




## National 4: Expressions and Formulae

<b>Learning Intention</b>	I can simplify and carry out substitutions using algebraic expressions.		
<b>Success Criteria</b>			
<ul style="list-style-type: none"> <li>I can simplify algebraic expressions.  Simplify:    <math>2a + 3a</math>                      <math>5a + 2b - 4a</math>                      <math>3 \times a</math>  <u>Extension:</u>    Simplify:    <math>a \times b</math>                      <math>a \times a</math>                      <math>6a \times a</math>                      <math>5a \times 4b</math> </li> </ul>			
<ul style="list-style-type: none"> <li>I can use the distributive law and expand a bracket.  Expand:    <math>2(3t + 1)</math>                      <math>5(3m - 2n)</math> </li> </ul>			
<ul style="list-style-type: none"> <li>I can use the distributive law and simplify expressions.  Expand and simplify:    <math>2(3t + 1) + 7</math>                      <math>4(2k - 3) - 5k</math> </li> </ul>			
<ul style="list-style-type: none"> <li>I can identify a common factor and factorise an expression.  List the factors of:                      5                      8                      24                      <math>7y</math>  Find the highest common factor (HCF) of:    5 and 15    4 and 8    14 and 21    9, 12 and 18  Factorise:                      <math>3p + 12</math>    <math>8p - 4</math>    <math>15t + 35</math>    <math>12d - 18e + 9</math> </li> </ul>			
<ul style="list-style-type: none"> <li>I know how to carry out a substitution.  1)    If <math>a = 6</math> , <math>b = 2</math> and <math>c = -3</math> find the value    <math>a + b</math>                      <math>5a - 3b</math>    <math>ab + c</math>    <math>\frac{a}{b} + c</math>    <math>a^2</math>  2)    The post office uses the formula <math>C = 1.5F + 0.9S</math> to calculate the cost of sending small packages where <math>C</math> is the total cost (in £), <math>F</math> is first class and <math>S</math> is second class.  Calculate the cost of sending 5 packages by first class and 4 by second class. </li> </ul>			

**Learning Intention** I can continue a pattern and find a rule

**Success Criteria**



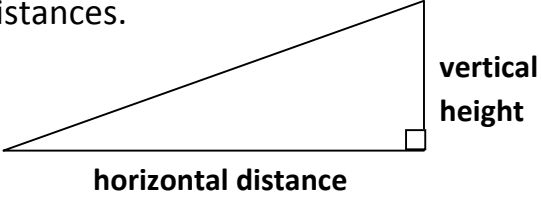
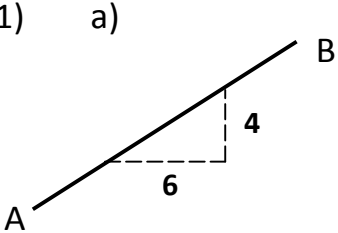
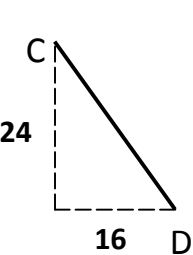
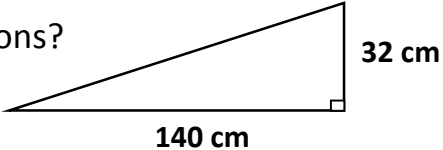





- I can continue a pattern.  
Find the next 3 terms in the following sequences: (a) 5, 9, 13, .... (b) 20, 18, 16, ...

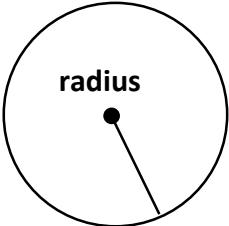
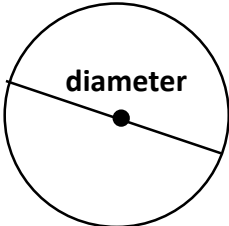
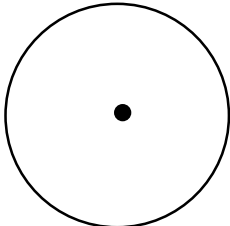
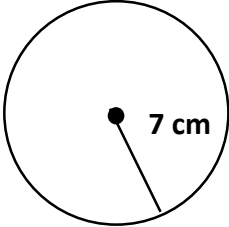
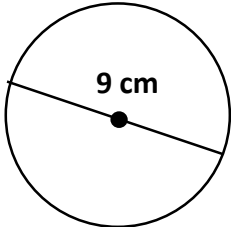
- I can determine the formula for a linear pattern and use it to carry out evaluations and solve related problems.

a) Complete the table and know how to find a formula for D in terms of T.

T	1	2	3	4	5		13
D	5	9	13				

- b) Find a formula for D in terms of T
- c) Find D if T is 17.
- d) Use the formula to find T when  $D = 101$ .

<b>Learning Intention</b> I can calculate the gradient of a straight line.			
<b>Success Criteria</b>	😊	😐	😞
<ul style="list-style-type: none"> <li>I know that the gradient of a line is a measure of its steepness.</li> </ul>			
<ul style="list-style-type: none"> <li>I can calculate the gradient of a line using vertical and horizontal distances.</li> </ul> <p style="text-align: center;"> <math display="block">\text{Gradient} = \frac{\text{vertical height}}{\text{horizontal distance}}</math> </p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>horizontal distance</p> <p>vertical height</p> </div> <div style="text-align: center;"> <p>Find the gradient of these lines:</p> <p>1) a)  b) </p> </div> <div style="text-align: center;"> <p>2) To satisfy building regulations the gradient of the slope has to be less than 0.2. Does this slope meet building regulations?</p>  <p>140 cm</p> <p>32 cm</p> </div> </div>			
<ul style="list-style-type: none"> <li>I can recognise lines with positive  and negative  gradients.</li> </ul>			
<ul style="list-style-type: none"> <li>I can recognise lines with zero  and undefined  gradients.</li> </ul>			
<ul style="list-style-type: none"> <li>I know that parallel lines have equal gradients. </li> </ul>			
<ul style="list-style-type: none"> <li>I know how to calculate the gradient of a line given 2 points.</li> </ul> <p>Find the gradient of the line joining A (-2, 3) and B (4, 5).</p>			

<b>Learning Intention</b> I can calculate the perimeter and area of shapes.			
<b>Success Criteria</b>	😊	😐	😞
<ul style="list-style-type: none"> <li>I know the meaning of perimeter.</li> </ul>			
<ul style="list-style-type: none"> <li>I know how to calculate the perimeter of a shape.</li> </ul>			
<ul style="list-style-type: none"> <li>I know the meaning of radius, diameter and circumference of a circle.</li> </ul> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>			
<ul style="list-style-type: none"> <li>I know that <math>d = 2r</math>, <math>r = \frac{1}{2}d</math>, <math>C = \pi d</math> and <math>A = \pi r^2</math>.</li> </ul>			
<ul style="list-style-type: none"> <li>I know how to calculate the circumference and area of a circle.</li> </ul> <p>Find the circumference of a circle which has a radius of 7 cm.</p> <p>Find the area of a circle which has a diameter of 9 cm.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>			

- I know that a quadrilateral is a shape with 4 sides.

- I know that there are 6 quadrilaterals:

Square

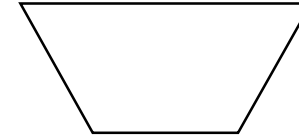
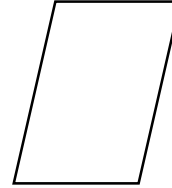
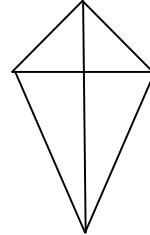
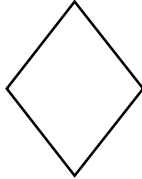
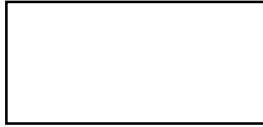
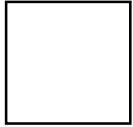
Rectangle

Rhombus

Kite

Parallelogram

Trapezium



Plot the points A (-2, 4), B (3, 4) and C (3, -2). Find the point D, such that ABCD is a rectangle.

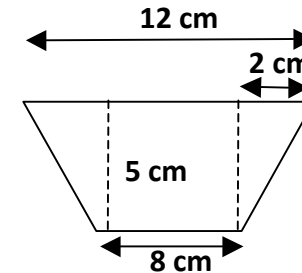
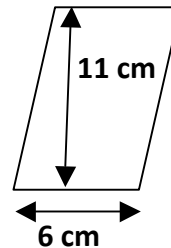
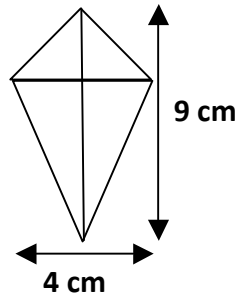
Plot the points P (-4, 5), Q (-2, 5), R (1, 0). Find the point S, such that PQRS is a kite.




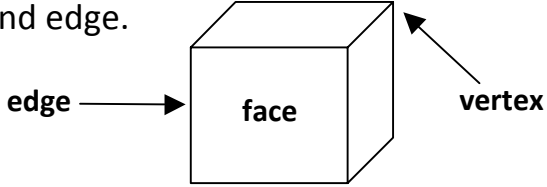
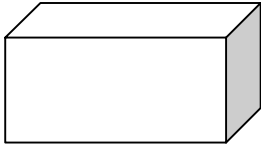
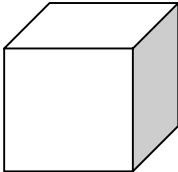
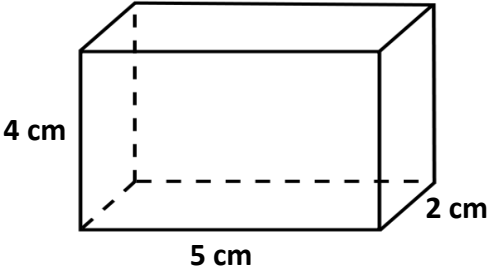
- I know the meaning of area.

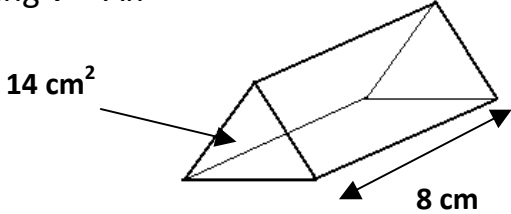
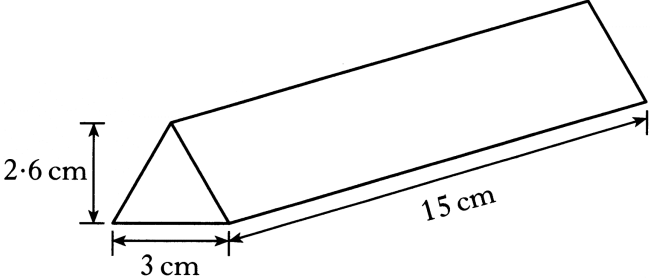
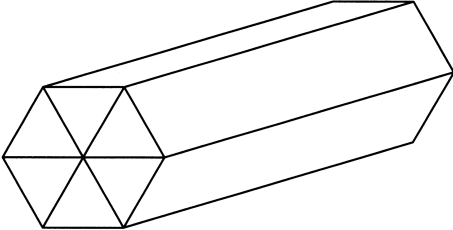
- I know how to find the area of a square, rectangle and triangle.

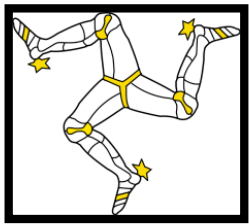
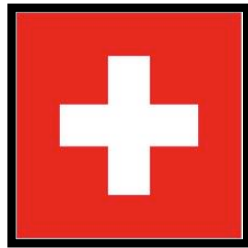
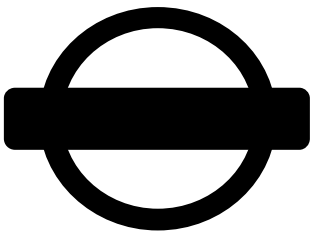

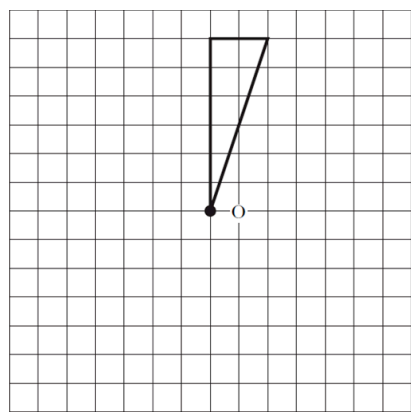
- I can calculate the area of a kite, parallelogram and trapezium by splitting the shape into rectangles and triangles or by using appropriate formulae.

Find the area of the following shapes:



<b>Learning Intention</b> I know that a prism is a 3D shape with a uniform cross-section.			
<b>Success Criteria</b>			
<ul style="list-style-type: none"> <li>I know the meaning of face, vertex and edge.</li> </ul> <div style="text-align: center;">  </div>			
<ul style="list-style-type: none"> <li>I can recognise a net of a cube and cuboid and know there are other nets.</li> </ul>			
<ul style="list-style-type: none"> <li>I know how to draw the net of a prism.</li> </ul> <p>Draw the net of:</p> <div style="text-align: center;">  </div>			
<ul style="list-style-type: none"> <li>I know how to calculate the surface area of a prism.</li> </ul> <p>Find the surface area of:</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>3 cm</p> </div> <div style="text-align: center;">  <p>4 cm      5 cm      2 cm</p> </div> </div>			

<b>Learning Intention</b> I know how to calculate the volume of a prism			
<b>Success Criteria</b>	☺	☹	☹
<ul style="list-style-type: none"> <li>I know the meaning of volume.</li> </ul>			
<ul style="list-style-type: none"> <li>I know how to calculate the volume of a cube and cuboid.</li> </ul>			
<ul style="list-style-type: none"> <li>I know how to calculate the volume of a prism using <math>V = Ah</math></li> </ul> <p>1) Calculate the volume of this prism.</p>  <p>2) The box for a chocolate bar is shown.</p>  <p>Six chocolate bars are packaged together. Find the volume of the package of six bars.</p> 			

Learning Intention	I know how to complete a diagram using rotational symmetry about a point.		
Success Criteria	😊	😐	😞
<ul style="list-style-type: none"> <li>I know the meaning of order of symmetry. What is the order of rotational symmetry in the following diagrams?</li> </ul> <div style="display: flex; justify-content: space-around; align-items: center;">     </div>			
<ul style="list-style-type: none"> <li>I know the meaning of <math>\frac{1}{4}</math> and <math>\frac{1}{2}</math> turn symmetry.</li> </ul>			
<ul style="list-style-type: none"> <li>I know how to complete a diagram using rotational symmetry about a point.</li> </ul> <p>Complete the shape so that it has quarter turn symmetry around the point O.</p> <div style="text-align: center;">  </div>			



<b>Learning Intention</b>	I can interpret statistics using a variety of methods.		
<b>Success Criteria</b>	😊	😐	😞
• I know that mean, median and mode are measures of “average”.			
• I know that range is a measure of spread.			
• I know how to calculate the mean, median, mode and range from a set of data.  Find the range, mean, median and mode of: 1, 3, 3, 3, 4, 4, 6, 10, 11			
• I can use mean, median, mode and range to compare data sets.			
• I know that a probability value lies between 0 and 1 inclusive.			
• I can calculate the probability of an event occurring. When rolling a die what is the probability of getting a number greater than 4?			
• I can use probability to make comparisons.			

<b>Learning Intention</b>	I can represent data sets in table and graph form.		
<b>Success Criteria</b>	😊	😐	😞
• I know the meaning of discrete and continuous data.			
• I can choose appropriate class intervals to group data.			
• I know how to construct a frequency table with class intervals. Choose an appropriate scale and interval for the data: 24, 18, 9, 36, 45, 29, 32, 7, 40, 28, 5, 41, 8, 28, 25. Construct a frequency table.			
• I know how to construct a pie chart. A group of people were asked for their favourite country to go on holiday to. The results are shown in the table: Draw a pie chart to illustrate this information.			
• I know how to construct a stem and leaf diagram.			
• I know how to construct a scattergraph.			
• I can draw a line of best fit on a scattergraph.			
• I can use a line of best fit to estimate one variable given the other.			

Country	Number
Italy	6
France	10
U.S.A.	8
Spain	14
Scotland	22