

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Secondary Education
Higher Tier
June 2015

Mathematics (Linear)

4365/1H

Paper 1

Thursday 4 June 2015 9.00 am to 10.30 am

H

<p>For this paper you must have:</p> <ul style="list-style-type: none"> mathematical instruments. <p>You must not use a calculator.</p>	
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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.

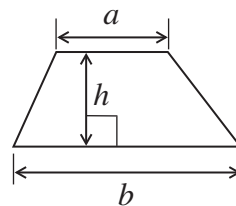
For Examiner's Use	
Examiner's Initials	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
18 – 19	
20 – 21	
TOTAL	



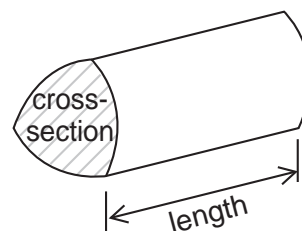
J U N 1 5 4 3 6 5 1 H 0 1

Formulae Sheet: Higher Tier

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

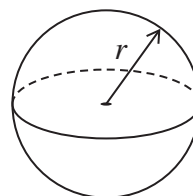


Volume of prism = area of cross-section \times length



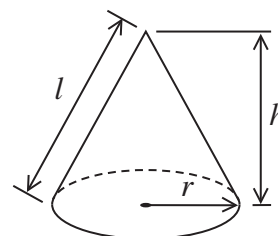
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

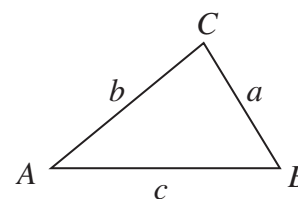


In any triangle ABC

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 $a^2 = b^2 + c^2 - 2bc \cos A$



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]**

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.....

Answer

1 (b) Make w the subject of the formula $z = w + 3$ **[1 mark]**

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Answer

1 (c) Factorise fully $4y^2 + 6y$ **[2 marks]**

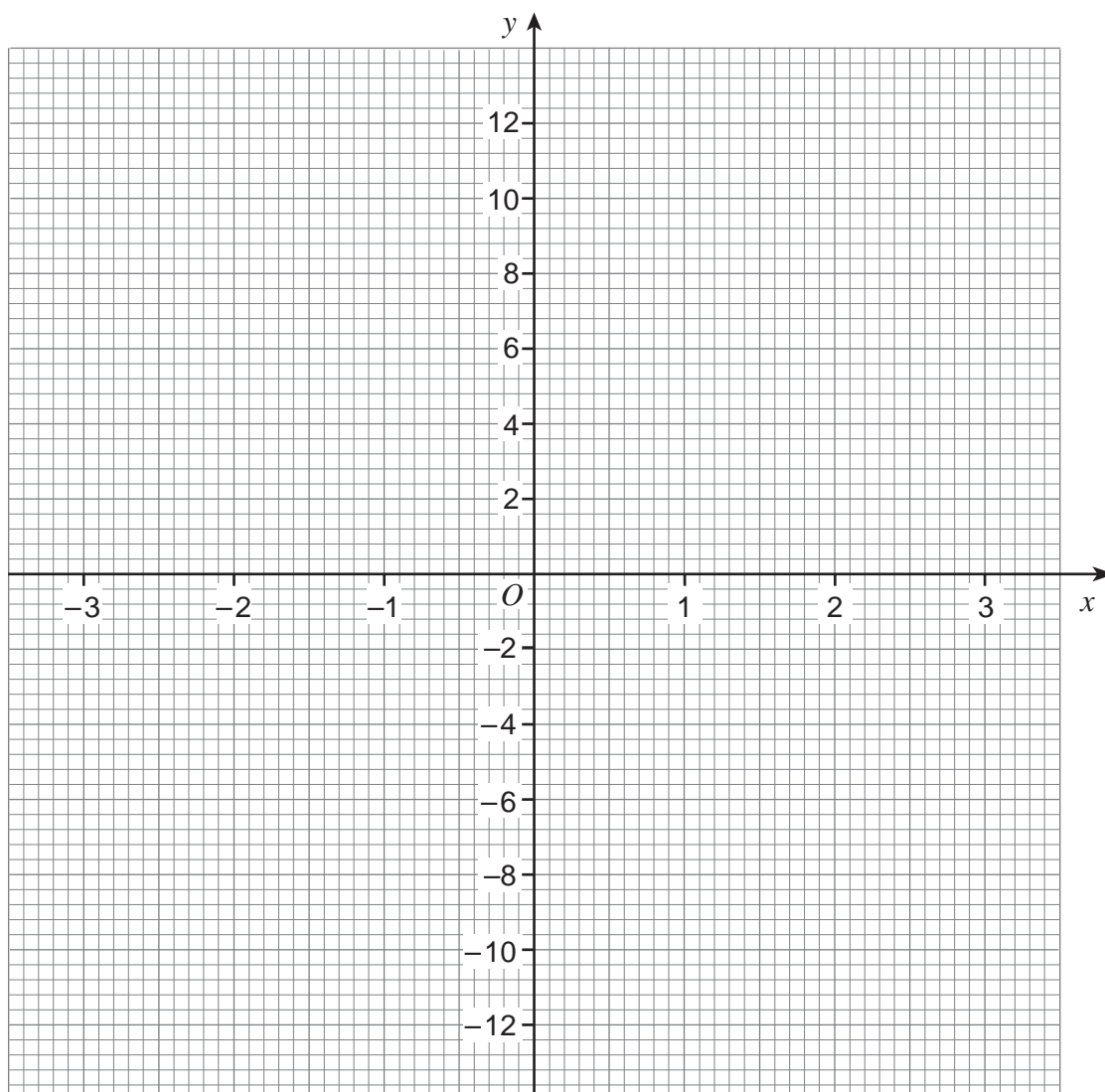
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Answer



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]

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Answer millilitres

Turn over for the next question

6

Turn over ►



- 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 m³

Work out the value for April.

[3 marks]

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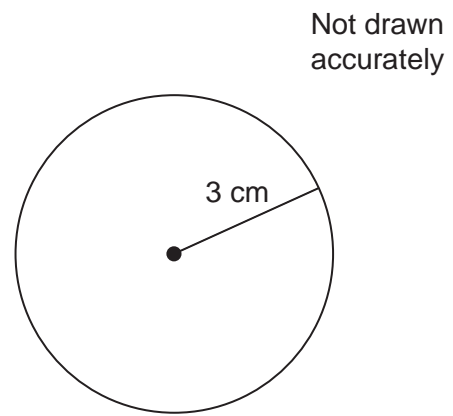
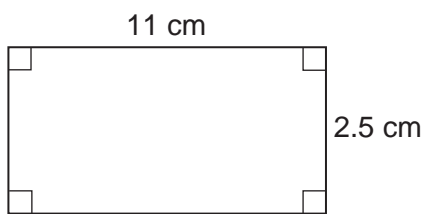
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Answer m³



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



Use $\pi = 3.1$
You **must** show your working.

[3 marks]

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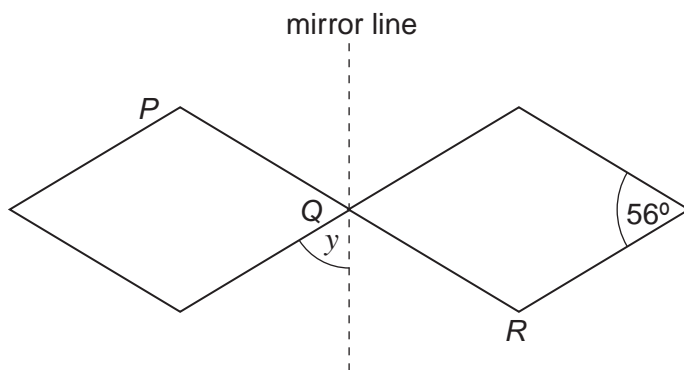
Answer

6

Turn over ►



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



Not drawn accurately

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

[2 marks]

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.....

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]

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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]

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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]

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10 Here is a linear sequence.

46 40 34 28 22

Work out the n th 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

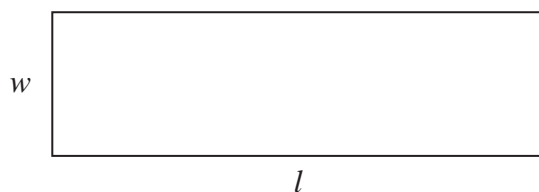
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Turn over ►



12 In this question all lengths are in centimetres.

A rectangle has length l and width w .



Not drawn
accurately

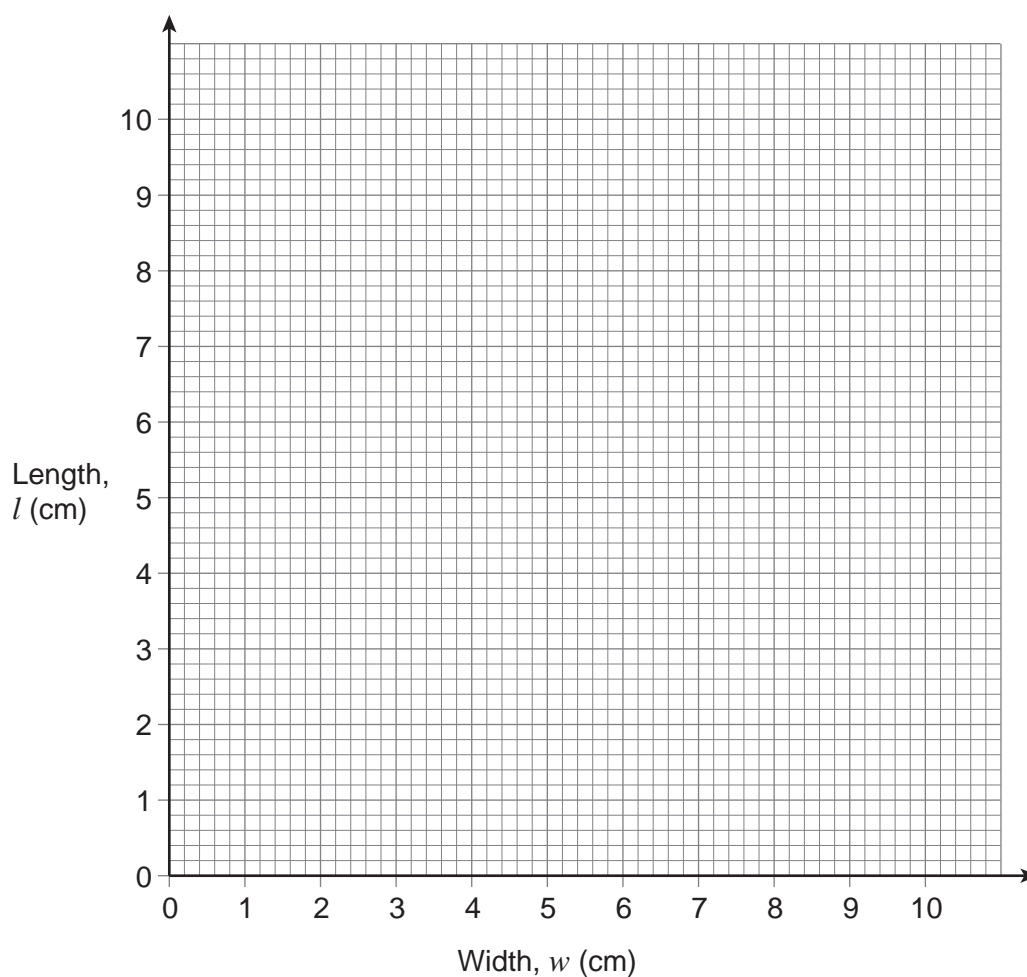
12 (a) w and l are such that

$$1 \leq w \leq 9$$

$$w + l = 10$$

Show this information on the graph.

[2 marks]



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

[2 marks]

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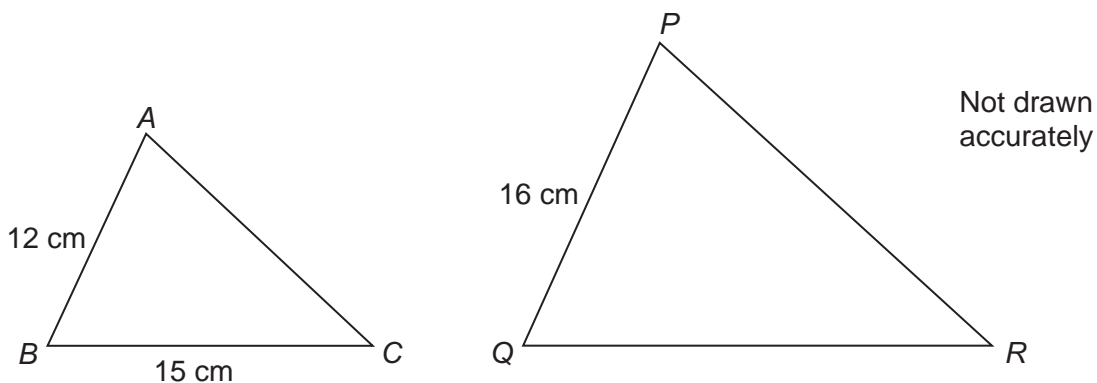
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Answer

13 Triangles ABC and PQR are similar.



Work out the length QR .

[2 marks]

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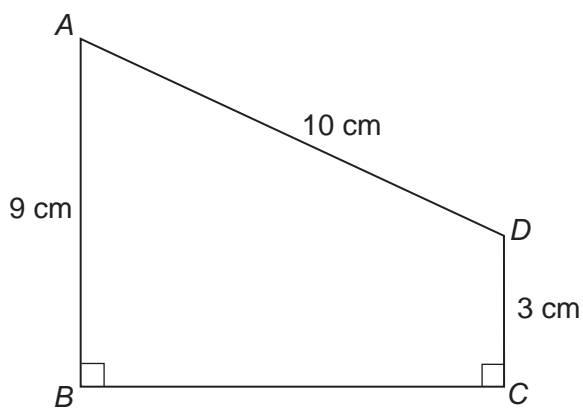
Answer cm

6

Turn over ►



14 $ABCD$ is a trapezium.



Not drawn
accurately

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

[4 marks]

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Answer cm



- 15 Work out the smallest integer value that satisfies the inequality

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

[3 marks]

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Answer

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

Circle the gradient of line M .

[1 mark]

-3 $-\frac{3}{2}$ 3 $\frac{3}{2}$

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

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

[1 mark]

$-\frac{4}{3}$ $\frac{3}{4}$ $\frac{4}{3}$ 3



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

$$\frac{9a^2 - b^2}{3a - b}$$

[2 marks]

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Answer

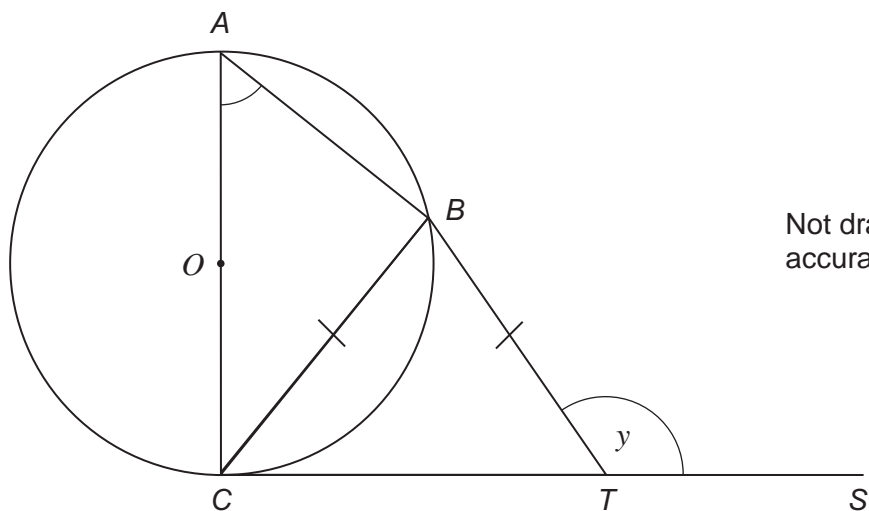
Turn over for the next question

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 $CAB = 180^\circ - y$
 Give reasons for any angles you write down or calculate.

[3 marks]

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19 (b) You are given that angle $ACB = 20^\circ$

Work out the value of y .

You **must** show your working which may be on the diagram.

[2 marks]

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Answer degrees

Turn over for the next question

5

Turn over ►



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

[1 mark]

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.....

Answer

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

[2 marks]

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Answer

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

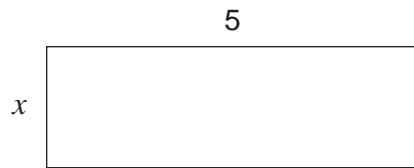
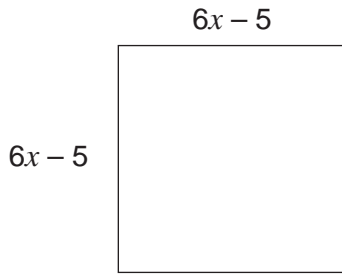
[3 marks]

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Answer



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



Not drawn accurately

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

[2 marks]

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

Work out the value of x .

[4 marks]

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$x =$

END OF QUESTIONS



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