Surname

Other Names

Candidate Signature

AQA

General Certificate of Secondary Education
Higher Tier
June 2015

Mathematics (Linear)   **4365/1H**

H

Paper 1

Thursday 4 June 2015   9.00 am to 10.30 am

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 spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book.

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 5, 19 and 21. These questions are indicated with an asterisk (*).
- You may ask for more answer paper, tracing paper and graph paper. These must be tagged securely to this answer book.

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

Formulae Sheet: Higher Tier

Area of trapezium = $\frac{1}{2}(a+b)h$
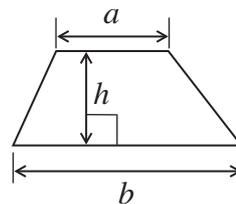
Volume of prism = area of cross-section × length
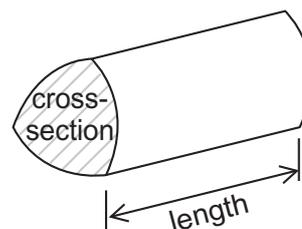
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$
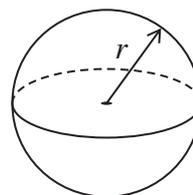
Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$
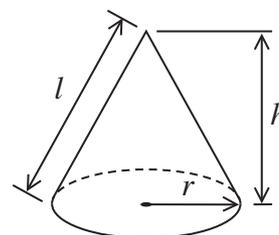
In any triangle ABC

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

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

Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$
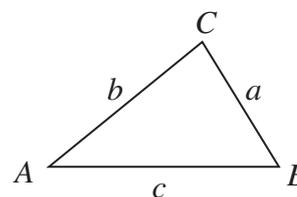
The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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

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

1 (a) Multiply out $5(3x + 7)$

[1 mark]

....

....

Answer ....

1 (b) Make w the subject of the formula $z = w + 3$

[1 mark]

....

....

Answer ....

1 (c) Factorise fully $4y^2 + 6y$

[2 marks]

....

....

Answer ....

Turn over ▶

2   Draw the graph of $y = 3x - 2$ for values of x from   –3 to 3

[3 marks]
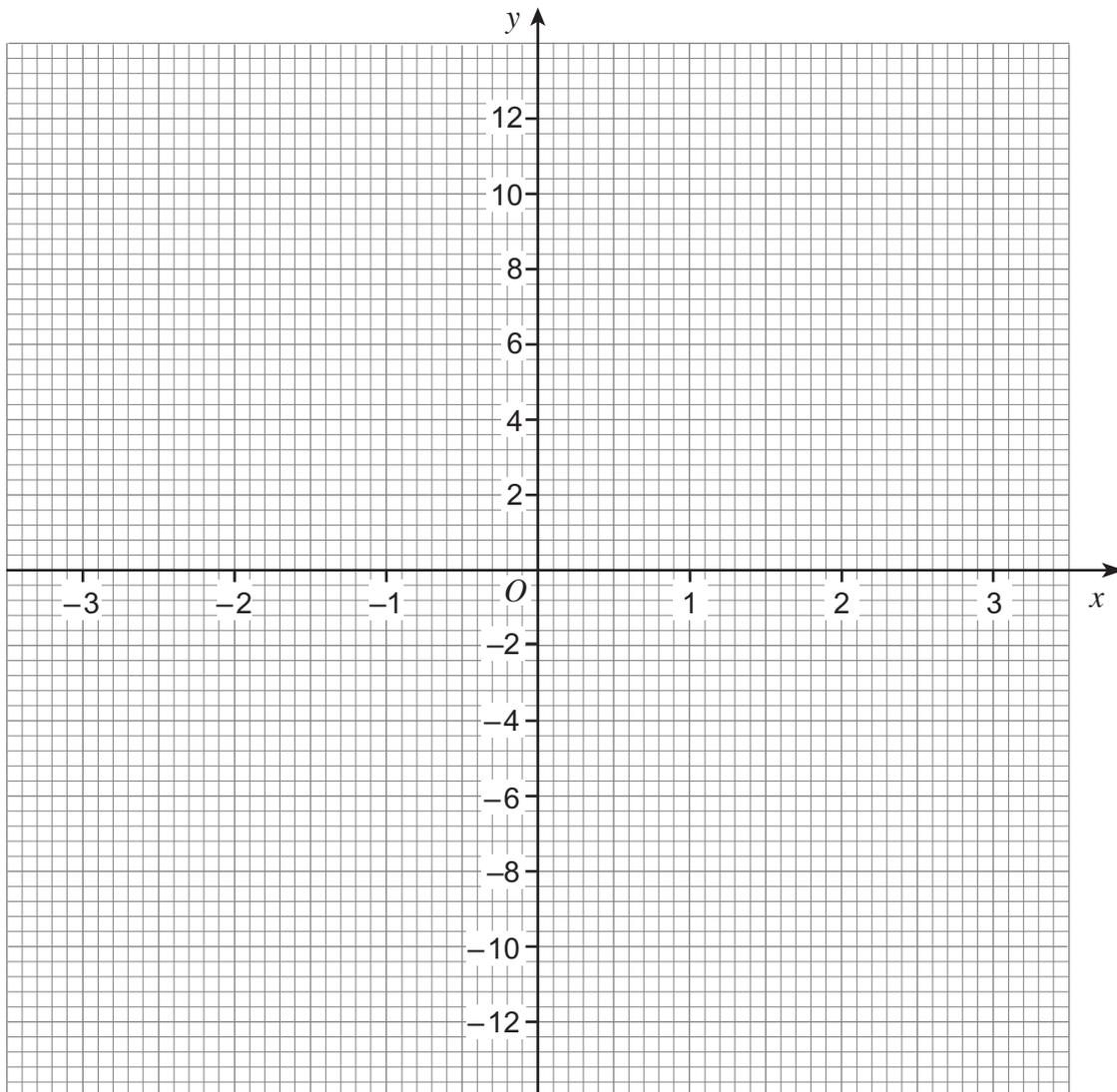
3 These instructions are on a bottle of lawn feed.

'Mix 200 millilitres of lawn feed with 10 litres of water.'

How many millilitres of lawn feed should be mixed with 3 gallons of water?
Use 1 gallon = 4.5 litres

[3 marks]

....

....

....

....

....

....

Answer .... millilitres

Turn over for the next question

4 The table shows information about water used in a household.
The value for April is missing.

Month	Water used (m^3)
January	16.2
February	18.1
March	15.9
April	
May	17.8
June	21.0

The mean monthly water used for the six months is 18 m^3

Work out the value for April.

[3 marks]

....

....

....

....

Answer .... m^3

*5 Which has the **greater** area?

Not drawn
accurately

11 cm

2.5 cm

3 cm
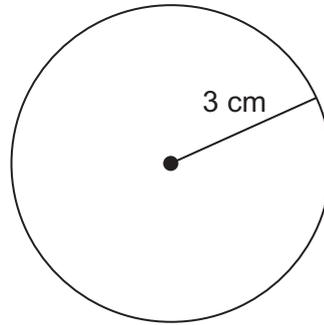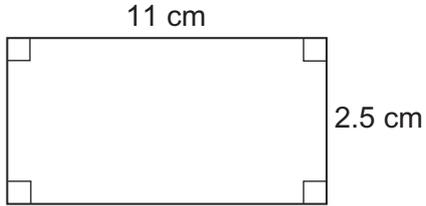
Use π = 3.1
You **must** show your working.

[3 marks]

....

....

....

....

....

....

....

....

Answer ....

Turn over ▶

6 A rhombus is reflected in a mirror line as shown.
PQR is a straight line.

mirror line
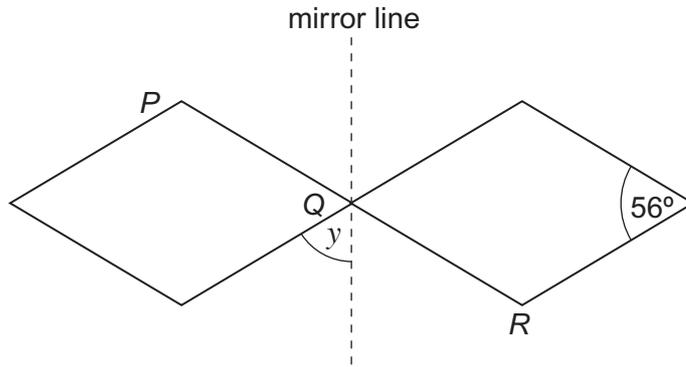
Not drawn accurately

Work out the size of angle *y*.
You **must** show your working which may be on the diagram.

[2 marks]

....

....

....

....

Answer .... degrees

7 The first buses to X and Y leave a bus station at 7 am

Buses to X leave every 25 minutes.

Buses to Y leave every 20 minutes.

When will the buses to X and Y next leave at the same time?

[3 marks]

....

....

....

....

Answer ....

8   Six whole numbers have

a median of 10

a mode of 11

a range of 4

Work out a possible set of six numbers.
Write the numbers in order.

[3 marks]

....

....

....

....

....

....

Answer .... , ... , ... , ... , ... , ...

Turn over for the next question

8

Turn over ▶

9 A fishing lake contains thousands of fish.
The fish are Carp, Bream or Roach.

10 fish are caught.
The table shows some of the results.

	Carp	Bream	Roach
Frequency	4		
Relative frequency		0.1	

9 (a) Complete the table.

[3 marks]

9 (b) The owner uses the results to estimate the proportion of Carp in the lake.

How can she make her estimate more reliable?

[1 mark]

....

....

10 Here is a linear sequence.

46   40   34   28   22   ......

Work out the nth term of the sequence.

[2 marks]

....

....

Answer ....

11 You will need a ruler and a pair of compasses to answer this question.

Construct the perpendicular **from** point *P* to the line *L*.
You **must** show your construction arcs.

[3 marks]

P
×

L

Turn over ▶

9

12 In this question all lengths are in centimetres.

A rectangle has length l and width w.

w

l
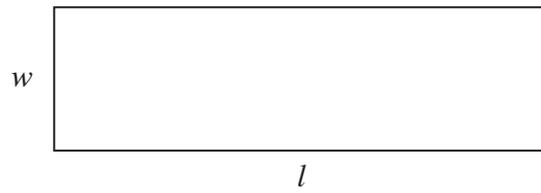
Not drawn accurately

12 (a) w and l are such that

$1 \leqslant w \leqslant 9$

$w + l = 10$

Show this information on the graph.

[2 marks]

Length, l (cm)

Width, w (cm)
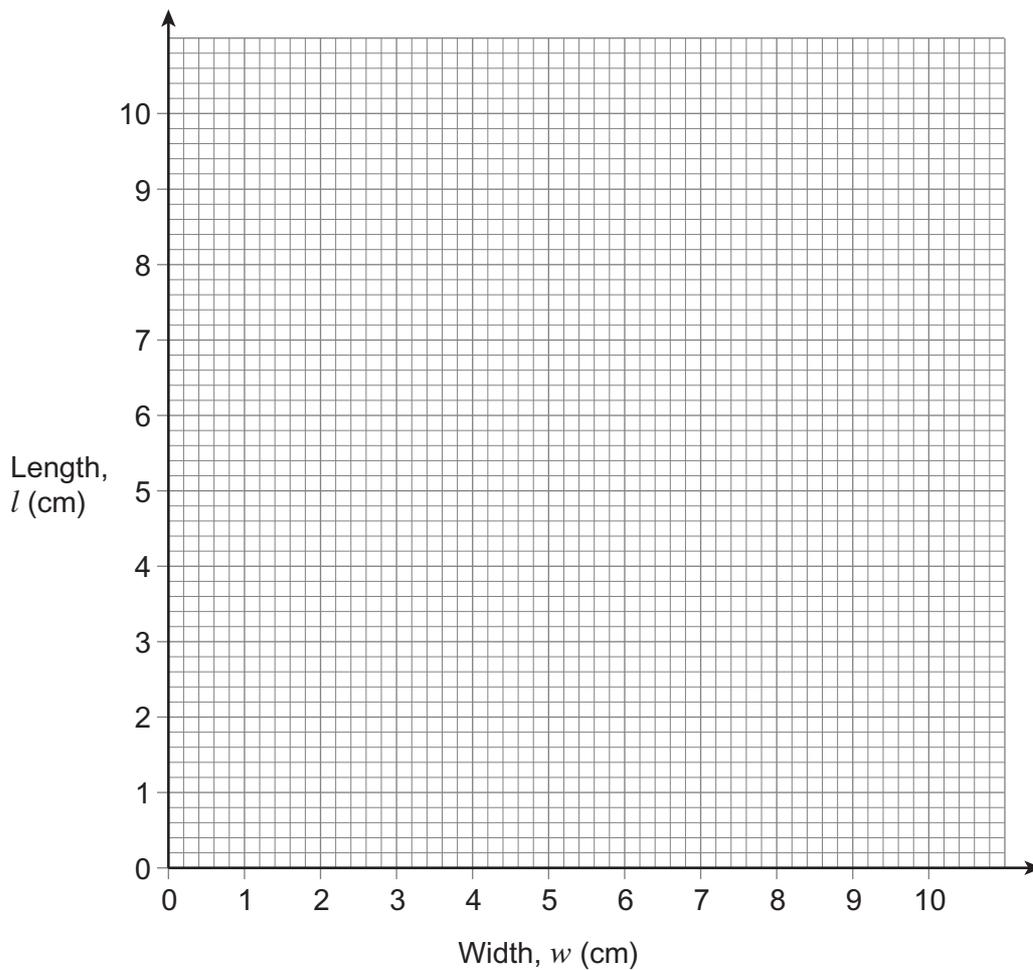
12 (b) Use the graph, or otherwise, to work out the value of w when $l = 3w$
You **must** show your working.

[2 marks]

....

....

....

....

Answer ....

13 Triangles *ABC* and *PQR* are similar.
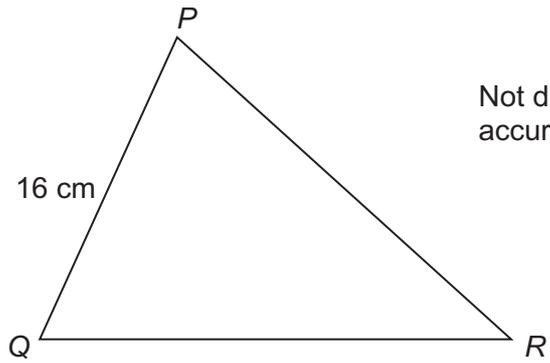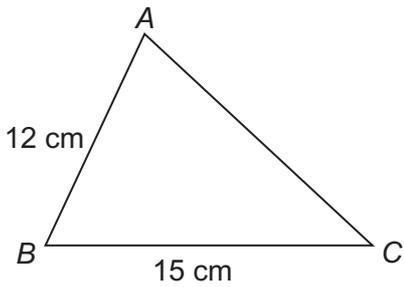
Not drawn
accurately

Work out the length *QR*.

[2 marks]

....

....

....

....

....

Answer .... cm

6

Turn over ▶

14 *ABCD* is a trapezium.

A

10 cm

9 cm

D

Not drawn
accurately

3 cm

B

C
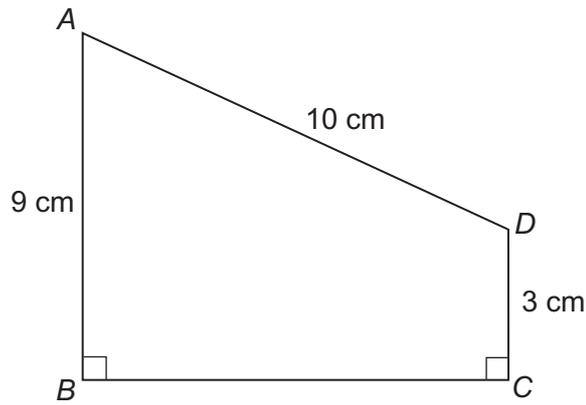
Work out the length of *BC*.
You **must** show your working.

[4 marks]

....

....

....

....

....

....

....

Answer .... cm

15 Work out the smallest integer value that satisfies the inequality

$$5x + 2 > 3x + 7$$

[3 marks]

....

....

....

....

....

....

....

Answer ....

16 (a) Line *M* has the equation $3x + 2y = 7$

Circle the gradient of line *M*.

[1 mark]

-3 $\qquad$ $-\dfrac{3}{2}$ $\qquad$ 3 $\qquad$ $\dfrac{3}{2}$

16 (b) Line *N* has the equation $y = 5 - \dfrac{3}{4}x$

Circle the gradient of a line that is **perpendicular** to line *N*.

[1 mark]

$-\dfrac{4}{3}$ $\qquad$ $\dfrac{3}{4}$ $\qquad$ $\dfrac{4}{3}$ $\qquad$ 3

9

Turn over ▶

17 Dan is a vet.
In February he saw 250 customers.

82 were dog owners.
107 were cat owners.
61 were owners of other pets.

Dan wants to survey a sample of customers.
He chooses a sample of 50, stratified by the type of pet.

Complete the table.

[3 marks]

	Dog owners	Cat owners	Owners of other pets	Total
Number of customers	82	107	61	250
Number in sample				50

18   Simplify $\dfrac{9a^2 - b^2}{3a - b}$

[2 marks]

....

....

....

....

....

Answer ....

Turn over for the next question

5

Turn over ▶

19   *AC* is a diameter of a circle, centre *O*.
CTS is a tangent to the circle.
B is a point on the circumference of the circle such that *BC* = *BT*
Angle *BTS* = *y*
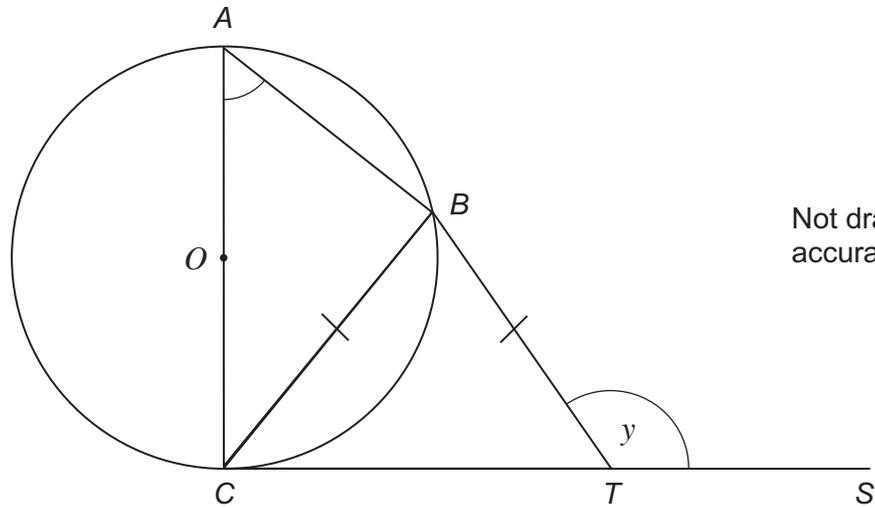
Not drawn
accurately

*19 (a)**   Prove that angle *CAB* = 180º – *y*
Give reasons for any angles you write down or calculate.

[3 marks]

....

....

....

....

....

....

19 (b) You are given that angle *ACB* = 20º

Work out the value of *y*.
You **must** show your working which may be on the diagram.

[2 marks]

....

....

....

....

Answer .... degrees

Turn over for the next question

5

Turn over ▶

20 (a) Simplify fully $\dfrac{m^3 \times m^5 \times m}{m^2 \times m^4}$

[1 mark]

....

....

Answer ....

20 (b) Expand and simplify $(3 + \sqrt{2})(5 - \sqrt{2})$

[2 marks]

....

....

Answer ....

20 (c) Work out the value of $25^{-\frac{1}{2}} \times 81^{\frac{3}{4}}$

[3 marks]

....

....

....

....

Answer ....

21 The square and the rectangle have the same area.
All lengths are in centimetres.

$6x - 5$

$6x - 5$

5

x
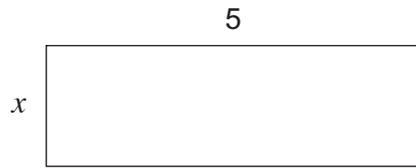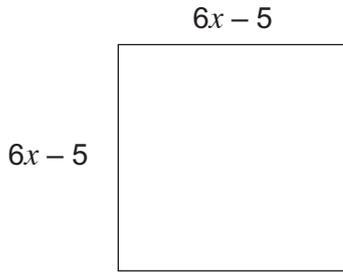
Not drawn accurately

21 (a) Show that $36x^2 - 65x + 25 = 0$

[2 marks]

....

....

....

....

*21 (b) $36x^2 - 65x + 25 = 0$

Work out the value of x.

[4 marks]

....

....

....

....

$x = $ ....

END OF QUESTIONS

12

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED