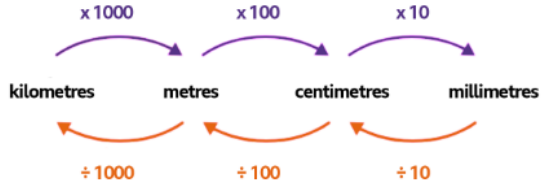
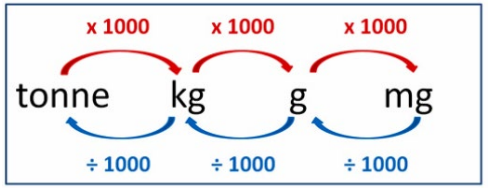
The Sutton Academy

Knowledge Rich Curriculum Plan

Year 7 Core – Measures, 2D Shapes and Angles

Lesson objective	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success	Feedback
To learn how to convert metric units for measures.	• Students will know how to make simple conversions between units of length including mm, cm, m, km. • Students will know how to make simple conversions between units of mass including mg, g, kg, tonnes. • Students will know how to make simple conversions between units of volume including ml, cl, l. **Opportunity for challenge:** • Students will know how to make multi-step conversions between different units of length, mass and volume. E.g. mm to m etc.	**Convert –** change a value from one form to another **Metric** –A system of measurement that uses the meter, litre, and gram as base units of length, volume and mass **Capacity –** the maximum amount that something can contain. **Volume** – the amount of space inside a 3D object **Mass** – the weight of an object	• Students need to know how to multiply and divide by 10, 100 and 1,000.	 **Going from larger to smaller units (purple arrows):** • Kilometres to metres: multiply by 1000 (because 1 kilometre = 1000 metres) • Metres to centimetres: multiply by 100 (because 1 metre = 100 centimetres) • Centimetres to millimetres: multiply by 10 (because 1 centimetre = 10 millimetres) **Going from smaller to larger units (orange arrows):** • Millimetres to centimetres: divide by 10 • Centimetres to metres: divide by 100 • Metres to kilometres: divide by 1000  This diagram shows how to convert between different units of mass in the metric system: tonne, kilogram (kg), gram (g), and milligram (mg). **Converting from larger to smaller units (red arrows, multiply):** • Tonne to kilogram: multiply by 1,000 (1 tonne = 1,000 kilograms) • Kilogram to gram: multiply by 1,000 (1 kilogram = 1,000 grams) • Gram to milligram: multiply by 1,000 (1 gram = 1,000 milligrams) **Converting from smaller to larger units (blue arrows, divide):** • Milligram to gram: divide by 1,000 • Gram to kilogram: divide by 1,000 • Kilogram to tonne: divide by 1,000	

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				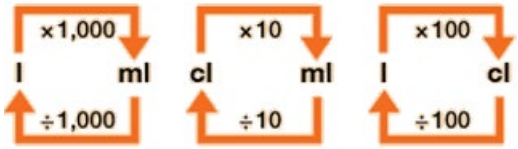 This diagram explains how to convert between three metric units of volume: litres (l), centilitres (cl), and millilitres (ml). **Converting from larger to smaller units (arrows going down/right, orange):** • From litres to millilitres: multiply by 1,000 (1 litre = 1,000 millilitres) • From centilitres to millilitres: multiply by 10 (1 centilitre = 10 millilitres) • From litres to centilitres: multiply by 100 (1 litre = 100 centilitres) **Converting from smaller to larger units (arrows going up/left, orange):** • From millilitres to litres: divide by 1,000 • From millilitres to centilitres: divide by 10 • From centilitres to litres: divide by 100	
To learn how to recognise and identify 2D shapes.	• Students will know the properties of different 2D shapes and will be able to identify them. • Students will be able to identify regular and irregular shapes. • Students will know how to recognise and draw the different types of triangle: isosceles, scalene, right-angled, equilateral. • Students will know how to name and sketch all types of quadrilaterals and their properties including; square, rectangle, parallelogram, rhombus, kite, trapezium. **Opportunity for challenge:** • Students will know how to identify 2D shapes from a worded description.	Polygon – a closed shape with straight sides Regular Polygon – A polygon where all sides are the same length and all angles are equal Irregular Polygon – A polygon where all sides are the same length and all angles are not equal Isosceles Triangle – a triangle with two equal sides and two equal angles Equilateral Triangle – a triangle with three equal sides and three equal, 60° angles Scalene Triangle – a triangle with no equal sides or angles Quadrilateral – a four-sided polygon, having four edges and four corners Perpendicular – at a right angle to Parallel – parallel lines are two lines that are side by side and have the same distance continuously between them The Fryer model can be used here.	• Students need to know how to identify triangles, squares and rectangles from a selection of 2D shapes. (They may not be able to name each type of triangle)		

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To learn how to identify lines of symmetry and rotational symmetry.	• Students will know how to identify lines of symmetry in 2D shapes. • Students will know that a shape is symmetric if it can be divided into two or more identical pieces that are arranged in an organized fashion. • Students will know how to identify the order of rotational symmetry of any 2D shape by rotating the shape 360° (this can be done with the use of tracing paper). **Opportunity for challenge:** • Students will know that to accurately tessellate a polygon the shapes must create a pattern of identical shapes which must fit together with no gaps.	**Symmetry –** the quality of being made up of exactly similar parts facing each other or around an axis. **Rotational symmetry –** A shape has rotational symmetry when it can be rotated and it still looks the same **Order of Rotational Symmetry –** order of rotational symmetry of a shape is the number of times it can be rotated around a full circle and still look the same	• Students need to know how to identify regular polygons and irregular polygons.		
To learn how to recognise different types of angles and estimate angles.	• Students will know how to identify each type of angle by sight. • Students will know how to accurately estimate angles based on their knowledge of the types of angles.	**Estimate –** roughly calculate or judge the value, number, quantity, or extent of. **Acute angle –** An angle that is less than 90° **Obtuse angle –** An angle that is more than 90° but less than 180° **Reflex angle –** An angle that is more than 180° but less than 360° **Right angle –** An angle that is exactly 90°	• Students need to identify different 2D shapes.		
To learn how to measure and draw angles.	• Students will know how to use a protractor to measure an angle. • Students will know how to draw an angle. • Students will know how to measure reflex angles. • Students will know how to draw reflex angles.	**Protractor** – an instrument used for measuring angles	• Students need to know how to identify different types of angles.	<u>Step to Success – Measuring angles</u> **Step 1:** Place the centre of the protractor on the corner of the angle – take care and be accurate with this! Step 2: Match up the line on the protractor with the base line of the angle. **Step 2:** Read off the size of the angle you on the protractor – remember to start at 0 to ensure you use the correct set of numbers on the protractor. **Step 3:** Check your answer looks right: • If you are measuring an acute angle you should have an answer less than 90°. • If you are measuring an obtuse angle you should have an answer more than 90° but less than 180°. • If you are measuring a reflex angle you should have an answer more than 180°. <u>Step to Success – Drawing angles</u> **Step 1:** Draw a base line if one is not provided for you. **Step 2:** Place the centre of the protractor on the end of the line. If you want your angle to be on the left go to the left end of the line and if you want your angle to be on the right then go to the right end of the line.	

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				Step 3: Start from 0 on your line and follow it round until you get to the required measurement and make a mark. **Step 4:** Connect the mark with the end of the line that you measured from. **Step 5:** Check your answer looks right: • If you are drawing an angle less than 90^o then your answer should look like an acute angle. • If you are drawing an angle more than 90^o but less than 180^o your answer should look like an obtuse angle. If you are drawing an angle more than 180^o your answer should look like a reflex angle.	
To learn how to find missing angles on straight lines and around a point.	• Students will know how to use angle facts to find missing angles on straight lines. • Students will know how to use angle facts to find missing angles at a point. • Students will know that vertically opposite angles are equal. **Encourage students to write reasons for every missing angle that they find.**		• Students need to know that angles in a right-angle add up to 90°.	**Steps to Success – Angles on a straight line** **Step 1:** Add up the angles that you know. **Step 2:** Subtract the angles known from 180^o. **Step 3:** Write, 'Angles on a line add up to 180^o' as your reason. You may also need to write any other reasons that you have used to find that angle. **Steps to Success – Angles at a point** **Step 1**: Add up the angles that you know. **Step 2**: Subtract the angles you know from 360^o. **Step 3**: Write: 'angles at a point add up to 360^o', as your reason. You may also need to write any other reasons that you have used to find that angle.	
To learn how to find missing angles in triangles.	• Students will know how to use angle facts to find the missing angles in triangles. • Students will know how to use angle facts to find missing angles in special triangles. **Encourage students to write reasons for every missing angle that they find.**	Isosceles Triangle – a triangle with two equal sides and two equal angles Equilateral Triangle – a triangle with three equal sides and three equal, 60° angles Scalene Triangle – a triangle with no equal sides or angles	• Students need to know how to find missing angles on a straight line.	**Steps to Success – Angles in a triangle** **Step 1:** Add up the angles you know. **Step 2:** Subtract the known angles from 180^o. **Step 3:** Write: 'Angles in a triangle add upto 180^o' as your reason. You also need to write any other reasons that you have used to find that angle. **Steps to Success – Angles in special triangles** **Step 1:** Identify the type of triangle and think about what makes this triangle different or special compared to normal ones. **Step 2:** You may be able to identify an angle without any calculation – place this on the diagram. If this is not the case then go to step 3. **Step 3:** Add up the angles you know. **Step 4:** Subtract the known angles from 180^o. You be required to split this in half for some isosceles angles. If this is not the case then go straight to step 5. **Step 5:** Write: 'Angles in a triangle add upto 180^o' as well as one of the reasons below. • Two angles in an isosceles triangle are equal. The three angles in an equilateral triangle are equal	
To learn how to find missing angles in quadrilaterals.	• Students will know why the angles in a quadrilateral add to 360°. • Students will know how to use angle facts to find the missing angles in quadrilaterals • Students will know how to solve multi-step problems involving angles in quadrilaterals and other basic angle rules (straight lines, around a point etc.)	Quadrilateral – a four-sided polygon, having four edges and four corners	• Students need to know how to find missing angles in a triangle.	**Steps to Success – Angles in a quadrilateral** **Step 1:** Add up the angles you know. **Step 2:** Subtract the known angles from 360^o. **Step 3:** Write: 'Angles in a quadrilateral add upto 360^o' as your reason. You also need to write any other reasons that you have used to find that angle.	

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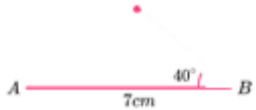
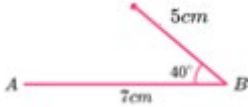
	Encourage students to write reasons for every missing angle that they find.				
To learn how to identify parts of a circle and draw circles and other 2D shapes accurately.	• Students will know how to label the radius, diameter, circumference, tangent, chord, segment, sector and centre of a circle. • Students will know how to draw the radius, diameter, circumference, tangent, chord, segment, sector and centre of a circle. • Students will know that the diameter is double the size of the radius or the radius is half the size of the diameter. • Students will know that the circumference is the distance around the circle and is a measure of length. • Students will know how to use a pair of compasses to accurately draw a circle when given the radius or diameter.	**Circumference –** the perimeter of a circle **Perimeter –** the distance around the outside of a shape **Arc –** a part of a curve, a part of the circumference of a circle **Radius –** a straight line from the centre to the circumference of a circle or sphere **Diameter –** a straight line passing from side to side through the centre of a body or figure, especially a circle or sphere **Tangent –** a line touching a circle or curve at only one point **Segment –** a region bounded by a chord and a corresponding arc lying between the chord's endpoints **Chord –** the line segment joining two points on a curve	• Students need to know how to draw an accurate straight line using a ruler.		
To learn how to construct triangles.	• Students will know how to construct SAS triangles using a ruler and protractor. • Students will know how to construct ASA triangles using a ruler and protractor. **Opportunity for challenge:** • Students will know how to construct SSS triangles using a pair of compasses.	**Construct –** Build or make. In maths, construct means to draw a shape, line or angle accurately using a compass and rule	• Students need to know how to draw straight lines accurately with a ruler. • Students need to know how to draw angles using a protractor.	<u>Steps to Success- Constructing SAS Triangles</u> **Step 1: Draw the base.** Use a pencil and a ruler to draw the base.  **Step 2: At one end point measure one angle.** At point B use a protractor to measure the angle 40˚, make a mark.  **Step 3: At the end point draw a line.** Use a ruler to measure 5cm from point B, while making sure that the ruler lines up with the mark you made in step 2.  **Step 4: Complete the triangle.** Use your ruler to draw a straight line from point A to the end of the 5cm line drawn in step 3.	

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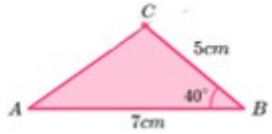
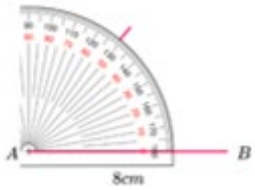
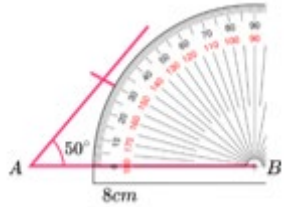
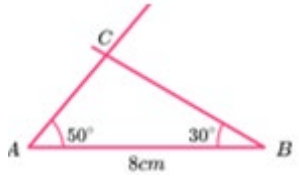
				 **Steps to Success- Constructing ASA Triangles** **Step 1: Draw the base.** Use a pencil and a ruler to draw the base.  **Step 2: At one end point measure one angle.** At point A use a protractor to measure the angle 50˚, make a mark and then draw a straight line from point A through the mark. Make this line long.  **Step 3: At the other end point measure the second angle.** At point B use a protractor to measure the angle 30˚, make a mark and then draw a straight line from point B though the mark.  **Step 4: Complete the triangle.** Make sure that the two lines intersect each other to form the triangle. **Leave all construction lines visible!**  **Steps to Success- Constructing SSS Triangles** **Step 1: Draw the base.** Use a pencil and a ruler to draw the base. It is usually easier to use the longest side.  **Step 2: Set compasses for the second side and draw an arc.** Open the compasses to 4cm. Place the point on point A and draw an arc. Make sure this arc is longer than you think necessary.	

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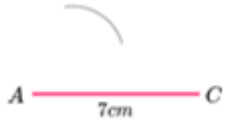
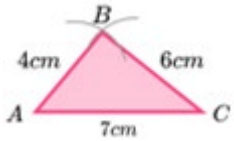
				 **Step 3: Set compasses for the third side and draw an arc.** Open the compasses to 6cm. Place the point on point C and draw an arc. This second arc should cross the first arc. If they don't cross you may have to go make and draw the arc's longer.  **Step 4: Join up the intersection of the arcs.** Complete the triangle by joining the point where the arcs intersect to point A and point C. **Leave all construction lines visible!** 	
Mini-Assessment 8					