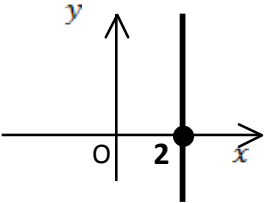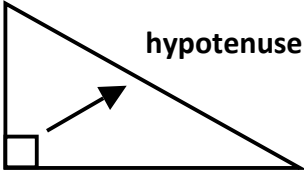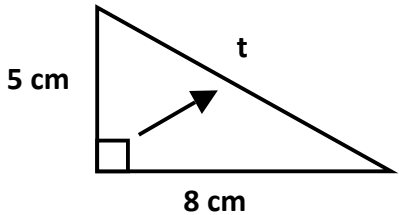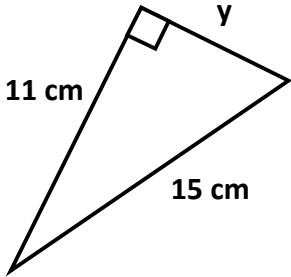# National 4: Relationships

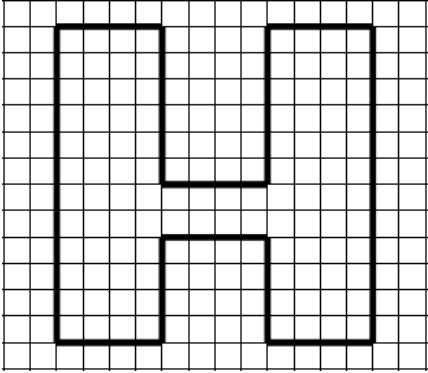| Learning Intention	I can draw and interpret straight line equations.			
Success Criteria		☺	😐	☹
• I can complete a table of values to identify a set of points. Complete the table for $y = 3x + 1$ <table><tr><td>x</td><td>1</td><td>2</td><td>3</td></tr><tr><td>y</td><td></td><td></td><td></td></tr></table>				
• I can plot a set of points and join them to make a straight line. Draw the line $y = 3x + 1$.				
• I can find the equation of a vertical or horizontal line from its graph. A vertical line has an equation of the form $x = c$. Draw the lines $x = 3$ and $x = -5$. A horizontal line has an equation of the form $y = c$. Draw the lines $y = -3$ and $y = 4$. Write down the equations of these lines:				
Extension • I know that $y = mx + c$ is the equation of a straight line with gradient m and y intercept c.				
• I can draw a straight line given the values of m and c. Draw the line with $m = 2$ and $c = 3$.				
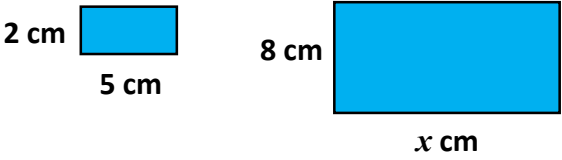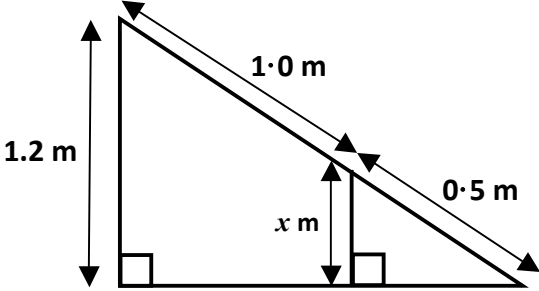
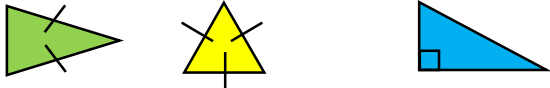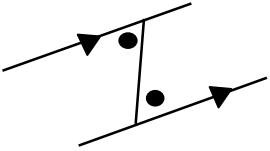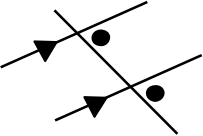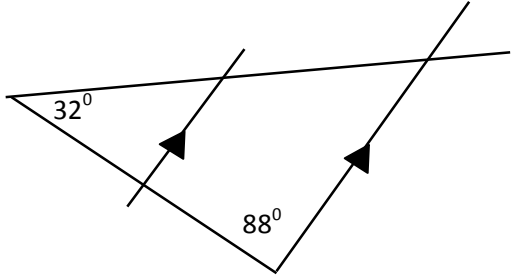| Learning Intention	I can solve linear equations and change the subject of a formula.			
Success Criteria		☺	😐	☹
• I know how to use the balancing method to solve an equation.				
• I know to use opposite processes when balancing an equation.				
• I know that as equations get more complex, more steps are needed to solve them.				
• I can recognise and solve equations which involve 2 steps: $3x + 5 = 17$ $\quad$ $8p - 11 = 5$				
• I can recognise and solve equations which involve 3 steps: $5t - 2 = 2t + 19$ $\quad$ $7y + 11 = 4y - 19$				
• I can solve equations involving brackets: $3(x - 5) = 21$ $\quad$ $5(m + 7) - 2(3m - 4) = 45$				
• I can solve inequalities of the form: $ax + b < c$ $\quad$ Solve the inequality: $8x - 11 < 5$				
• I can change the subject of a formula using the balancing method.				
• I know that my answer must start with the subject on the left hand side.				
• I recognise formulae that can be rearranged in 1 step. Change the subject of the formula to x: $\quad x + A = B$ $\quad gx = k$ $\quad \dfrac{x}{t} = f$				
• I recognise formulae that can be rearranged in 2 steps. Change the subject of the formula to x: $\quad dx - h = k$ $\quad \dfrac{d}{x} = g$ $\quad y = 2x + 4$				

Learning Intention	I can use the Theorem of Pythagoras.
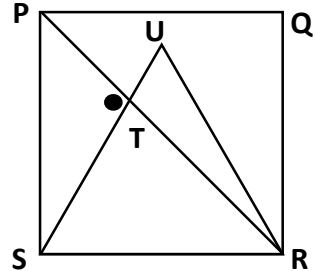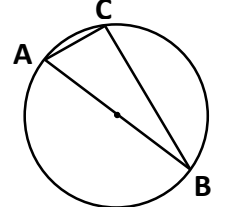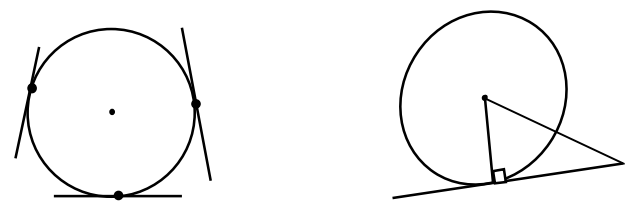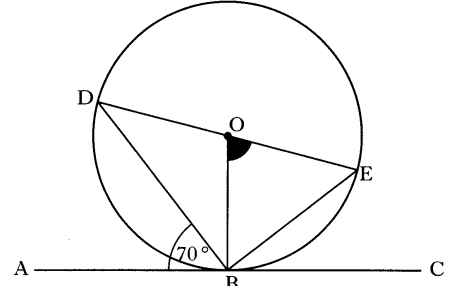
Success Criteria	☺	😐	☹
• I know that the longest side in a right angled triangle is called the hypotenuse.			
• I know that the hypotenuse is opposite the right angle. hypotenuse			
• I can use the Theorem of Pythagoras to find the missing side in a right angled triangle.			
• I know that to use the Theorem of Pythagoras I need the length of 2 of the 3 sides in a right angled triangle. Calculate the length of the missing side in each triangle. 5 cm, t, 8 cm y, 11 cm, 15 cm			
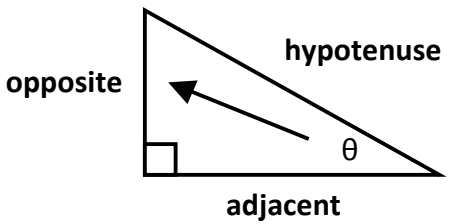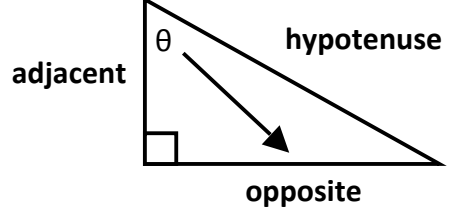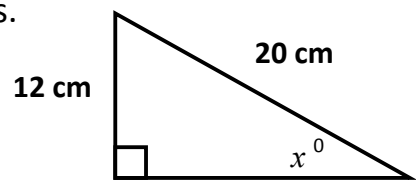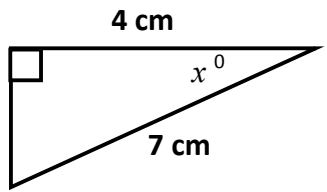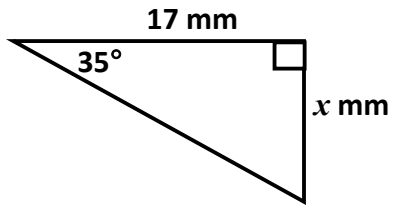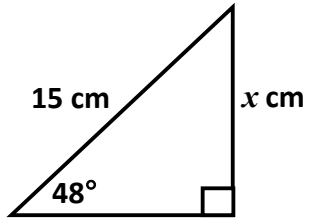
Success Criteria	☺	😐	☹
• I can solve problems by applying the Theorem of Pythagoras to isosceles triangles, squares and rectangles and other shapes by identifying and drawing a right angled triangle and labelling the sides appropriately. **Examples** (1) A flagpole is held in position by two ropes which are 8 m in length. If the ropes are fixed 6 metres apart on the ground, what is height of the flagpole? (2) The diagram below shows the shape of Samiha's garden. Samiha plants a hedge along side AB. Calculate the length of the hedge.			
• I can calculate the distance between 2 points using the Theorem of Pythagoras. Calculate the length of the line segment between A(2, 5) and B(4, 9).			
Extension • I know how to use the converse of the Theorem of Pythagoras and can communicate my solution and conclusion correctly. Is this a right angled triangle?			

Learning Intention	I can use a fractional scale factor to enlarge or reduce a shape.			

Success Criteria	☺	😐	☹
• I know how to use a scale factor to enlarge or reduce a shape. Draw an enlargement of the given shape using a scale factor of $\dfrac{3}{2}$. Draw a reduction of the given shape using a scale factor of $\dfrac{1}{2}$.			
• I know how to find a linear scale factor. These rectangles are similar. 2 cm 5 cm 8 cm x cm (a) What is the linear scale factor? (b) Calculate x.			
• I can solve problems using a linear scale factor. The diagram below shows the design for a house window. Find the value of x. 1·0 m 1.2 m 0·5 m x m			

Learning Intention	I can solve problems using a combination of angle properties.			

Success Criteria	☺	😐	☹
• I know that when 2 lines cross, the vertically opposite angles are equal.			
• I know that the angles in a triangle add up to 180°.			
• I know the angle properties of an isosceles, equilateral and right angled triangle.			
• I know that the angles in a quadrilateral add up to 360°.			
• I know that alternate angles are equal.			
• I know that corresponding angles are equal.			
• I know that when two parallel lines are crossed by another line alternate (Z) and corresponding (F) angles are created. Calculate the size of **all** the missing angles in this diagram. 32^0 88^0			

| Success Criteria	☺	😐	☹

• In the diagram   ➢ PQRS is a square
 	
           ➢ PR is a diagonal of the square
 	
           ➢ Triangle RST is equilateral.
 	
Calculate the size of angle PTS.			

• I know that every triangle in a semi-circle is right angled. In the diagram AB is a diameter. If angle ABC = 32°. Calculate the size of angle CAB.			
• I know that a tangent is a straight line which touches a circle at one point only. • I know that a tangent is a straight line which makes a right angle with the radius.			

• In the diagram   ➢ a circle, centre O, is drawn
 	
           ➢ the line AC is a tangent to the circle at B
 	
           ➢ Angle DBA = 70°.
 	
Calculate the size of the shaded angle BOE.			

| Learning Intention	I can use trigonometry in right angled triangles to calculate an angle or a side.			
Success Criteria		☺	😐	☹
• I know that the three sides in a right angled triangle are called the opposite, adjacent and hypotenuse.				
• Given an angle, I can draw and label the 3 sides of a right angled triangle correctly.				
• I can use "SOH CAH TOA" to determine the correct ratio.				
• I know how to calculate an angle given 2 sides. Calculate the size of angle $x°$.				
• I know how to calculate a side given an angle and a side. Calculate the length of side x.				

Success Criteria	☺	😐	☹
• I can solve problems by applying trigonometry to isosceles triangles, squares and rectangles and other shapes by identifying and drawing a right angled triangle and labelling the sides appropriately.			

(1)   A ramp has been constructed at a health centre.

It is 3·6 metres long and rises through 0·4 metres.

3·6 m

0·4 m

x^o
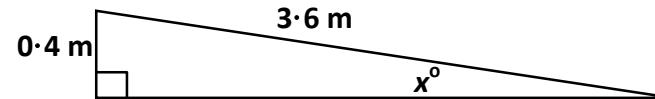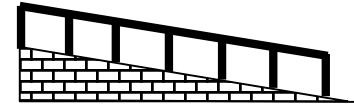
Calculate the angle, x^o, that the ramp makes with the horizontal.

(2)   A ramp in a skateboard park is in the shape of a triangle.

The ramp is 250 centimetres long and it makes an

angle of 35° with the ground.
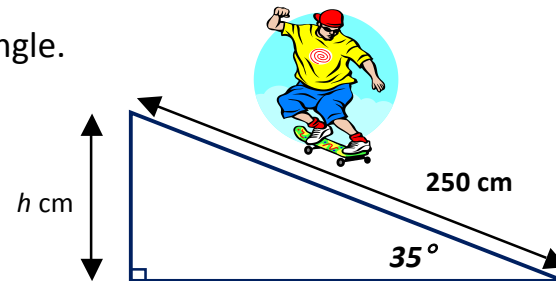
Calculate the height, h, of the ramp.

h cm

250 cm

35°