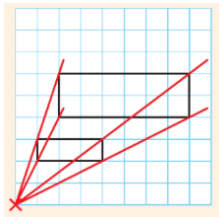
Topic: KS4 Foundation Unit 10 Transformations

MathsWatch clip numbers: 48, 49, 50, 148, 182

Duration: 10 Lessons

Composite: Unit Test

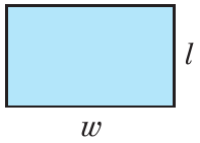
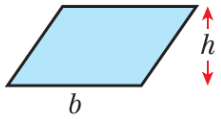
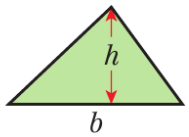
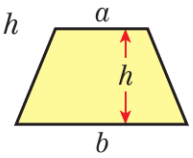
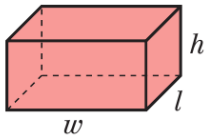
Key vocabulary:	**Powerful knowledge components crucial to commit to long term memory. Declarative knowledge.**	**Core knowledge components. Procedural and conditional knowledge.**	**Links to previous and future topics**
Translate Coordinate Reflection Rotation Enlargement Transform Scale Factor Origin	I know that: You can use a **column vector** to describe a transformation. The top number describes the movement to the left or right, and the bottom number describes the movement up or down. For example: $\begin{pmatrix}3\\2\end{pmatrix}$ means 3 right, 2 up $\quad$ $\begin{pmatrix}-4\\-5\end{pmatrix}$ means 4 left, 5 down. A **transformation** moves a shape so that it is in a different position. To describe fully a reflection on a coordinate grid you need to give the equation of the **mirror line**. You rotate a shape by turning it around a point called the **centre of rotation**. To describe fully a rotation, you need to give the angle, the direction and the centre of rotation. To enlarge a shape you multiply all the side lengths by the same number. The number that the side lengths are multiplied by is called the **scale factor**. The word **enlargement** is used even when the new shape is smaller than the original shape. When you enlarge a shape using a centre of enlargement, you multiply the distance from the centre to each vertex by the scale factor. To describe fully an enlargement, you need to give the scale factor and the centre of enlargement. Scale Factor Write $\frac{\text{length on image}}{\text{length on object}}$ and simplify.  Draw lines through each vertex on the image and the equivalent vertex on the original. All the lines should meet at the **centre of enlargement**.	I know how to: • Translate a shape on a coordinate grid. • Use a column vector to describe a translation. • Draw a reflection of a shape in a mirror line and on a coordinate grid. • Describe reflections. • Rotate a shape on a coordinate grid. • Describe a rotation. • Enlarge a shape by a scale factor. • Enlarge a shape using a centre of enlargement. • Describe an enlargement. • Transform shapes using more than one transformation. I know when to: • Identify the scale factor of an enlargement. • Find the centre of enlargement. • Describe combined transformations of shapes on a grid.	This topic builds on prior knowledge: • Be able to plot points in all four quadrants. • Understand the concept of rotation. • Draw and recognise lines parallel to axes and y = x, y = –x. This topic will be used in future learning: • Use transformation when dealing with more complex 15 constructions, loci and bearings questions •

Topic: KS4 Foundation Unit 8 Perimeter, area and volume 1

MathsWatch clip numbers: 52, 53, 54, 55, 56, 112, 114, 115, 119

Duration: 10 Lessons

Composite: Unit Test

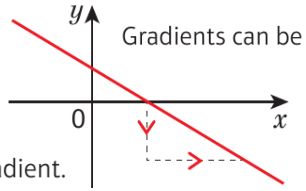
Key vocabulary:	Powerful knowledge components crucial to commit to long term memory. Declarative knowledge.	Core knowledge components. Procedural and conditional knowledge.	Links to previous and future topics
Perimeter Rectangle Parallelogram Triangle Trapezia Area Volume Perimeter Hectares Cuboid Prism Surface Area Convert	I know that: The perimeter of a 2D shape is the total distance all around the outside. The area of a 2D shape is the amount of space inside a shape. Area of rectangle = length × width $= l \times w$  Area of a parallelogram = base × vertical height $= b \times h$  Area of triangle = $\frac{1}{2}$ × base × vertical height $= \frac{1}{2} \times b \times h$  Area of trapezium = $\frac{1}{2} \times (a + b) \times h$  To find the **surface area** of a 3D solid, work out the area of each face. Add to find the total surface area. The **volume** of a 3D solid is the amount of space it takes up. Volume is measured in mm^3, cm^3 or m^3. Volume of a cuboid = length × width × height $= l \times w \times h$  	I know how to: • Calculate the perimeter and area of rectangles, parallelograms, triangles, and trapezia. • Find the height of a trapezium given its area. • Calculate the perimeter and area of shapes made from triangles and rectangles. • Calculate the surface and volume area of a prism. • Solve problems involving surface area and volume. • Convert between measures of volume. I know when to: • Convert between area measures. • Calculate a missing length, given the area. • Estimate lengths, areas and costs.	This topic builds on prior knowledge: • Recall the names of 2D shapes. • Identify and name common 3D solids: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres. • Convert metric units to metric units. This topic will be used in future learning: • Solve problems involving geometry and multiplicative reasoning problems. • Find area and perimeter of enlarged shapes.

Topic: KS4 Foundation Unit 9 Graphs

MathsWatch clip numbers: 96, 97, 133, 143, 159

Duration: 10 Lessons

Composite: Unit Test

Key vocabulary:	**Powerful knowledge components crucial to commit to long term memory. Declarative knowledge.**	**Core knowledge components. Procedural and conditional knowledge.**	**Links to previous and future topics**
Segment Midpoint Axes Coordinates Parallel Equation Interpret Scatter Graph Distance-time Graph Predictions	I know that: The equation $y = 1$ means the y-coordinate is always 1. The line is parallel to the x-axis. The equation $x = 3$ means the x-coordinate is always 3. The line is parallel to the y-axis. The **midpoint** of a line segment is the point exactly in the middle. To find the coordinates of the midpoint, add the x-coordinates of the end points and divide by 2, and add the y-coordinates of the endpoints and divide by 2. The steepness of a graph is called the **gradient**. You can find the gradient using: $\frac{\text{units up or down}}{\text{units across}}$ Gradients can be positive (/) or (\) negative. To find the gradient work out how many units the graph goes up or down for each unit it goes across.  **Parallel lines** have the same gradient. A linear equation produces a straight-line graph.The equation of a straight line is $y = mx + c$ gradient m — y-intercept c You can use the ***y*-intercept** and gradient to write the equation of a line of best fit and other real-life graphs, and use this equation to make predictions. Average speed = $\frac{\text{distance travelled}}{\text{time taken}}$ On a distance–time graph, the gradient represents the speed of the journey. On a velocity–time graph the gradient represents the acceleration.	I know how to: • Find the midpoint of a line segment. • Recognise, name and plot straight-line graphs parallel to the axes. • Generate and plot coordinates from a rule and from tables of values. • Find the gradient of a line. • Find the equations of straight-line graphs. • Sketch graphs given the values of m and c. • Draw and interpret graphs from real data. • Use distance–time graphs to solve problems. • Draw distance–time graphs. I know when to: • Draw graphs to represent relationships. • Identify and interpret the gradient from an equation. • Interpret rate of change graphs. • Draw and interpret a range of graphs.	This topic builds on prior knowledge: • Plot coordinates and read scales • Substitute into a formula. • Understand that parallel lines will never meet. This topic will be used in future learning: • Ratio and proportion problems that include reading from a grade • Proportion and graphs questions requiring students to recognise and use direct proportion on a graph. • Understand the link between the unit ratio and the gradient.