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	
10	
TOTAL	

General Certificate of Secondary Education
Higher Tier
January 2012

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

Unit 1 Algebra and Probability
Section B Non-calculator

H

Wednesday 11 January 2012 9.50am to 10.35 am

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 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.

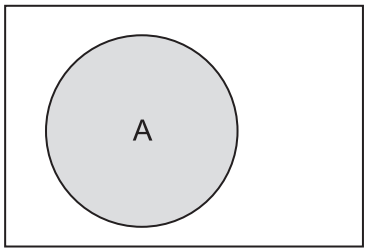
Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 40.
- The quality of your written communication is assessed in Section A only.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer booklet.

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

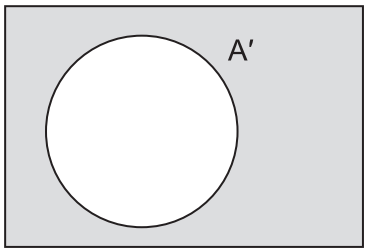
Formulae Sheet: Higher Tier

Set notation

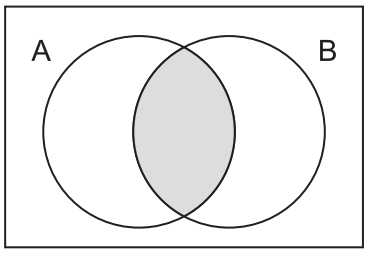
A



A′



A ∩ B



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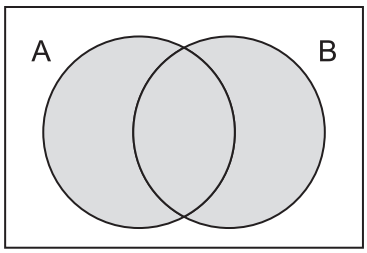

Answer **all** questions in the spaces provided.

11 (a) Work out $\frac{3}{8} + \frac{2}{5}$

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

11 (b) Work out $\frac{4}{7} \times \frac{5}{6}$

Give your answer in its simplest form.

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

12 (a) Multiply out $4(a - 5)$

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

12 (b) Factorise $6d + 14$

.....

.....

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

6

13 (a) What is 66 out of 600 as a percentage?

.....

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.....

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

13 (b) Given that 23.5 % of 160 = 37.6

What is 2.35 % of 16 000?

.....

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

13 (c) Share 600 in the ratio 1 : 11

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

14 x and y are two numbers.

$7x = 28$ and $3x + 5y = 2$

What is the value of $2x + 4y$?

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

15 Farook has a bag containing red marbles and blue marbles.
The probability of picking a red marble from the bag is $\frac{1}{5}$.

He adds 6 red marbles to the bag.
The bag now contains the same number of red marbles as blue marbles.

How many marbles does Farook now have in his bag?

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

16 x is an integer.

$4x - 3 \geqslant 7$ and $6x + 2 < 32$

List the possible values of x.

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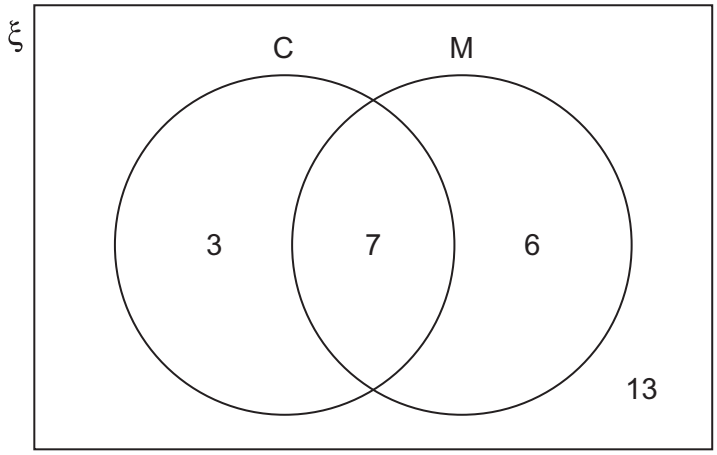
Answer ..... *(3 marks)*

15

17 The Venn diagram shows the number of students in Form 10X.
Set C shows the number of students in the Chess club.
Set M shows the number of students in the Maths club.



17 (a) How many students are there in Form 10X?

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

17 (b) One of the students is chosen at random.

17 (b) (i) What is the probability that the student is in the Chess club?

.....

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

17 (b) (ii) What is the probability that the student is **not** in the Maths club?

.....

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

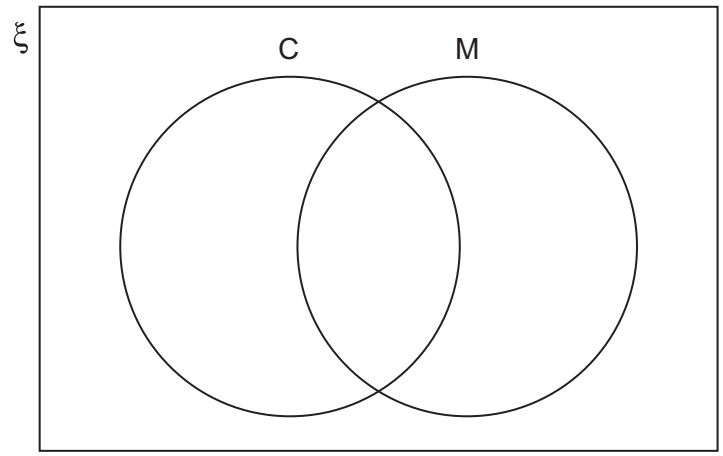
17 (c) Three more students join Form 10X.

The probability that a student is in the Chess club is now $\frac{3}{8}$

The probability that a student is in the Maths club is now $\frac{7}{16}$

Eight of the students are now in both clubs.

Complete the new Venn diagram for Form 10X.



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(3 marks)

Turn over for the next question

6

18 (a) Write 93 000 000 in standard form.

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

18 (b) Work out $\dfrac{4 \times 10^7}{8 \times 10^2}$

Give your answer in standard form.

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

18 (c) When written in standard form a number is $n \times 10^n$
When written as an ordinary number it has four digits.

Write down a possible value of n.

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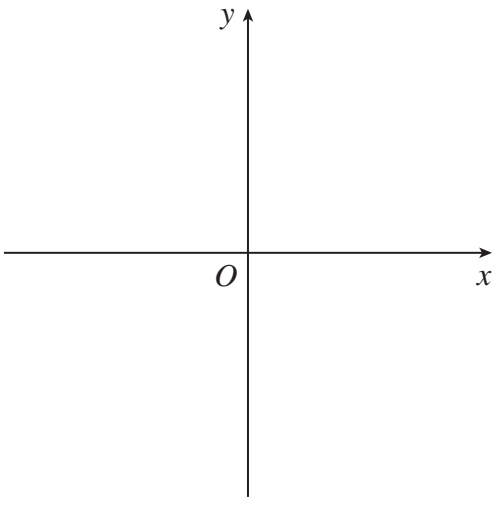
Answer ..... *(1 mark)*

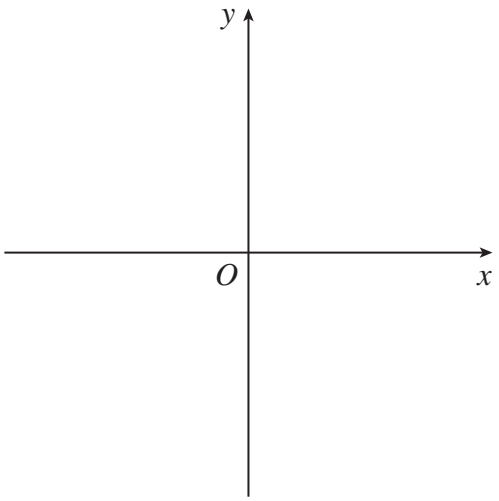
19 On each grid sketch the graph of the given equation.

19 (a) $y = x^3$



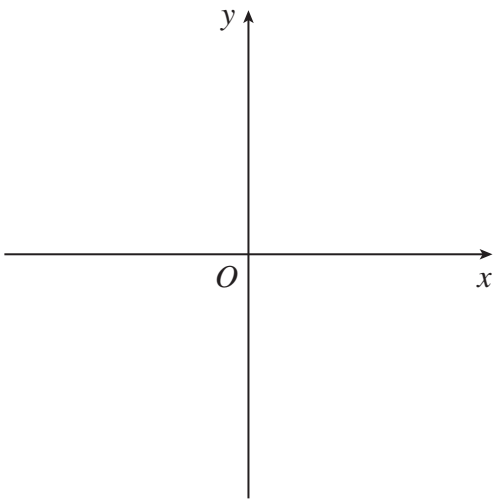
(1 mark)

19 (b) $y = \frac{1}{x}$



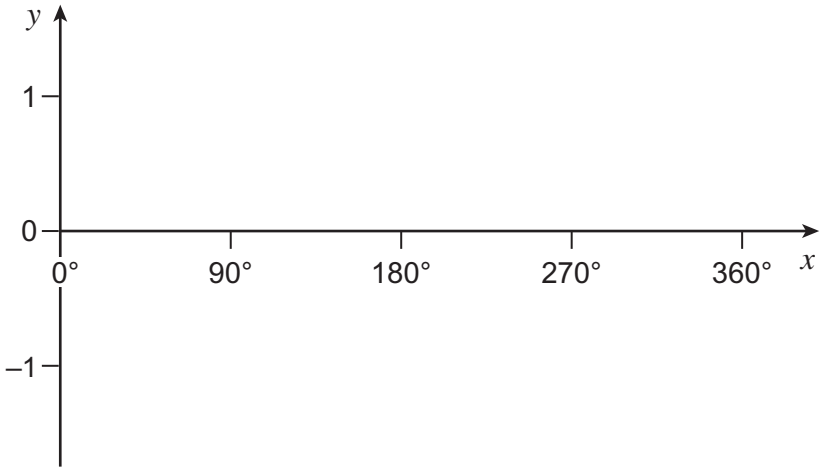
(1 mark)

19 (c) $y = 2^x$



(1 mark)

19 (d) $y = \sin x$



(1 mark)

8

Turn over ▶

20 Simplify $\dfrac{6+\sqrt{32}}{\sqrt{2}}$

Give your answer in the form $a + b\sqrt{2}$, where a and b are integers.

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

21 Here is part of a train timetable.
The train journey between Newton and Lonnen takes 2 hours.

Trains from Newton to Lonnen	
Depart Newton	09:00
Depart Newton	09:30
Then every half-hour until 22:00	

Trains from Lonnen to Newton	
Depart Lonnen	09:15
Depart Lonnen	09:45
Then every half-hour until 22:15	

Krystle catches the 15:00 train from Newton to Lonnen.

During her journey, how many trains going from Lonnen to Newton does her train pass?

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

END OF QUESTIONS

5

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DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

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ANSWER IN THE SPACES PROVIDED