

Surname	Centre Number	Candidate Number
Other Names		0



**GCSE**

4370/06



S15-4370-06

**MATHEMATICS – LINEAR  
PAPER 2  
HIGHER TIER**

A.M. THURSDAY, 4 June 2015

2 hours

**ADDITIONAL MATERIALS**

A calculator will be required for this paper.

A ruler, a protractor and a pair of compasses may be required.

**INSTRUCTIONS TO CANDIDATES**

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

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

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

Take  $\pi$  as 3.14 or use the  $\pi$  button on your calculator.

**INFORMATION FOR CANDIDATES**

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question 5.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	7	
2.	8	
3.	7	
4.	8	
5.	9	
6.	6	
7.	4	
8.	4	
9.	1	
10.	5	
11.	6	
12.	9	
13.	3	
14.	8	
15.	6	
16.	4	
17.	5	
<b>Total</b>	<b>100</b>	

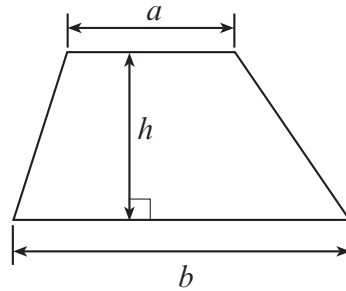
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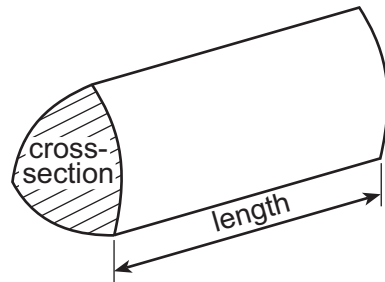
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## Formula List

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

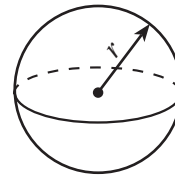


$$\text{Volume of prism} = \text{area of cross-section} \times \text{length}$$



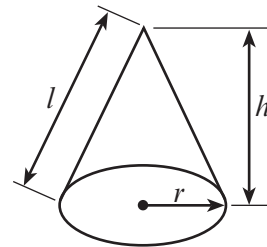
$$\text{Volume of sphere} = \frac{4}{3}\pi r^3$$

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



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

$$\text{Curved surface area of cone} = \pi r l$$

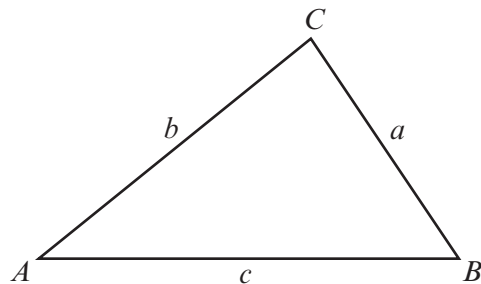


In any triangle  $ABC$

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

$$\text{Cosine rule } a^2 = b^2 + c^2 - 2bc \cos A$$

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



### The Quadratic Equation

The solutions of  $ax^2 + bx + c = 0$

where  $a \neq 0$  are given by

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



1. Solve the following equations.

(a)  $6x + 13 = 43 - 4x.$

[3]

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(b)  $\frac{2x}{5} = 40$

[1]

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(c)  $2(30 - x) = 44.$

[3]

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2. The table below shows some comparative data for 3 different European airlines.



	European Airlines		
	FreeFlight	Best2Fly	GoJet
Percentage of flights arriving on time, based on 30 000 flights	85%	88%	92%
Number of complaints, per 1000 passengers	0.62	0.68	0.78
Number of lost suitcases, per 1000 passengers	0.36	0.24	0.42

Use the information given in the table to answer the following questions.

- (a) FreeFlight, Best2Fly and GoJet all claim to be the best of these 3 airlines. Complete the following statements. [2]

'FreeFlight are the best of these 3 airlines because .....

.....'

'Best2Fly are the best of these 3 airlines because .....

.....'

'GoJet are the best of these 3 airlines because .....

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(b) How many of the 30 000 flights with Best2Fly were late?

[2]

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(c) FreeFlight and GoJet both expect to carry 500 000 passengers next month.  
How many more suitcases would you expect GoJet to lose than FreeFlight next month?

[3]

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(d) Write down an estimate for the probability that a flight with GoJet does not arrive on time.  
Express your answer as a percentage.

[1]

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3. Lewis owns a restaurant in Austria. He has received a bill for the electricity he used in the last three months.



The bill he received was for 760 euros. This was based on an **estimated** meter reading.

Lewis had made a note of his own meter readings. His note shows the following:

Previous meter reading	30 256
Meter reading at the end of this 3 month period	31 008

Electricity costs 0.78 euros per unit.  
The standing charge for electricity is 24.40 euros **per month**.  
In Austria, VAT is charged at 12% on electricity bills.

Calculate the difference between the bill Lewis was sent and what he thinks he should pay using the meter readings given. [7]

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4. (a) In Bilchbach, the rainfall for each of 10 days was measured. The results are summarised in the table below.

Daily rainfall, $r$ (mm)	Number of days
$4.5 \leq r < 5.5$	4
$5.5 \leq r < 6.5$	2
$6.5 \leq r < 7.5$	0
$7.5 \leq r < 8.5$	2
$8.5 \leq r < 9.5$	2

- (i) Calculate an estimate for the mean daily rainfall for the 10 days. [4]

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- (ii) State the modal class. [1]

Modal class .....

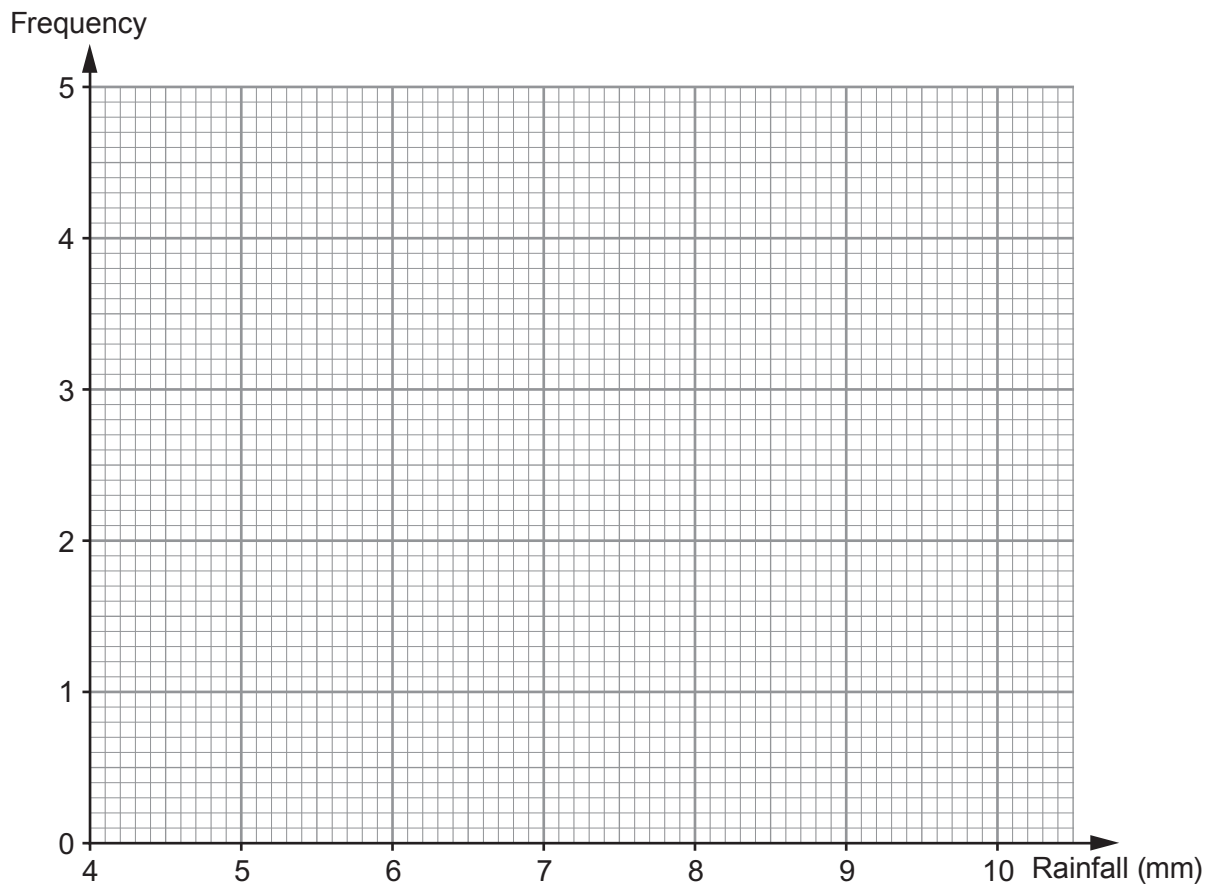
- (iii) Write down the class in which the median lies. [1]

Median class .....



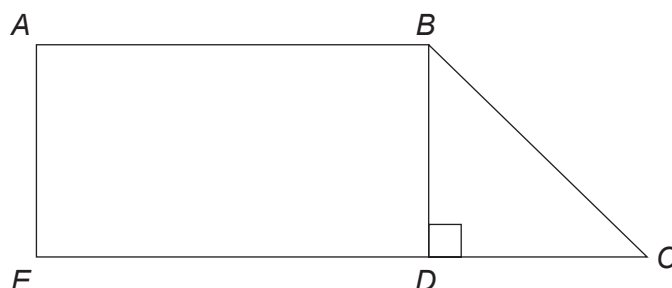


(b) On the graph paper below, draw a frequency polygon to show this rainfall data. [2]



5. You will be assessed on the quality of your written communication in this question.

The diagram below shows a rectangle and a triangle joined by a common side  $BD$ .



*Diagram not drawn to scale*

The area of rectangle  $ABDE$  is  $3900 \text{ cm}^2$ ,  $ED = 75 \text{ cm}$  and  $DC = 25 \text{ cm}$ .

Calculate each of the following:

- the area of triangle  $BDC$ , and
- the length of  $BC$ .

You must show all your working.

[9]

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6. A machine is used to pack boxes of peaches.



There should be exactly 8 peaches in each box.

To check the machine, 10 boxes of peaches are selected on the hour for 5 consecutive hours. Each hour the number of boxes containing exactly 8 peaches is recorded.

	1 a.m.	2 a.m.	3 a.m.	4 a.m.	5 a.m.
Number of the 10 boxes with <b>exactly</b> 8 peaches	8	10	7	7	9

- (a) The company prints a label for each box.

*Contains at least 8 peaches*

Explain why this label **may** not be suitable to use on the boxes of peaches.

[1]

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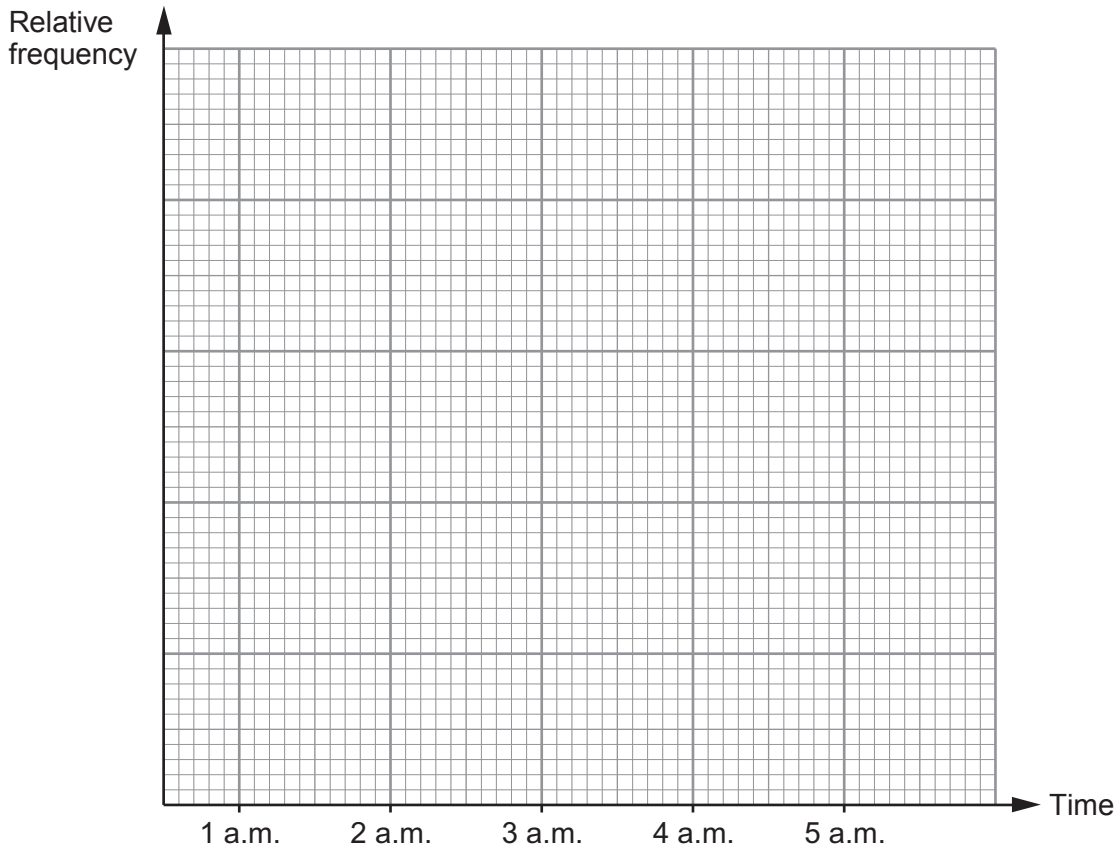


(b) It is decided to record and plot the relative frequencies for the information shown in the previous table.

(i) Complete the table below.  
Relative frequency must be recorded to 2 decimal places. [2]

	1 a.m.	2 a.m.	3 a.m.	4 a.m.	5 a.m.
Total number of boxes with exactly 8 peaches	8	18	25	32	41
Total number of boxes checked	10	20	30		
Relative frequency	0.80				

(ii) Use the graph paper below to plot the relative frequencies. [2]



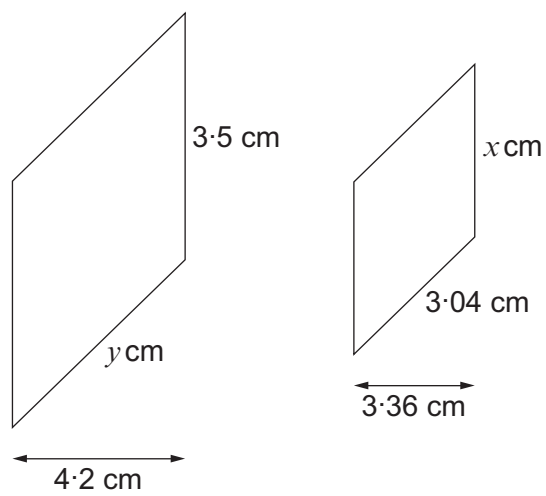
(iii) A box of peaches is selected at random.  
What is the best estimate of the probability that the box contains exactly 8 peaches? [1]

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7. The diagram shows two similar shapes.



*Diagrams not drawn to scale*

Calculate  $x$  and  $y$ .

[4]

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$x = \dots\dots\dots$

$y = \dots\dots\dots$

8. (a) Rearrange the following formula to make  $k$  the subject. [2]

$$3k^2 = m$$

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- (b) Rearrange the following formula to make  $g$  the subject. [2]

$$eg + fg = h$$

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9. Express 13 million in standard form.

[1]

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10. Jake's car has travelled a total of 31 500 miles, correct to the nearest 100 miles.

For each hour that the car travelled, he estimates that it travelled 46 miles, correct to the nearest mile.

Calculate the least number and greatest number of hours that Jake's car could have taken to travel this distance.

Give your answers correct to the nearest hour.

[5]

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Least number of hours taken .....

Greatest number of hours taken .....





11. At lunchtime, the probability that Shiona buys a bowl of soup is 0.8. The probability of Shiona buying an apple is independent of her buying a bowl of soup. The probability that Shiona buys a bowl of soup and an apple is 0.32.

(a) Complete the tree diagram.

[4]

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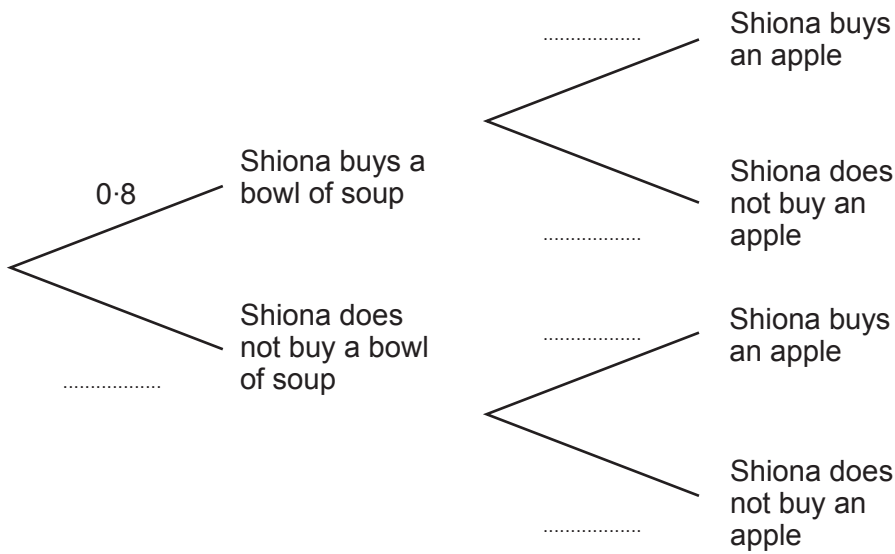
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(b) Find the probability that Shiona does not buy soup and does not buy an apple.

[2]

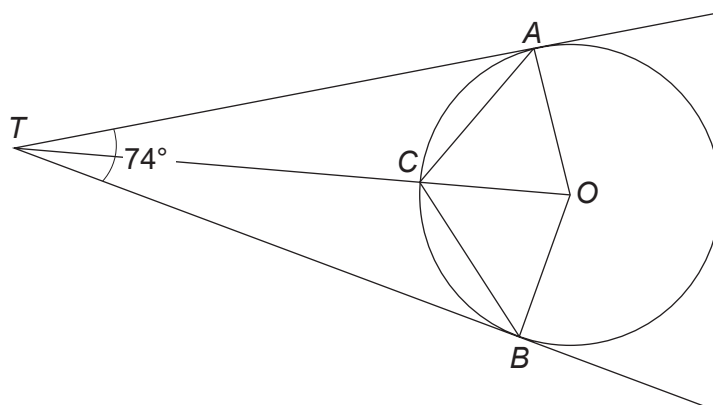
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12.



*Diagram not drawn to scale*

The diagram shows a circle with centre  $O$ .

$AT$  and  $BT$  are tangents to the circle and  $\widehat{ATB} = 74^\circ$ .

(a) Calculate the size of each of the following angles.

(i)  $\widehat{AOT}$

[2]

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(ii)  $\widehat{OBC}$

[2]

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(iii)  $\widehat{ACB}$

[1]

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- (b) The radius of the circle is 8 cm.  
Calculate the perimeter of the quadrilateral  $TAOB$ .

[4]

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13. On the squared paper below, draw the region which satisfies all of the following inequalities.

$$x \leq 7$$

$$x + y \geq 6$$

$$y \leq \frac{x}{2}$$

Make sure that you clearly indicate the region that represents your answer.

[3]

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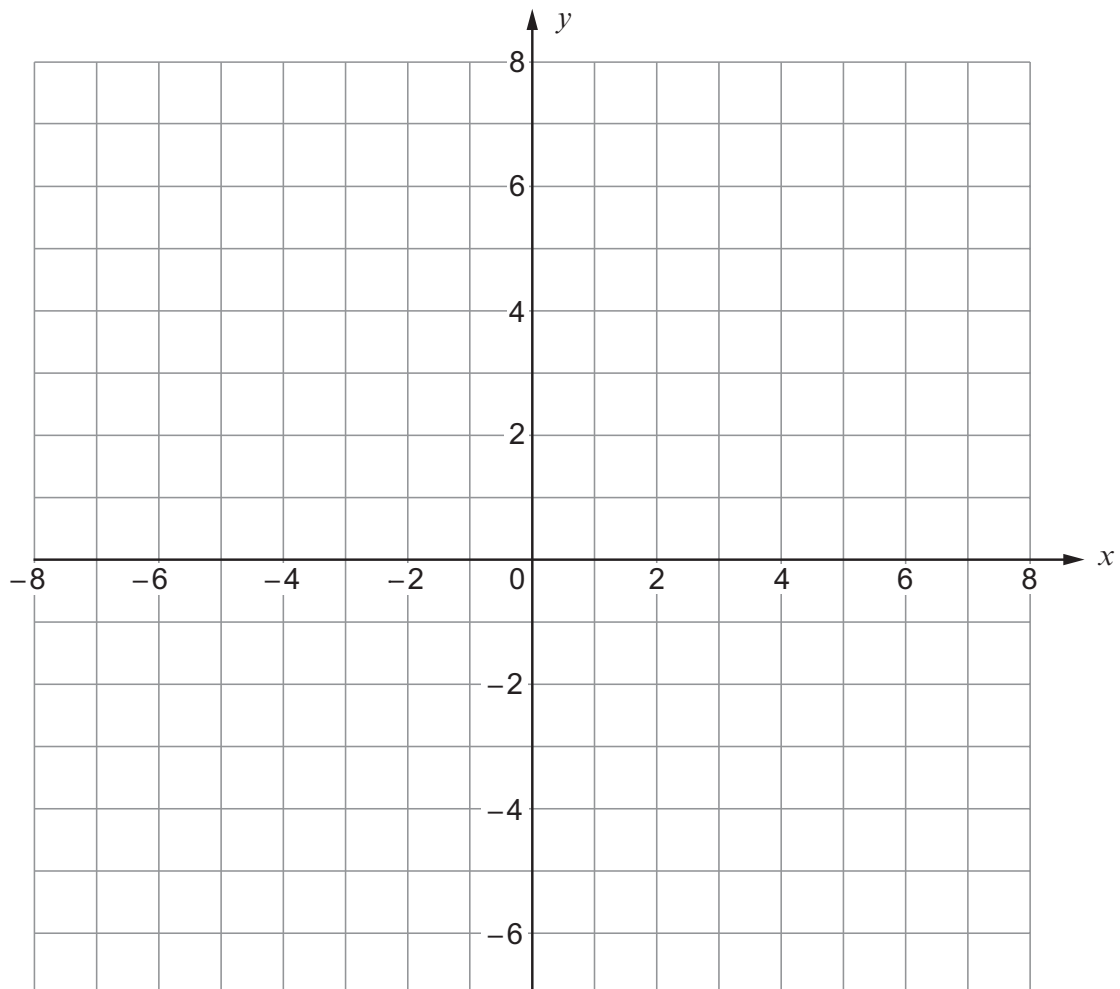
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14. The base of an open rectangular box is of length  $(2x + 6)$  cm and width  $x$  cm.  
The area of this base is  $59 \text{ cm}^2$ .  
The height of the open box is  $(x - 3)$  cm.

(a) Show that  $2x^2 + 6x - 59 = 0$ .

[2]

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(b) (i) Solve the equation  $2x^2 + 6x - 59 = 0$ , giving your answers correct to 2 decimal places.  
You must show all your working.

[3]

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(ii) Hence calculate the volume of the box.  
State clearly the units of your answer.

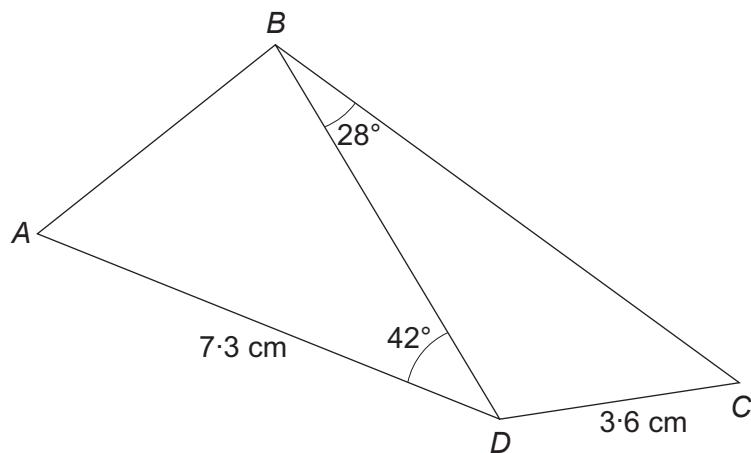
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Volume of the box is .....



15.

*Diagram not drawn to scale*

The area of triangle  $ABD$  is  $16.2 \text{ cm}^2$ .

$\hat{BCD}$  is an acute angle.

Calculate the size of  $\hat{BCD}$ .

[6]

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16. (a) Using the axes below, **sketch** the graph of  $y = \sin x$  for values of  $x$  from  $0^\circ$  to  $360^\circ$ .

[2]



- (b) Find all solutions of the following equation in the range  $0^\circ$  to  $360^\circ$ .

[2]

$$\sin x = -0.829$$

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17. The diagram below shows a box of chocolates.  
The shape of the box is a cylinder attached to a cone.

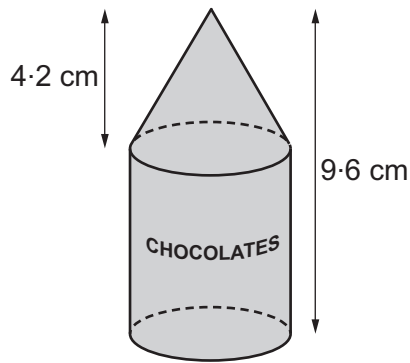


Diagram not drawn to scale

The volume of the complete box is  $245 \text{ cm}^3$ .  
Calculate the radius of the base of the box.  
Give your answer correct to one decimal place.

[5]

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