

Candidate Name	Centre Number	Candidate Number
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## New GCSE

4352/02

### MATHEMATICS (UNITISED SCHEME) UNIT 2: NON-CALCULATOR MATHEMATICS HIGHER TIER

A.M. TUESDAY, 21 June 2011

$1\frac{1}{4}$  hours

**CALCULATORS ARE  
NOT TO BE USED  
FOR THIS PAPER**

#### INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

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.

Take  $\pi$  as 3.14.

#### 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.

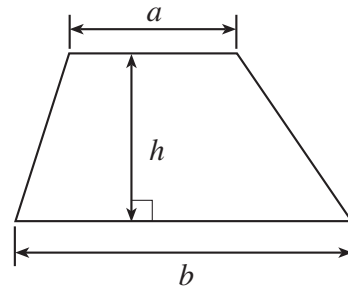
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question 4.

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

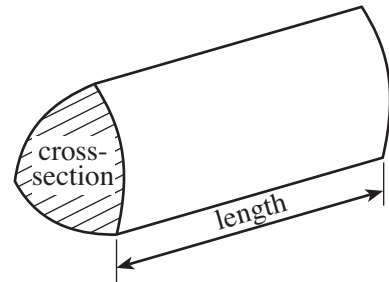
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## Formula List

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

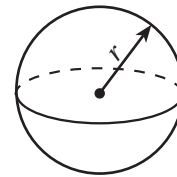


**Volume of prism** = area of cross-section  $\times$  length



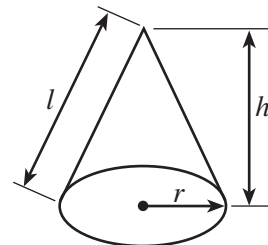
**Volume of sphere** =  $\frac{4}{3} \pi r^3$

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



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

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

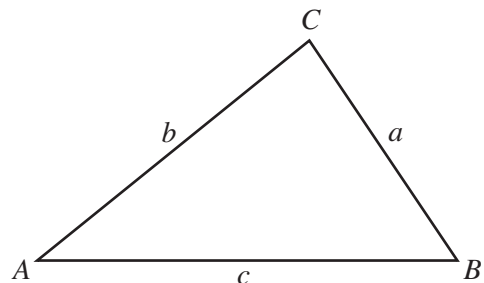


**In any triangle ABC**

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

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

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



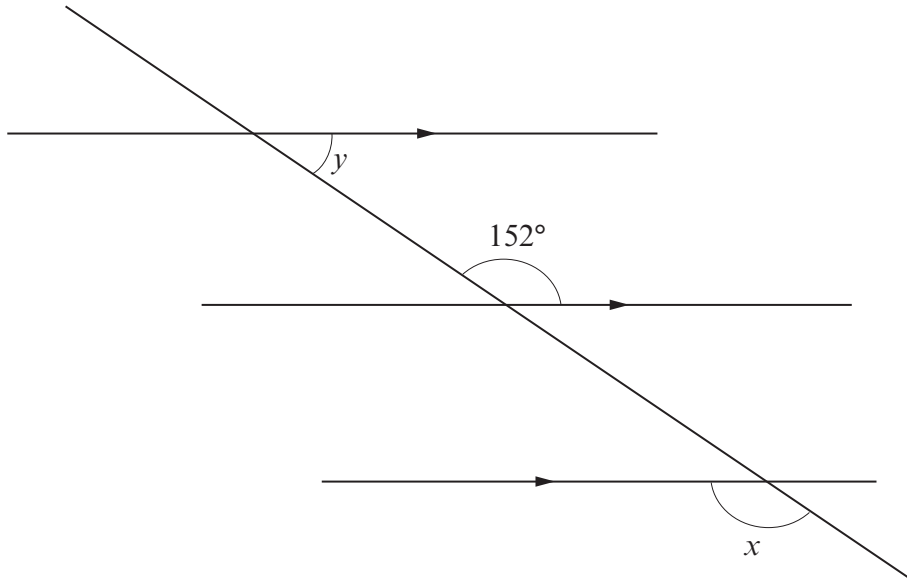
### The Quadratic Equation

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. (a) Write down the size of each of the angles marked  $x$  and  $y$  in the diagram.



*Diagram not drawn to scale*

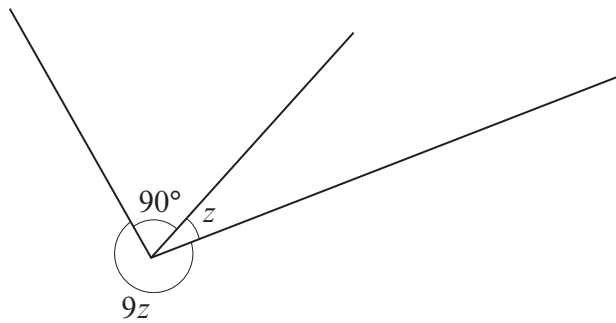
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$x = \dots\dots\dots^\circ$   
 $y = \dots\dots\dots^\circ$

[2]

- (b) Find the size of the angle marked  $z$ .



*Diagram not drawn to scale*

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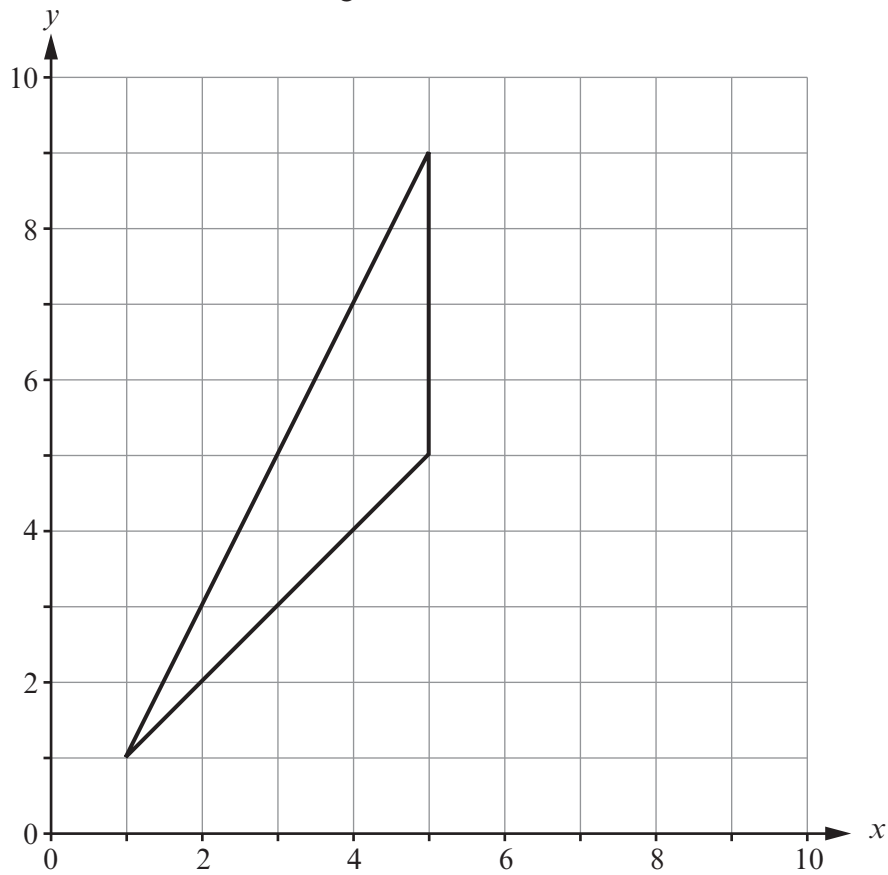
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$z = \dots\dots\dots^\circ$

[2]

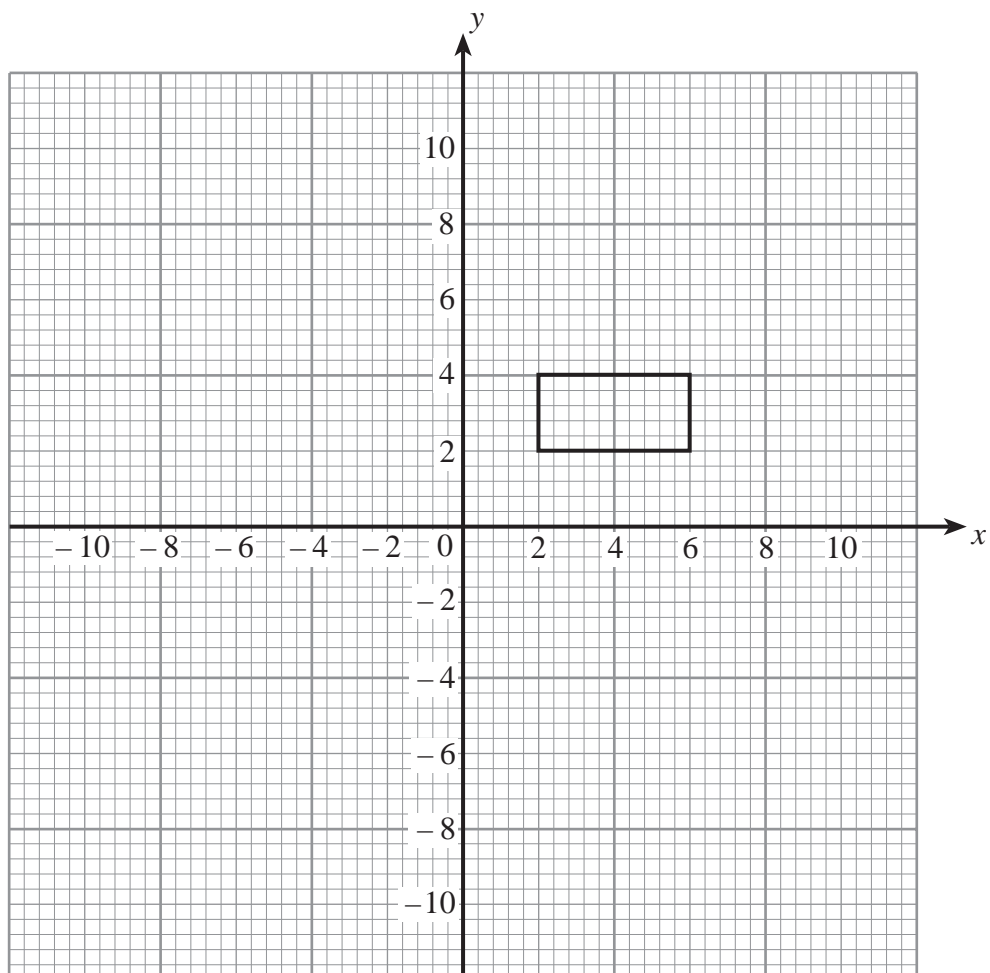
2. (a) Draw the reflection of the triangle shown in the line  $x = 5$ .

[2]



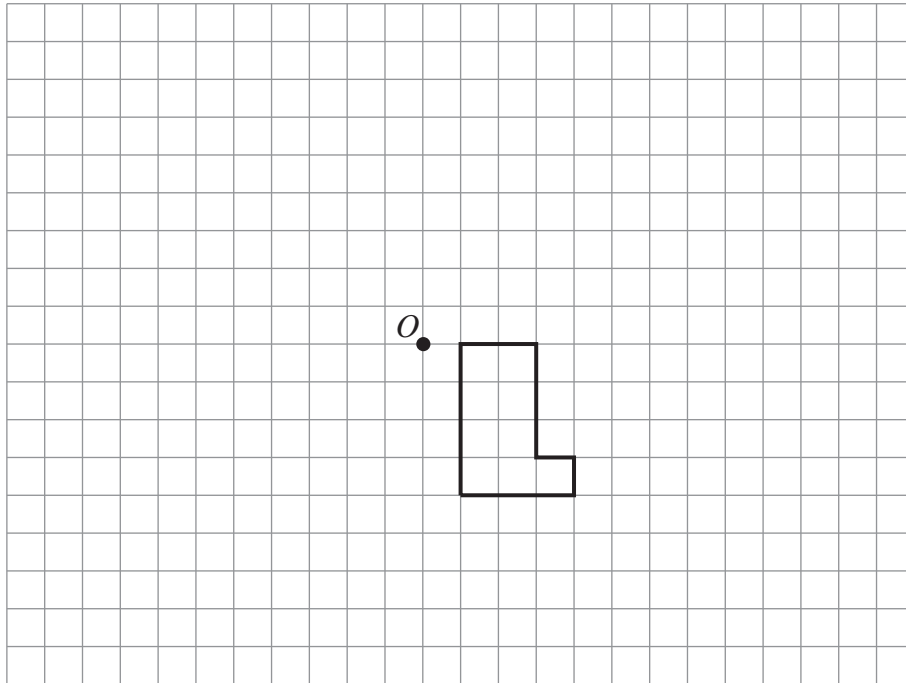
- (b) Rotate the rectangle through  $90^\circ$  anticlockwise about the point (6, 2).

[2]



- (c) On the grid below, draw the enlargement of the given shape using a scale factor of 2 and centre  $O$ .

[3]



3. Solve  $4x - 9 > 15 + 2x$ .

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[3]





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5. The table shows values of  $y = 2x^2 - 5x - 12$  for values of  $x$  from  $-3$  to  $5$ .

$x$	$-3$	$-2$	$-1$	$0$	$1$	$2$	$3$	$4$	$5$
$y = 2x^2 - 5x - 12$	21	6	$-5$	$-12$	$-15$	$-14$		0	13

- (a) Complete the table above.

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[1]

- (b) On the graph paper opposite, draw the graph of  $y = 2x^2 - 5x - 12$  for the values of  $x$  between  $-3$  and  $5$ .

[2]

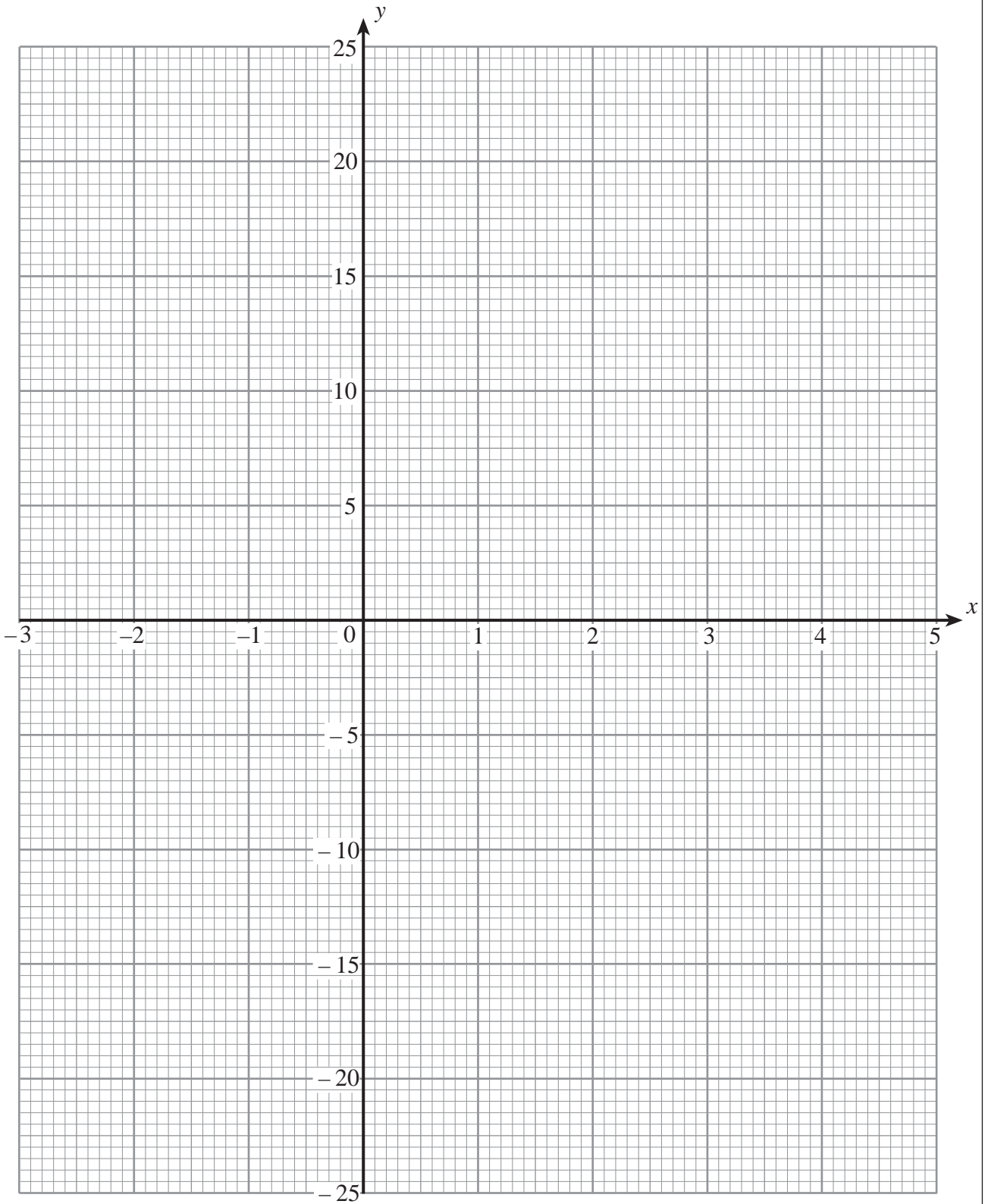
- (c) Write down the  $x$ -coordinates of the points where the curve  $y = 2x^2 - 5x - 12$  intersects the  $x$ -axis.

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[1]

- (d) Draw the line  $y = -2$  on your graph paper and write down the  $x$ -coordinates of the points where this line intersects the curve  $y = 2x^2 - 5x - 12$ .

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[2]





6. (a) Complete the following table by placing a tick (✓) in any box where the given statement is true.

Statement	Kite	Rhombus	Parallelogram
The diagonals are <b>not</b> equal in length			
Only one line of symmetry			
The diagonals bisect each other			

[2]

- (b) Write down

- (i) the name of the three-dimensional solid that has only four faces, all of which are triangular,

..... [1]

- (ii) the name of the three-dimensional solid that has only five faces, two of which are triangular and three of which are rectangular.

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7. Michelle has been given 6 equations and she has been asked to draw 6 graphs. Before starting, she looks at the equations.

$$y = 3x$$

$$y = x$$

$$y = \frac{1}{2}x$$

$$y = 2x + 5$$

$$y = 4x + 2$$

$$y = 2x + 4$$

- (a) Michelle says, “the steepest graph will be  $y = 2x + 5$ ”.  
Is Michelle correct?  
You must give a reason for your answer.

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[1]

- (b) Michelle also says, “no two graphs will be parallel to each other”.  
Is she correct?  
You must give a reason for your answer.

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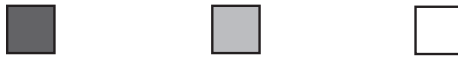
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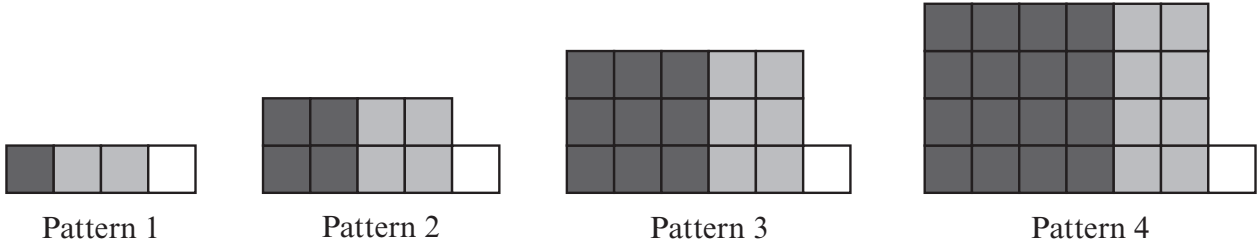
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[1]

8. Patterns are made using tiles of three different colours.



The patterns are made as shown below.



Write down an expression for the total number of tiles in Pattern  $n$ .

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[3]

9. A company owns a number of buses.

Bus	Unladen weight in kg
 <p data-bbox="376 712 732 748">Single decker low floor bus</p>	$7.72 \times 10^3$
 <p data-bbox="499 1041 611 1077">Minibus</p>	$4.68 \times 10^3$

Calculate the **total** unladen weight of **two** single decker low floor buses and **one** minibus altogether.

Give your answer in standard form.

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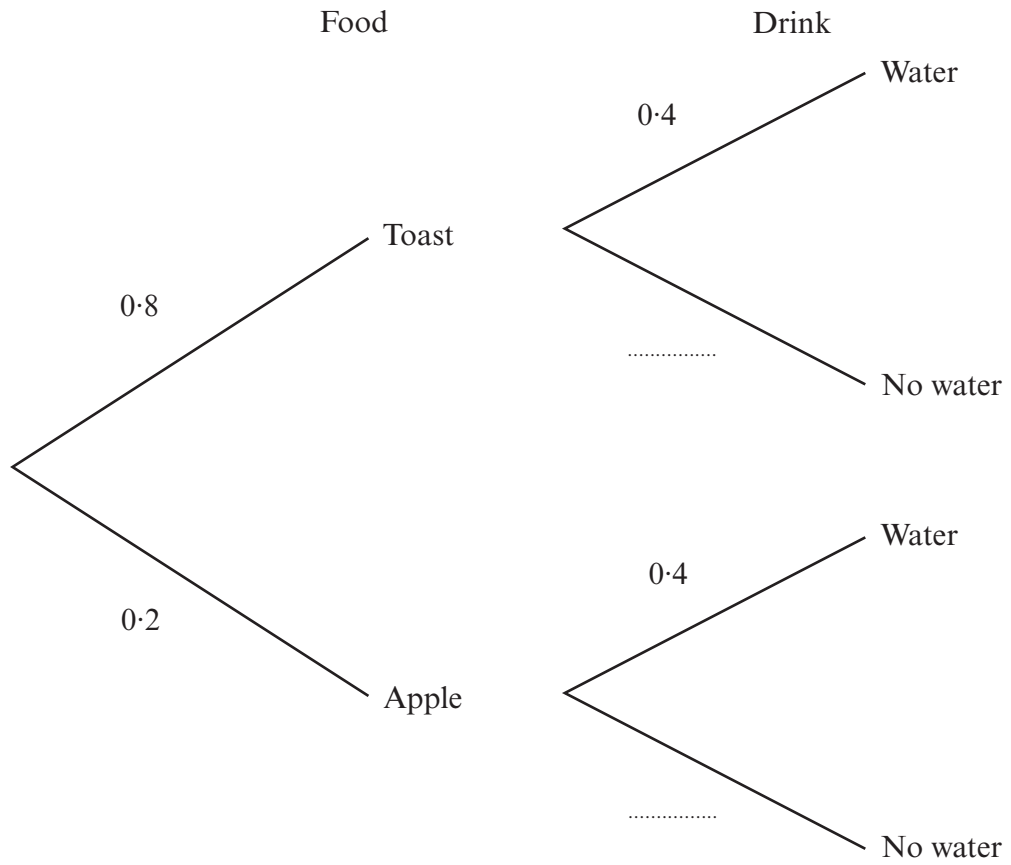
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[3]

10. Each morning break, Robert buys either a slice of toast or an apple in the school snack bar. The probability that he buys a slice of toast is 0.8. Whatever he eats, the probability that he buys a bottle of water is 0.4.

(a) Complete the following tree diagram.



[1]

- (b) Calculate the probability that Robert buys an apple but does not buy a bottle of water.

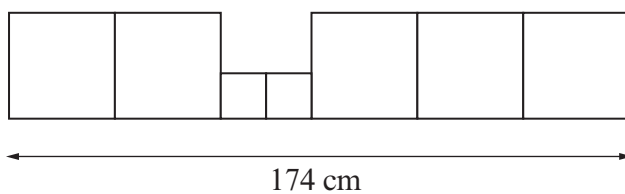
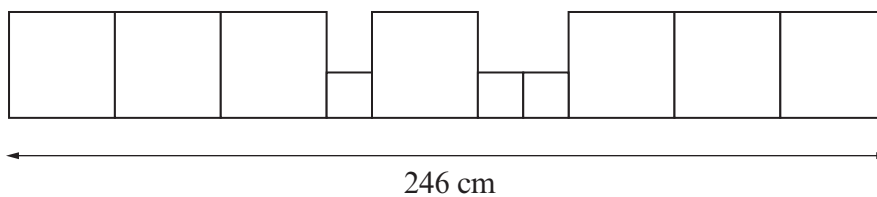
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11. Two sizes of square tiles are used to make these 2 patterns.



What would be the length of a pattern made using 2 large and 2 small tiles?

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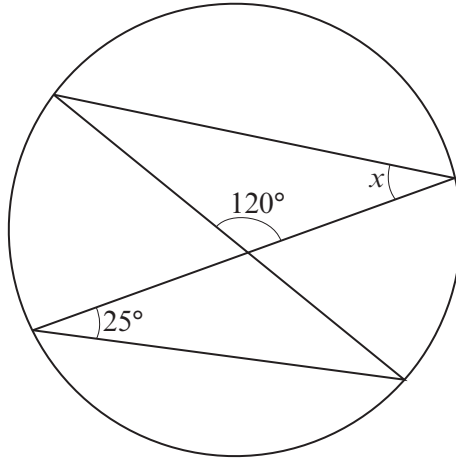
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12. (a) Calculate the size of the angle marked  $x$ .  
You must give a reason for your answer.



*Diagram not drawn to scale*

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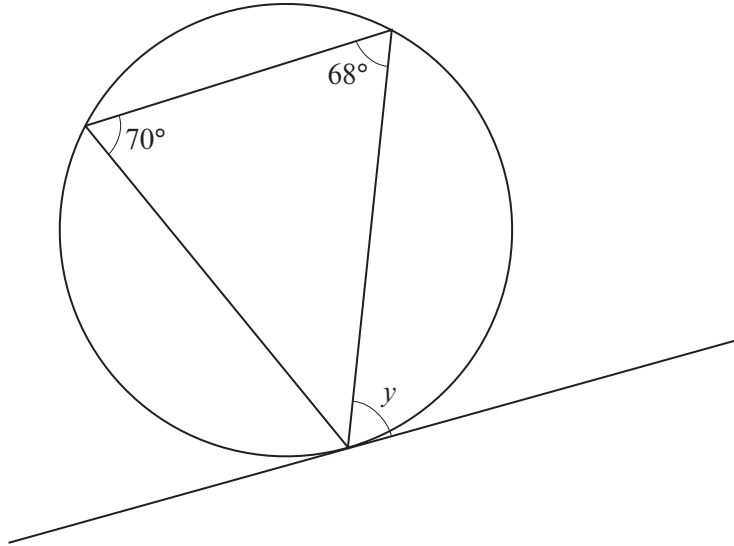
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- (b) Calculate the size of the angle marked  $y$ .  
You must give a reason for your answer.



*Diagram not drawn to scale*

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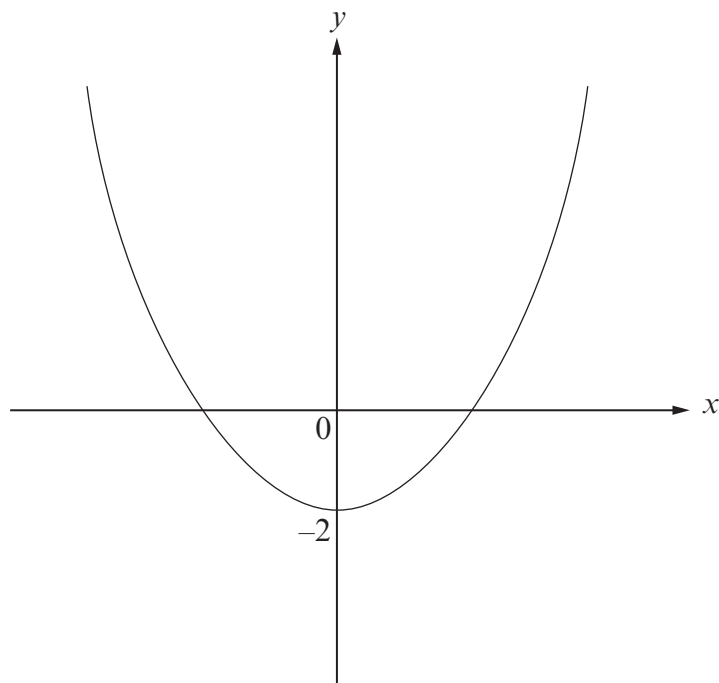
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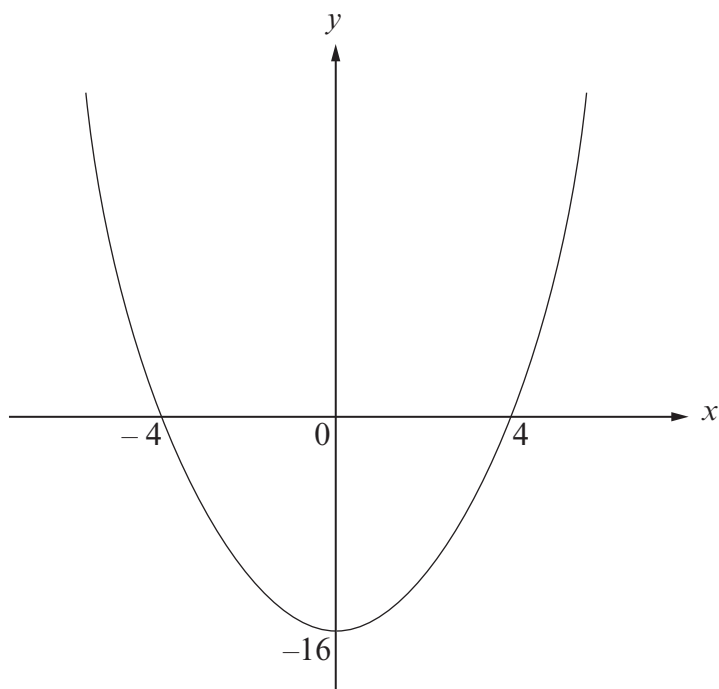
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13. (a) The diagram shows a sketch of  $y = f(x)$ .  
On the same diagram, sketch the curve  $y = f(x) + 6$ .  
Mark clearly the value of  $y$  at the point where this curve crosses the  $y$ -axis.



[2]

- (b) The diagram shows a sketch of  $y = g(x)$ .  
On the same diagram, sketch the curve  $y = -g(x)$ .  
Mark clearly the value of  $y$  at the point where this curve crosses the  $y$ -axis.



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14. (a) Express  $0.\dot{8}\dot{5}$  as a fraction.

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(b) Simplify  $(\sqrt{75} - \sqrt{3})^2$  and state whether your answer is rational or irrational.

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(c) Simplify  $1000^{-\frac{2}{3}}$ .

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15. A bag contains 11 beads, 6 of which are yellow, 3 are white and 2 are black. Two beads are drawn at random, without replacement, from the bag. Calculate the probability that at least one white bead is drawn.

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