

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Secondary Education  
Higher Tier  
June 2014

# Mathematics (Linear)

## 4365/1H

### Paper 1

Monday 9 June 2014 9.00 am to 10.30 am

# H

<p><b>For this paper you must have:</b></p> <ul style="list-style-type: none"> <li>mathematical instruments.</li> </ul> <p>You must <b>not</b> 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 2, 15 and 16. 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.

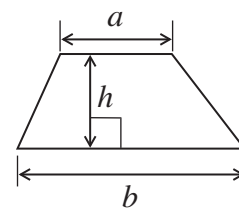
For Examiner's Use	
Examiner's Initials	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
18 – 19	
20 – 21	
22 – 23	
TOTAL	



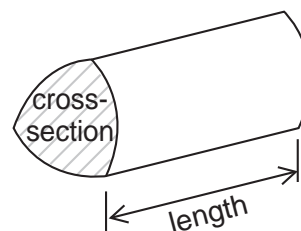
J U N 1 4 4 3 6 5 1 H 0 1

### Formulae Sheet: Higher Tier

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

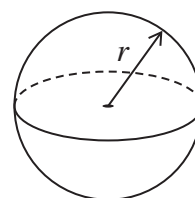


**Volume of prism** = area of cross section  $\times$  length



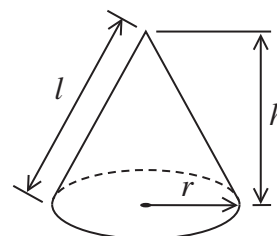
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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



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

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

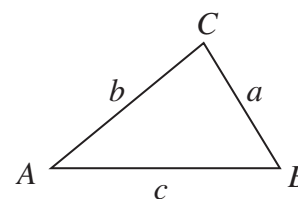


**In any triangle ABC**

**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** Circle the correct word to describe the following.

**1 (a)**  $2x - 7y$

[1 mark]

Equation

Expression

Formula

Identity

**1 (b)**  $P = 2l + 2w$

[1 mark]

Equation

Expression

Formula

Identity

**1 (c)**  $8(x - y) \equiv 8x - 8y$

[1 mark]

Equation

Expression

Formula

Identity

**Turn over for the next question**



\*2 A shop is having a sale on DVDs and CDs.

DVDs are sold at one price.  
CDs are sold at a different price.

2 DVDs and 1 CD cost £35  
2 DVDs and 2 CDs cost £45

Martin has £50

Does he have enough to buy 1 DVD and 3 CDs?  
You **must** show your working.

**[5 marks]**

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**3 (a)** Write down four **different** numbers that have  
 a **median** of 5  
 and a **range** of 7.

Put the numbers in order.

**[2 marks]**

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

**3 (b)** The table shows the scores of 20 students in a test.

Score	Frequency
7	6
8	9
9	4
10	1
<b>Total</b>	20

Work out the mean score.

**[3 marks]**

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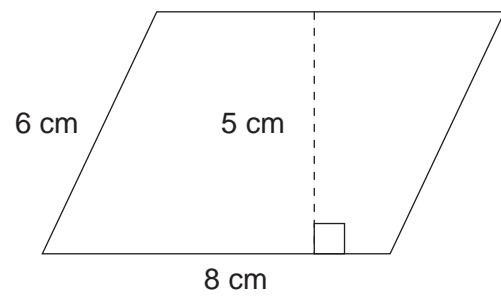
Answer .....

10
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Turn over ►



4 (a) Work out the area of this parallelogram.



Not drawn accurately

State the units of your answer.

[3 marks]

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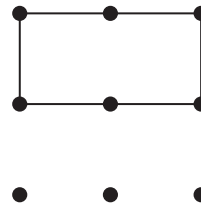
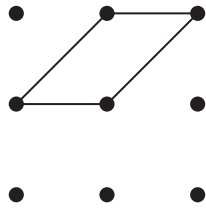
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Answer .....



4 (b) Shaz is drawing quadrilaterals on a nine-point square grid by joining points.

For example



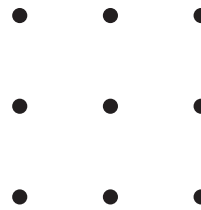
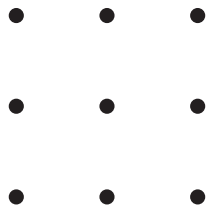
She says,

“If you draw a quadrilateral it will **always** have line or rotational symmetry.”

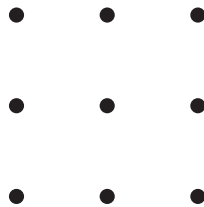
Draw a quadrilateral on the grid below to show that Shaz is wrong.  
Use the first two grids for practice and the bottom grid for your answer.

[1 mark]

Practice grids



Answer grid



4

Turn over ►



**5 (a)** Work out the Highest Common Factor (HCF) of 24 and 42

**[2 marks]**

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Answer .....

**5 (b)** As a product of prime factors  $36 = 2^2 \times 3^2$

Write 48 as a product of prime factors.

**[2 marks]**

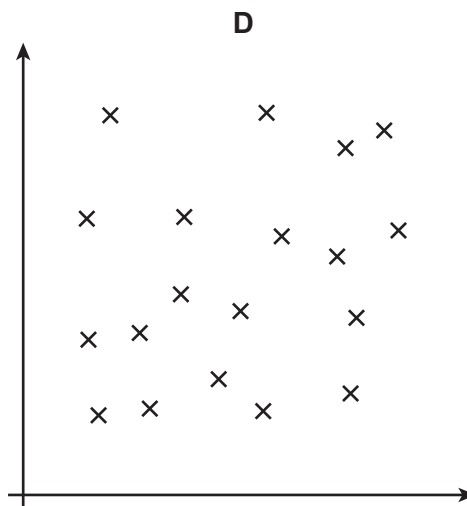
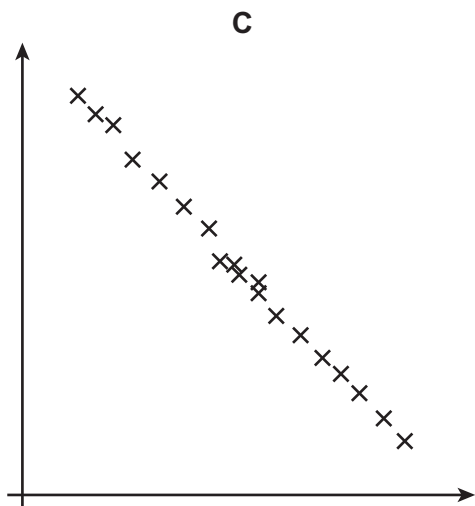
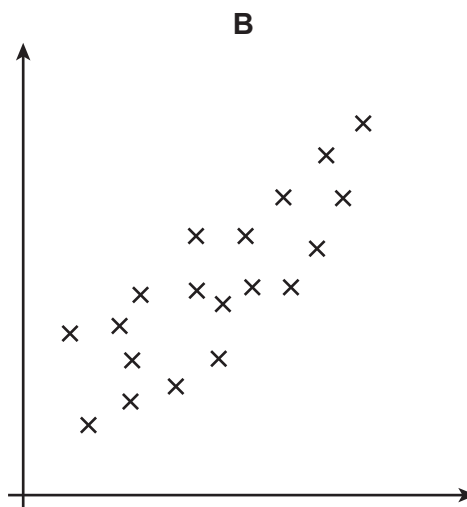
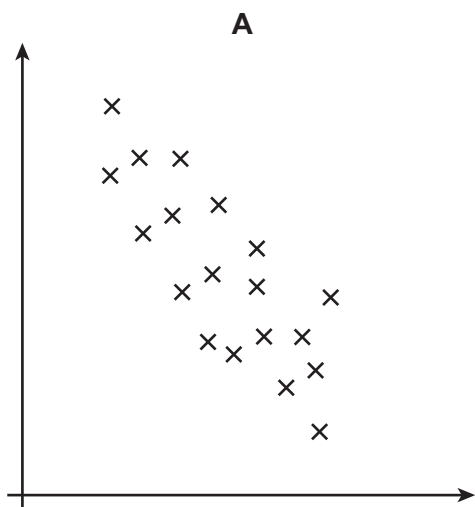
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Answer .....





6 Here are four scatter diagrams.



Choose a letter to complete these sentences.

[2 marks]

Scatter diagram ..... shows no correlation.

Scatter diagram ..... shows positive correlation.

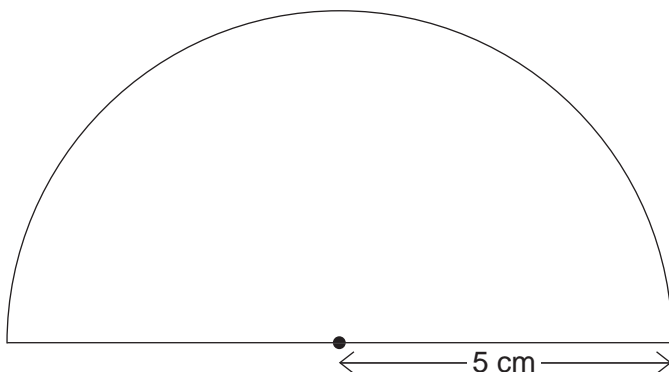
Scatter diagram ..... shows strong negative correlation.

6

Turn over ►



7 This semi-circle has a radius of 5 cm



Not drawn  
accurately

Work out the **perimeter** of the semi-circle.  
Remember to include the base.  
Use the approximation  $\pi = 3.1$

[3 marks]

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Answer..... cm



8 (a) Solve  $x^2 = 36$

[2 marks]

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Answer .....

8 (b) Solve  $\frac{y+1}{3} + \frac{y-2}{2} = 2$

[4 marks]

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y = .....

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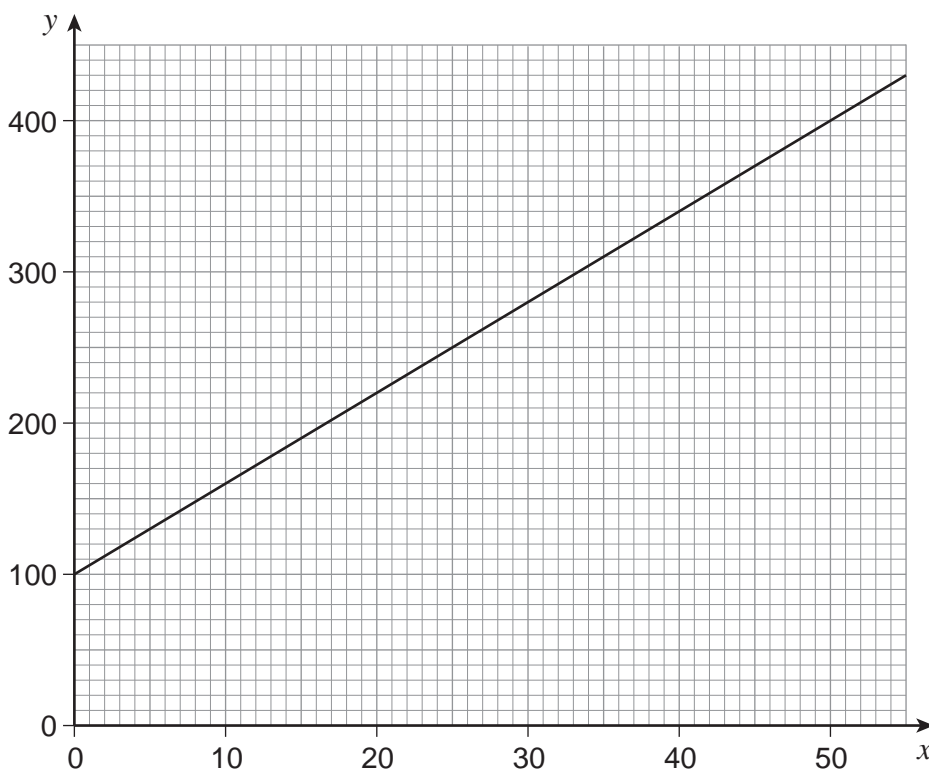
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9 (a) The graph shows the line  $y = ax + b$

Work out the values of  $a$  and  $b$ .

[2 marks]



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Answer  $a =$  .....

$b =$  .....



9 (b) Work out the value of  $y$  when  $x = 80$

[2 marks]

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Answer .....

Turn over for the next question

4

Turn over ►



**10** The table shows data about the times for men and women in a race.

	Mean	Interquartile range
Men	34m 50s	6m 30s
Women	40m 10s	4m 45s

Use data from the table to make **two** comparisons between the performances of the men and women in the race.

**[2 marks]**

Comparison 1

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Comparison 2

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**11** Paul travels from Rye to Eston at an average speed of 90 km/h  
He travels for  $T$  hours.

Mary makes the same journey at an average speed of 70 km/h  
She travels for 1 hour longer than Paul.

Work out the value of  $T$

**[4 marks]**

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Answer ..... hours

**Turn over for the next question**

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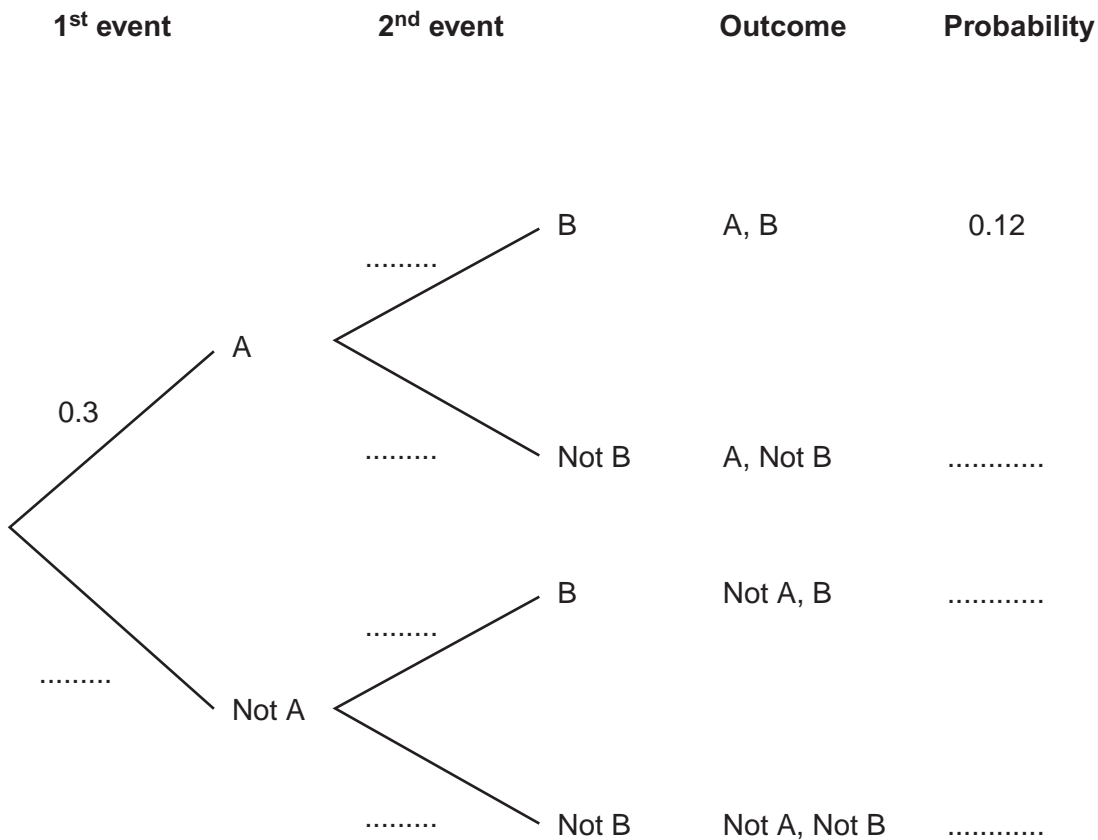
**Turn over ►**



12 A and B are independent events.

Fill in **all** eight missing probabilities in the diagram below.

[4 marks]



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**13** The sum of two numbers is 15.  
The difference of the same two numbers is 8.

Use algebra to work out the numbers.

Do **not** use trial and improvement.  
You **must** show your working.

**[4 marks]**

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Answer ..... and .....

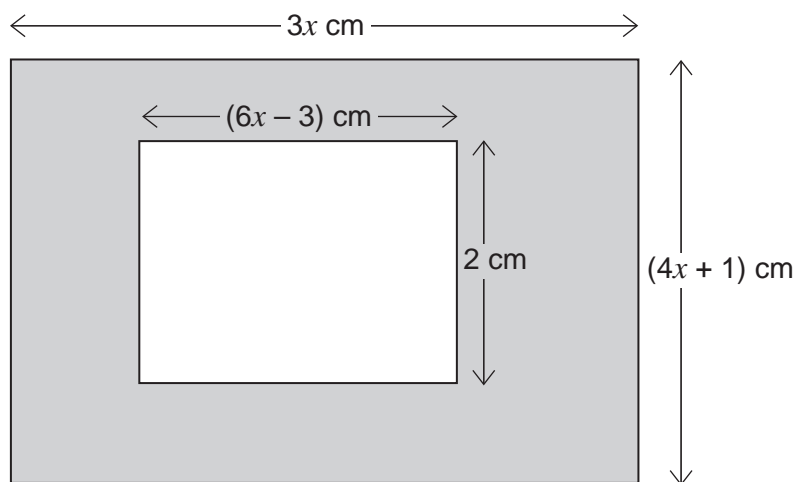
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8
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**Turn over ►**



14 The diagram shows two rectangles.



Not drawn accurately

14 (a) Show the shaded area, in  $\text{cm}^2$ , is given by  $12x^2 - 9x + 6$

[2 marks]

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14 (b) The shaded area is  $6 \text{ cm}^2$

Calculate the value of  $x$ .

[3 marks]

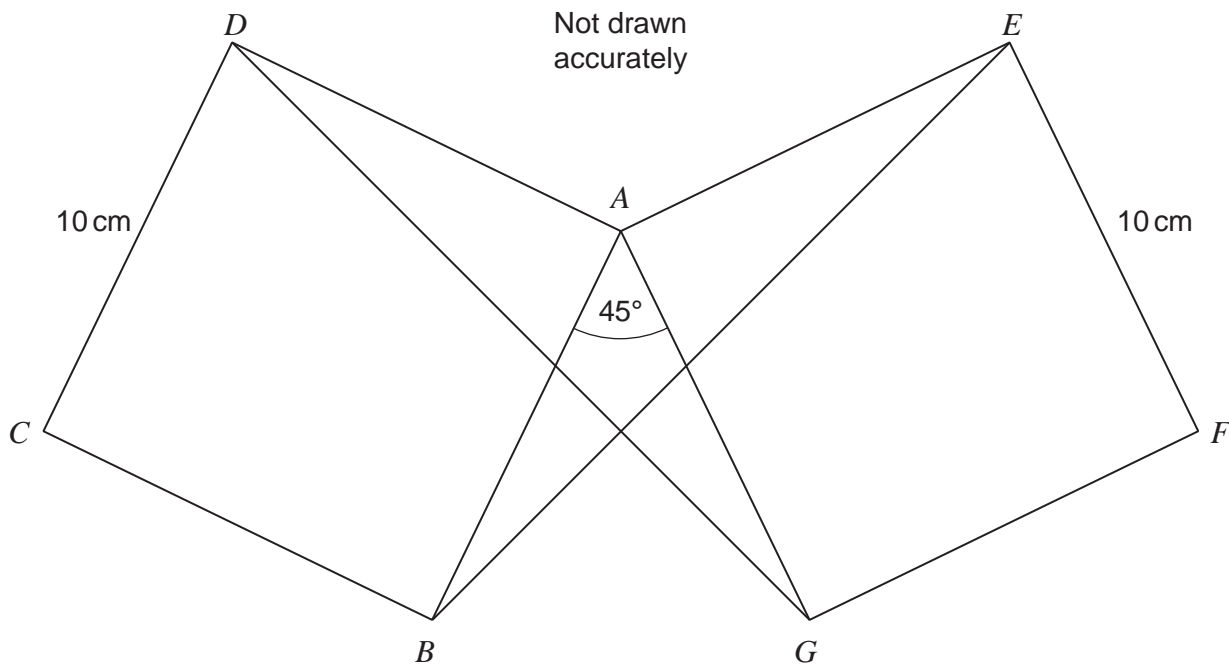
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Answer .....



**\*15**  $ABCD$  and  $AEFG$  are identical squares.  
 $CD = EF = 10$  cm  
Angle  $BAG = 45^\circ$



Prove that triangles  $AGD$  and  $ABE$  are congruent.

**[4 marks]**

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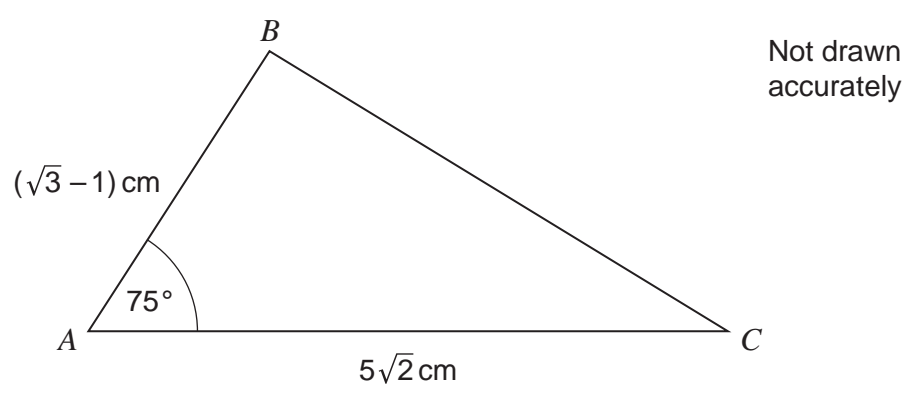


**16 (a)** Show clearly that  $(x - y)(x + y) \equiv x^2 - y^2$  **[1 mark]**

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**\*16 (b)**



You are given that  $\sin 75^\circ = \frac{\sqrt{3} + 1}{2\sqrt{2}}$

Show that the area of triangle  $ABC$  is  $2\frac{1}{2} \text{ cm}^2$  **[3 marks]**

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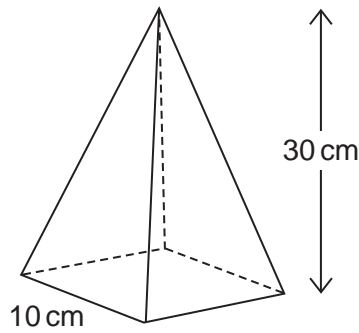
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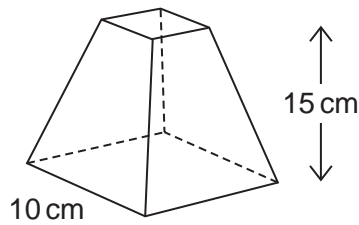


17 A pyramid has

a square base of side 10 cm  
a height of 30 cm



It is cut horizontally at a height of 15 cm  
The top pyramid is removed to leave this frustum.



You are given the formula

$$\text{Volume of pyramid} = \frac{1}{3} \times \text{area of base} \times \text{vertical height}$$

Calculate the volume of the frustum.

[3 marks]

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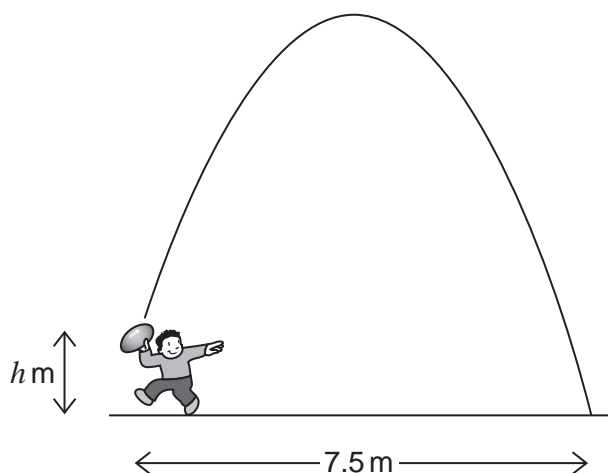
Answer ..... cm<sup>3</sup>

7
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Turn over ►

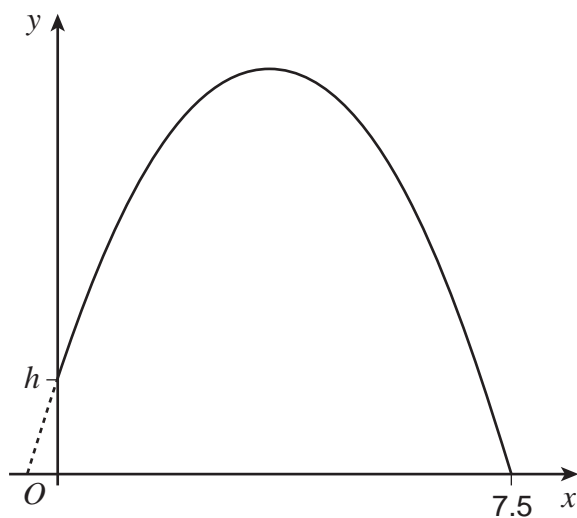


- 18 The diagram shows a ball being thrown. It is thrown from a height  $h$  metres above level ground. It lands 7.5 metres from where it was thrown.



The path of the ball can be modelled by the equation  $y = -\frac{1}{15}(2x + 1)(2x - 15)$

The sketch shows the graph of the equation.



**18 (a)** Work out the value of  $h$ .  
You **must** show your working.

**[2 marks]**

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Answer .....

**18 (b)** Show that the maximum height reached by the ball is  $4\frac{4}{15}$  metres.

Use the symmetry of the graph to help you.

You **must** show your working.

**[2 marks]**

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**END OF QUESTIONS**

4



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