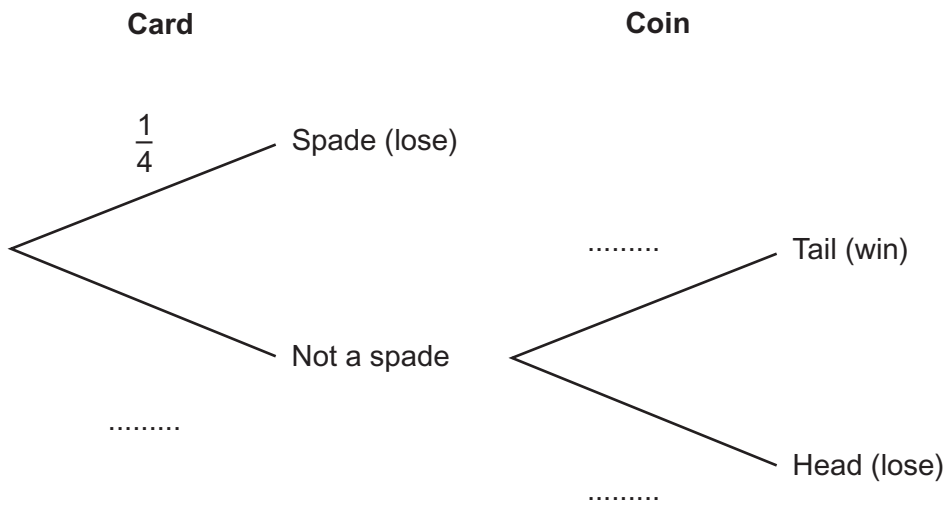
If they do **not** choose a spade, they throw a fair coin.

If they throw a tail, they win.

If they throw a head, they lose.

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

[1 mark]



19 (b) Work out the probability that the player **loses** the game.

[3 marks]

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Answer



20 $x^2 = a$ where a is a positive number.

Circle the correct ending to each sentence.

20 (a) The **sum** of the two possible values of x is

-1 0 a $2\sqrt{a}$ $-a$

[1 mark]

20 (b) The **product** of the two possible values of x is

-1 0 a $2\sqrt{a}$ $-a$

[1 mark]



21 (a) Factorise $x^2 - 16$ **[1 mark]**

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Answer

21 (b) Factorise $x^2 + 2x - 24$ **[2 marks]**

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Answer

21 (c) Hence, simplify $\frac{x^2 - 16}{x^2 + 2x - 24}$ **[1 mark]**

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Answer

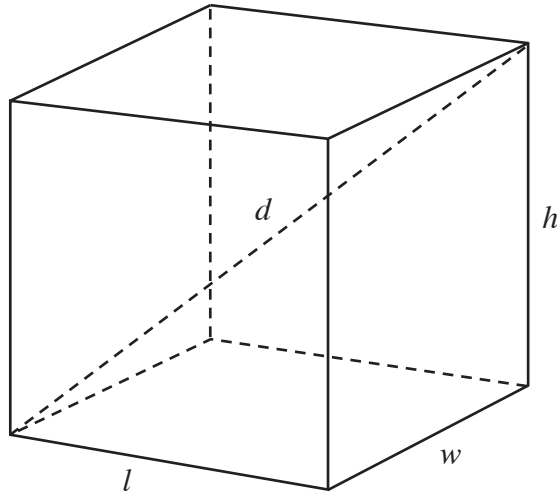
Turn over for the next question



22 The formula for the length, d , of a diagonal of a cuboid is

$$d = \sqrt{l^2 + w^2 + h^2}$$

where l , w and h are the dimensions of the cuboid.



A cuboid has dimensions 7 cm by 10 cm by 11 cm

Work out the length of a diagonal of this cuboid.

Give your answer in the form $a\sqrt{b}$, where a and b are integers and $a > 1$

[3 marks]

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Answer cm



23 y is directly proportional to the cube of x .

$y = 12$ when $x = 2$

Work out the value of y when $x = 10$

[3 marks]

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Answer

Turn over for the next question

6

Turn over ►



24

$$W = \frac{5 \times 10^{-3}}{2 \times 10^6}$$

Work out the value of W^{-1}
Give your answer in standard form.

[3 marks]

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Answer



25 Simplify $\frac{6\sqrt{5}}{\sqrt{15}}$

Give your answer in the form $a\sqrt{3}$ where a is an integer.
You **must** show your working.

[3 marks]

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Answer

END OF QUESTIONS

6



There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

