Version 1.0

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 – 11	
12 – 13	
14 – 15	
16 – 17	
TOTAL	

General Certificate of Secondary Education
Higher Tier

Mathematics (Linear) B 4365/1H

Paper 1 Non-calculator

Specimen Paper 2012 Specification

H

For this paper you must have:
- mathematical instruments.

You must **not** use a calculator.

Time allowed
- 1 hour 30 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.

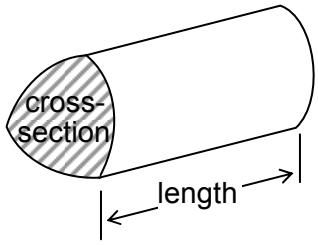
Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 70.
- The quality of your written communication is specifically assessed in questions 1, 4 and 16.
  These questions are indicated with an asterisk (✳)
- You may ask for more answer paper and graph paper.
  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

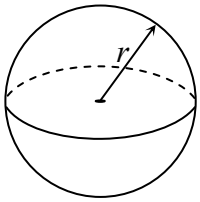
Area of trapezium = $\frac{1}{2}(a+b)h$

Volume of prism = area of cross-section × length



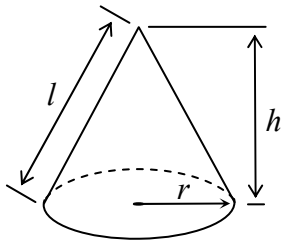
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$

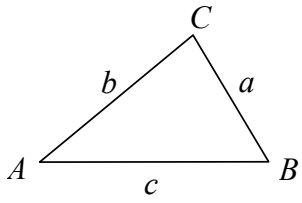


In any triangle ABC

Area of triangle = $\frac{1}{2}ab\sin C$

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2cb\cos A$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

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

1 (a) In a school there are 200 students in year 11.
110 of these students are boys.

What percentage of these students are girls?

.....

.....

.....

.....

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

✶**1(b)** The rate of VAT was reduced in December 2008 from $17\frac{1}{2}$% to 15%.

For sale

Lawnmower £140 + VAT

Work out the difference in price of a lawnmower due to the reduction in VAT.

.....

.....

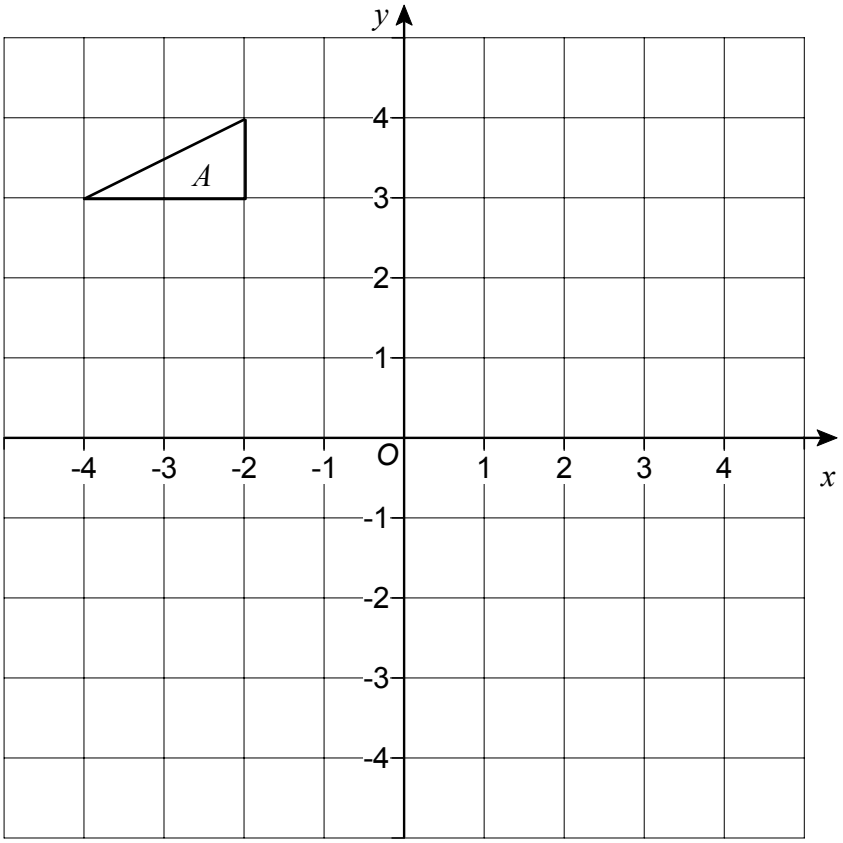
.....

Answer £ ..... *(3 marks)*

Turn over for the next question

6

2 The diagram shows a triangle A, with vertices at (–4, 3), (–2, 3) and (–2, 4).



2 (a) Draw a image of triangle *A* when it is reflected in the line $y = 1$

Label your image *B*.

(2 marks)

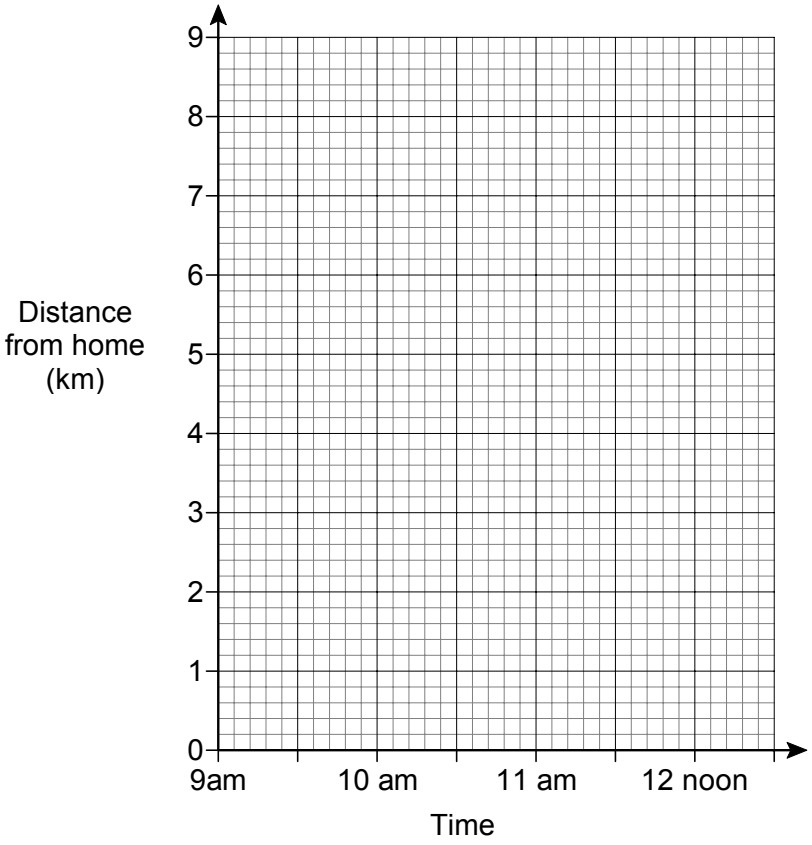
2 (b) Draw an image of triangle A when it is rotated 90° clockwise about the origin.

Label your image *C*.

(3 marks)

3 Simon leaves home at 9 am and goes for a walk.
He walks at a steady speed of 5 kilometres per hour for 90 minutes.
He stops for 30 minutes.
He then jogs back home and arrives at 12 noon.

3 (a) On the grid below draw a distance-time graph to show Simon's journey.



(3 marks)

3 (b) What is Simon's average speed on the return home?

.....

Answer ..... km/h *(1 mark)*

Turn over for the next question

9

✳ **4** Barbara uses her car to work as a volunteer driver at her local hospital.
She is paid 40p for every mile she drives.
On average she drives 2000 miles each month.

Here is some information about the running costs of Barbara's car.

Fuel Consumption	50 miles per gallon
Other running costs	10 pence per mile

Petrol costs £5 per gallon
After paying for fuel and other running costs, Barbara saves the money left over.
Barbara is planning to use this money for a holiday that will cost £3000.

Will Barbara have enough money after saving for one year?

.....

.....

.....

.....

.....

.....

.....

.....

(6 marks)

5 (a) The National Curriculum levels in Mathematics for 30 students in year 9 were recorded.

Level	**Number of students**	
3	0	
4	4	
5	6	
6	9	
7	8	
8	3	

Calculate the mean level.

.....

.....

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

5 (b) The 30 students study both French and Spanish.

Their National Curriculum levels in these subjects are shown in the table.

Level in Spanish

Level in French	1	2	3	4	5	6	Total
1	0	0	0	0	0	0	0
2	1	0	0	0	0	0	1
3	2	1	1	0	0	0	4
4	0	3	4	1	0	0	8
5	0	1	2	3	2	0	8
6	0	0	3	3	2	1	9
Total	3	5	10	7	4	1	30

5 (b) (i) What is the median level for French?

Show clearly how you obtain your answer.

.....

.....

.....

.....

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

5 (b) (ii) The teacher claims that the students are better at French than at Spanish.

How can you tell from the table that this is true?

.....

.....

.....

(1 mark)

Turn over for the next question

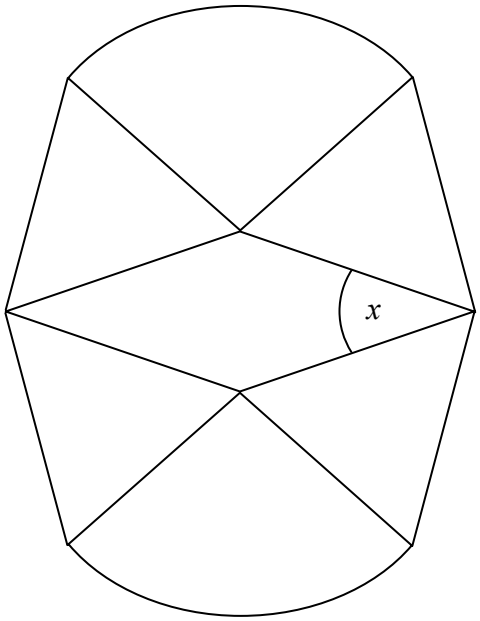
12

6 Katie says that it is impossible to have an isosceles triangle with a right angle.

Draw a fully labelled diagram to show that Katie is wrong.

(2 marks)

7 This diagram is composed of 2 quarter circles, 4 equilateral triangles and a rhombus.



Not drawn accurately

Work out angle x.

.....

.....

.....

.....

.....

.....

.....

.....

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

Turn over for the next question

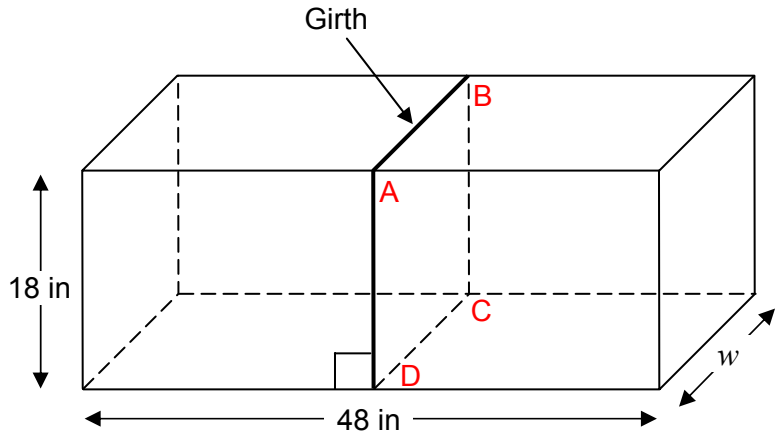
6

8 Postal regulations say that for a package the length plus girth cannot exceed 108 inches or the package will not be accepted by the post office.

The length is defined as the longest side of the package.

The girth is defined as the measurement around the package, perpendicular to the length, ABCDA, as shown.

This package is a cuboid with length of 48 inches.



Not drawn accurately

Show that the greatest value for the width, w, if the package is to be accepted by the post office, is 12 inches.

.....

.....

.....

.....

(2 marks)

Do not write outside the box

9 (a) A sequence starts

2 7 17 .....

The rule for finding the next term in this sequence is to multiply the previous term by 2 and then add on 3

Work out the next term.

.....

.....

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

9 (b) The rule for finding the next term in a different sequence is to multiply the previous term by 2 and then add on a, where a is an integer.

The first term is 8 and the fourth term is 127

8 127

Work out the value of a.

.....

.....

.....

.....

.....

.....

.....

Answer $a =$ ..... *(4 marks)*

Turn over for the next question

7

10 (a) Factorise fully $2x^2 - 8x$

.....

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

10 (b) Factorise $x^2 + 3x + 2$

.....

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

10 (c) Factorise fully $10x^2 - 40y^2$

.....

.....

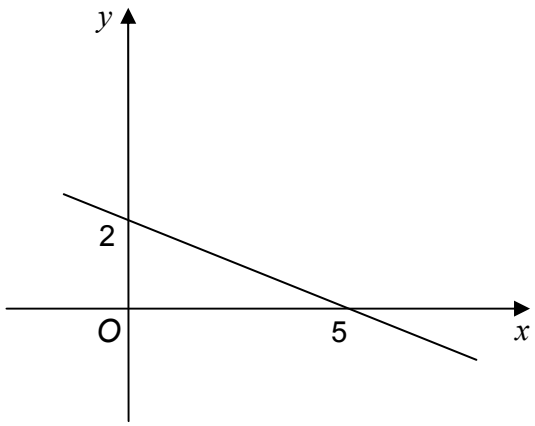
Answer ..... *(3 marks)*

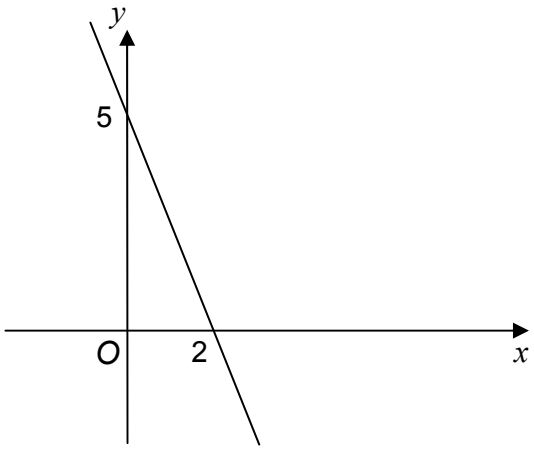
11 Each of these equations represents the graph of a straight line.

A: $5y + 10 = 2x$	B: $5x + 2y = 10$	C: $2y + 10 = 5x$	D: $2x + 5y = 10$

The four graphs are shown in the diagrams below.

Which equation represents which graph?





.....

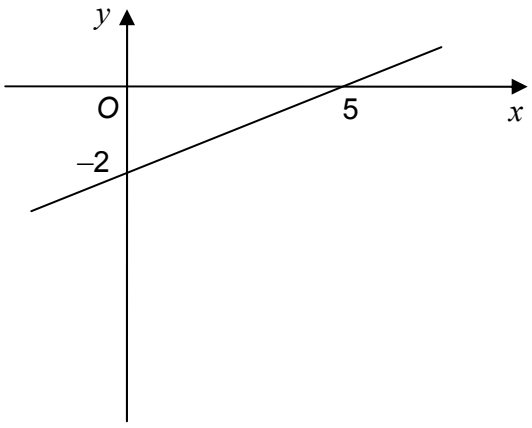
.....

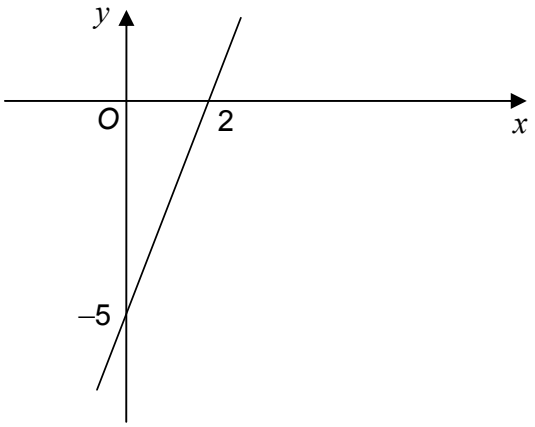
This is equation .....

.....

.....

This is equation .....





.....

.....

This is equation .....

.....

.....

This is equation .....

(3 marks)

9

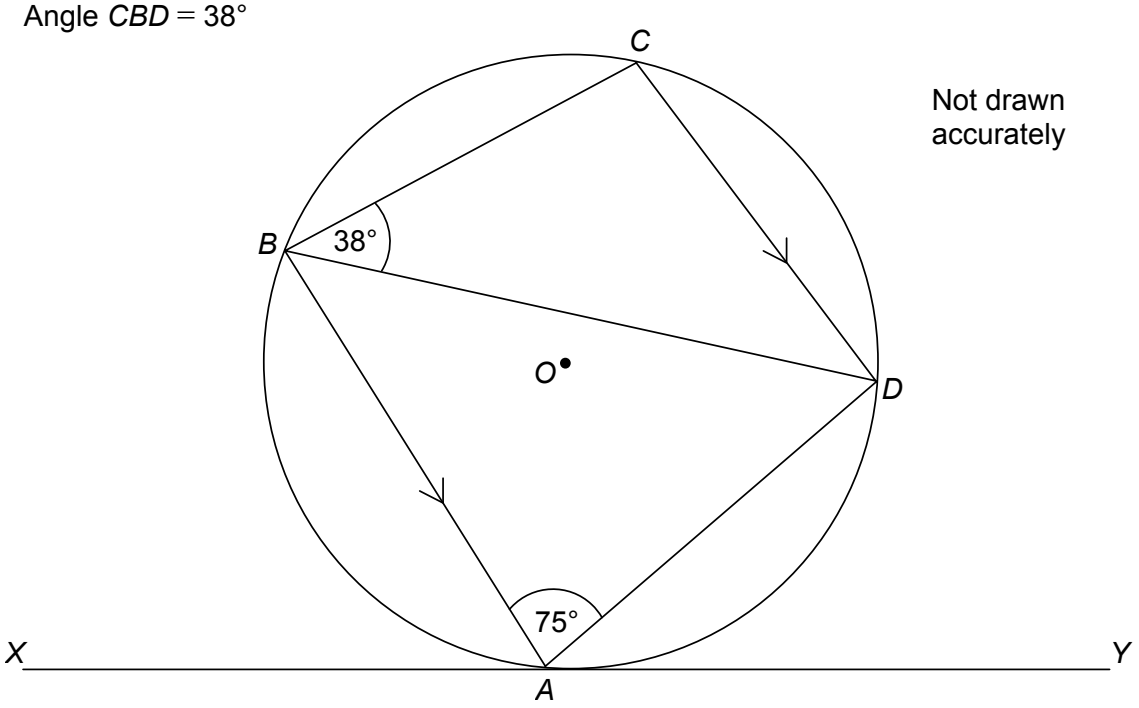
12 *ABCD* is a cyclic quadrilateral within a circle centre *O*.

XY is the tangent to the circle at *A*.

CD is parallel to *AB*.

Angle *BAD* = 75°

Angle *CBD* = 38°



12 (a) Give a reason why angle *BCD* = 105°

.....

.....

(1 mark)

12 (b) Work out the value of angle *BAX*

.....

.....

.....

.....

.....

.....

.....

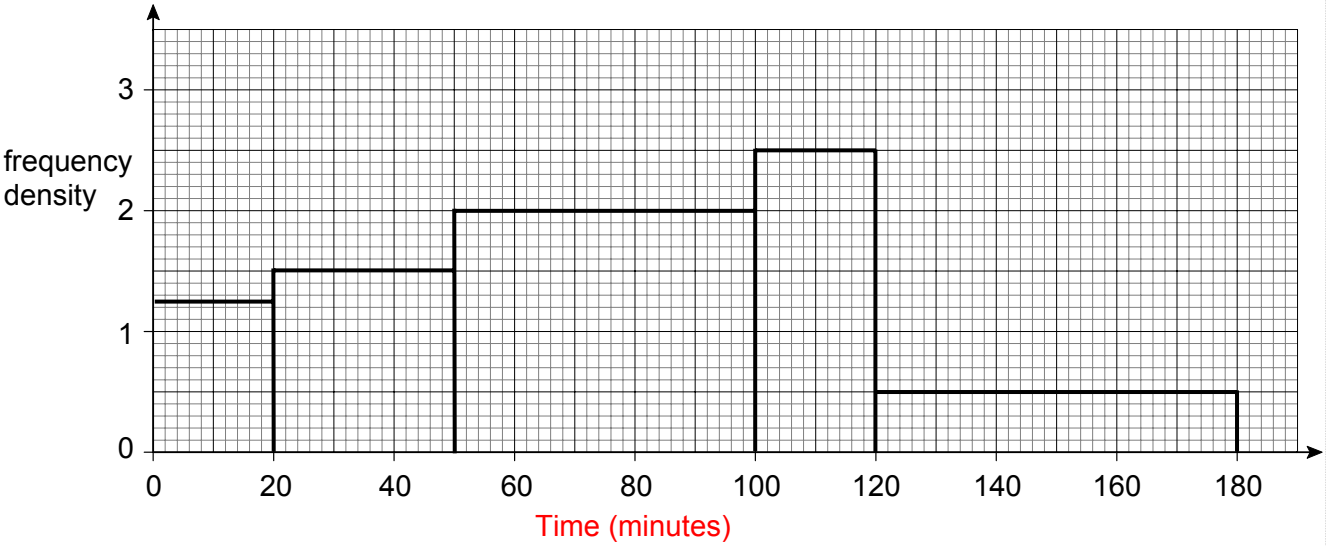
.....

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

Do not write outside the box

13 The histogram and the frequency table show some information about how much time vehicles spent in a car park.

Time (minutes)	Number of vehicles
$0 < t \leq 20$	25
$20 < t \leq 50$	45
$50 < t \leq 100$	100
$100 < t \leq 120$	50
$120 < t \leq 180$	30



Fifty vehicles were in the car park for more than T minutes.

Calculate an estimate of the value of T.

.....

.....

.....

.....

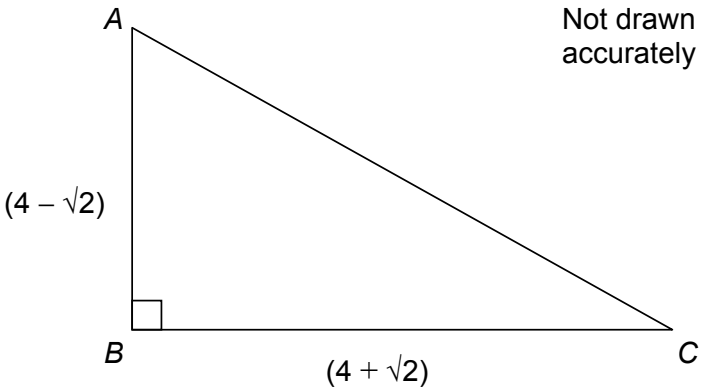
.....

Answer ..... minutes (3 marks)

7

14 *ABC* is a right-angled triangle.

$AB = (4 - \sqrt{2})$ cm, $BC = (4 + \sqrt{2})$ cm



Show that the perimeter of the triangle is 14 cm.

.....

.....

.....

.....

.....

.....

.....

(5 marks)

Do not write outside the box

15 Grace buys a packet of ten hyacinth blubs.

They all look the same.

Seven of the bulbs will produce Pink flowers, three will produce Blue flowers.

A bulb is taken at random and planted.

A second bulb is taken at random and planted.

Calculate the probability that the two bulbs will produce **at least one** Blue flower.

.....

.....

.....

.....

.....

.....

Answer ..... (3 marks)

8

Do not write outside the box

✳**16** Solve $\dfrac{10}{2x-1} - \dfrac{3}{x} = 3$

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

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

END OF QUESTIONS

6

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED