Year 6 Maths SPRING medium Term plan

Converting Units:				
NC Objectives: **Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate.** **Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to 3 dp.** **Convert between miles and kilometres.**				
Week	**Small step**	**Key Questions**	**Notes and Guidance**	**Assessment**
	Metric Measures	Which units measure length? Mass? Capacity? When would you use km instead of m? When would you use mm instead of cm? Which is the most appropriate unit to use to measure the object? Explain your answer. Why do you think ______ is not an appropriate estimate?	Children read, write and recognise all metric measures for length, mass and capacity. They may need to be reminded the difference between capacity (the amount an object can contain) and volume (the amount actually in an object). They develop their estimation skills in context and decide when it is appropriate to use different metric units of measure.	
	Convert Metric measures	How could you work out what each mark is worth on the scales? What do you think would be the most efficient method for converting the units of time? What's the same and what's different between 1.5 km and 1.500 km? Are the zeroes needed? Why or why not? What do you notice about the amounts in the table? Can you spot a pattern?	Children will use their skills of multiplying and dividing by 10, 100 and 1,000 when converting between units of length, mass and capacity. Children will convert in both directions e.g. m to cm and cm to m. Using metre sticks and other scales will support this step. They will need to understand the role of zero as a place holder when performing some calculations, as questions will involve varied numbers of decimal places.	

		What's the same and what's different about km and kg?		
	Calculate with Metric measure	What operation are you going to use and why? How could you use a bar model to help you understand the question? How many ___ are there in a ___? How can we convert between ___ and ___?	Children use and apply their conversion skills to solve measurement problems in context. Teachers should model the use of pictorial representations, such as bar models, to represent the problem and help them decide which operation to use.	
	Miles and Kilometres	Give an example of a length you would measure in miles or km. If we know 5 miles ≈ 8 km, how can we work out 15 miles converted to km? Can you think of a situation where you may need to convert between miles and kilometres?	Children need to know that 5 miles is approximately equal to 8 km. They should use this fact to find approximate conversions from miles to km and from km to miles. They should be taught the meaning of the symbol '≈' as "is approximately equal to".	
	Imperial Measures	Put these in order of size: 1 cm, 1 mm, 1 inch, 1 foot, 1 metre. How do you know? When do we use imperial measures instead of metric measures? Why are metric measures easier to convert than imperial measures?	Children need to know and use the following facts: • 1 foot is equal to 12 inches • 1 pound is equal to 16 ounces • 1 stone is equal to 14 pounds • 1 gallon is equal to 8 pints • 1 inch is approximately 2.5 cm They should use these to perform related conversions, both within imperial measures and between imperial and metric.	

Area, Perimeter and Volume

NC Objectives:

•Recognise that shapes with the same areas can have different perimeters and vice versa.
• Recognise when it is possible to use formulae for area and volume of shapes.
•Calculate the area of parallelograms and triangles.
•Calculate, estimate and compare volume of cubes and cuboids using standard units, including cm3 , m3 and extending to other units (mm3 , km3)

	Shapes- same area	What do we need to know in order to work out the area of a shape? Why is it useful to know your times-tables when calculating area? Can you have a square with an area of 48 cm2? Why? How can factors help us draw rectangles with a specific area?	Children will find and draw rectilinear shapes that have the same area. Children will use their knowledge of factors to draw rectangles with different areas. They will make connections between side lengths and factors.	
	Area and Perimeter	What is the difference between the area and perimeter of a shape? How do we work out the area and perimeter of shapes? Can you show this as a formula? Can you have 2 rectangles with an area of 24 cm^2 but different perimeters?	Children should calculate area and perimeter of rectilinear shapes. They must have the conceptual understanding of the formula for area by linking this to counting squares. Writing and using the formulae for area and perimeter is a good opportunity to link back to the algebra block. Children explore that shapes with the same area can have the same or different perimeters.	
	Area of a triangle (1)	How many whole squares can you see? How many part squares can you see? What could we do with the parts? What does estimate mean? Why is your answer to this question an estimate of the area? Revisit the idea that a square is a rectangle when generalising how to calculate the area of a triangle.	Children will use their previous knowledge of approximating and estimating to work out the area of different triangles by counting. Children will need to physically annotate to avoid repetition when counting the squares. Children will begin to see the link between the area of a triangle and the area of a rectangle or square.	
	Area of a triangle (2)	What is the same/different about the rectangle and triangle? What is the relationship between the area of a rectangle and the area of a right-angled triangle? What is the formula for working out	Children use their knowledge of finding the area of a rectangle to find the area of a right-angled triangle. They see that a right-angled triangle with the same length and perpendicular height as a rectangle will have an area half the size. Using the link	

		the area of a rectangle or square? How can you use this formula to work out the area of a right angled triangle?	between the area of a rectangle and a triangle, children will learn and use the formula to calculate the area of a triangle.	
	Area of a triangle (3)	What does the word perpendicular mean? What do we mean by perpendicular height? What formula can you use to calculate the area of a triangle? If there is more than one triangle making up a shape, how can we use the formula to find the area of the whole shape? How do we know which length tells us the perpendicular height of the triangle?	Children will extend their knowledge of working out the area of a right-angled triangle to work out the area of any triangle. They use the formula, base × perpendicular height ÷ 2 to calculate the area of a variety of triangles where different side lengths are given and where more than one triangle make up a shape.	
	Area of parallelogram (1)	Describe a parallelogram. What do you notice about the area of a rectangle and a parallelogram? What formula can you use to work out the area of a parallelogram?	Children use their knowledge of finding the area of a rectangle to find the area of a parallelogram. Children investigate the link between the area of a rectangle and parallelogram by cutting a parallelogram so that it can be rearranged into a rectangle. This will help them understand why the formula to find the area of parallelograms works.	
	Volume- counting cubes	What's the same and what's different between area and volume? Can you explain how you worked out the volume? What did you visualise? What units of measure could we use for volume? (Explore cm^3, m^3, mm^3 etc.)	Children should understand that volume is the space occupied by a 3-D object. Children will start by counting cubic units ($1\ cm^3$) to find the volume of 3D shapes. They will then use cubes to build their own models and describe the volume of the models they make.	
	Volume of a cuboid	Can you identify the length, width and	Children make the link between counting	

		height of the cuboid? If the length of a cuboid is 5 cm and the volume is 100 cm^3, what could the width and height of the cuboid be? What knowledge can I use to help me calculate the missing lengths?	cubes and the formula ($l \times w \times h$) for calculating the volume of cuboids. They realise that the formula is the same as calculating the area of the base and multiplying this by the height.	
Ratio **NC Objectives:** **•Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts.** **•Solve problems involving similar shapes where the scale factor is known or can be found.** **•Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.**				
	Using Ratio language	How would your sentences change if there were 2 more blue flowers? How would your sentences change if there were 10 more pink flowers? Can you write a "For every…" sentence for the number of boys and girls in your class?	Children will understand that a ratio shows the relationship between two values and can describe how one is related to another. They will start by making simple comparisons between two different quantities. For example, they may compare the number of boys to girls in the class and write statements such as, "For every one girl, there are two boys".	
	Ratio and Fractions	How many counters are there altogether? How does this help you work out the fraction? What does the denominator of the fraction tell you? How can a bar model help you to show the mints and chocolates?	Children often think a ratio 1 ∶ 2 is the same as a fraction of 1 2 In this step, they use objects and diagrams to compare ratios and fractions.	
	Introducing the Ratio symbol	What does the ∶ symbol mean in the context of ratio? Why is the order of the numbers important when we write ratios? How do we write a ratio that compares	Children are introduced to the colon notation as the ratio symbol, and continue to link this with the language 'for every…, there are…' They need to read ratios e.g. 3 : 5 as "three to five". Children understand	

		three quantities? How do we say the ratio “3 : 7”?	that the notation relates to the order of parts. For example, ‘For every 3 bananas there are 2 apples would be the same as 3 : 2 and for every 2 apples there are 3 bananas would be the same as 2 : 3	
	Calculating Ratio	How can we represent this ratio using a bar model? What does each part represent? What will each part be worth? How many parts are there altogether? What is each part worth? If we know what one part is worth, can we calculate the other parts?	Children build on their knowledge of ratios and begin to calculate ratios. They answer worded questions in the form of ‘for every… there are …’ and need to be able to find both a part and a whole. They should be encouraged to draw bar models to represent their problems, and clearly label the information they have been given and what they want to calculate.	
	Using Scale Factors	What does enlargement mean? What does scale factor mean? Why do we have to double/triple all the sides of each shape? Have the angles changed size?	In this step, children enlarge shapes to make them 2 or 3 times as big etc. They need to be introduced to the term “scale factor” as the name for this process. Children should be able to draw 2-D shapes on a grid to a given scale factor and be able to use vocabulary, such as, “Shape A is three times as big as shape B”.	
	Calculating Scale factors	What does similar mean? What do you notice about the length/width of each shape? How would drawing the rectangles help you? How much larger/smaller is shape A compared to shape B? What does a scale factor of 2 mean? Can you have a scale factor of 2.5?	Children find scale factors when given similar shapes. They need to be taught that ‘similar’ in mathematics means that one shape is an exact enlargement of the other, not just they have some common properties. Children use multiplication and division facts to calculate missing information and scale factors.	
	Ratio and proportion problems	How does this problem relate to ratio? Can we represent this ratio using a bar	Children will apply the skills they have learnt in the previous steps to a wide	

		model? What does each part represent? What is the whole? What is the same about the ratios? What is different about them?	range of problems in different contexts. They may need support to see that different situations are in fact alternative uses of ratio. Bar models will again provide valuable pictorial support	

Angles:

NC Objectives:

•Draw 2-D shapes using given dimensions and angles.

•Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals and regular polygons.

•Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

	Measure with a protractor	Can we name and describe the 4 different types of angles? (right angle, obtuse, acute, reflex) What unit do we use to measure angles? Does it matter which side of the protractor I use? What mistakes could we make when measuring with a protractor? How would I measure a reflex angle? Look at a compass, what angles can we identify using the compass?	This step revisits measuring angles using a protractor from Year 5 Children recap how to line up the protractor accurately, and identify which side of the scale to read. They link this to their understanding of angle sizes. Children read the measurement and practise measuring angles given in different orientations. Angles are also related to compass points.	
	Introduce angles	If there are 90 degrees in one right angle, how many are there in two? What about three? How many degrees are there in a quarter/half turn? Between which two compass points can you see a right angle/half turn/three quarter turn?	Children build on their understanding of degrees in a right angle and make the connection that there are two right angles on a straight line and four right angles around a point. Children should make links to whole, quarter, half and three quarter turns and apply this in different contexts such as time and on a compass.	
	Calculate angles	What do we know about a and b? How do we know this?	Children apply their understanding of angles in a right angle, angles on a straight	

		Which angle fact might you need to use when answering this question? Which angles are already given? How can we use this to calculate unknown angles?	line and angles around a point to calculate missing angles. They should also recognise right angle notation and identify these on a diagram. Children then use this information to help them calculate unknown angles.	
	Vertically opposite angles	What sentences can we write about vertically opposite angles in relation to other angles? How can we find the missing angle? Is there more than one way to find this angle?	Children recognise that vertically opposite angles share a vertex. They realise that they are equal and use practical examples to show this. They continue to apply their understanding of angles on a straight line and around a point to calculate missing angles.	
	Angles in a triangle	What's the same and what's different about the four types of triangle? What do the three interior angles add up to? Would this work for all triangles? Does the type of triangle change anything? Does the size of the triangle matter?	Children practically explore interior angles of a triangle and understand that the angles will add up to 180 degrees. Children should apply their understanding that angles at a point on a straight line add up to 180 degrees.	
	Angles in a triangle – special cases	How can we identify sides which are the same length on a triangle? How can we use the use the hatch marks to identify the equal angles? If you know one angle in an isosceles triangle, what else do you know? Can you have an isosceles right-angled triangle?	Children are introduced to hatch marks for equal lengths. They concentrate on angles in right-angled triangles and isosceles triangles. Children use their understanding of the properties of triangles to reason about angles.	
	Angles in a triangle-missing angles	Is it sensible to estimate the angles before calculating them? Are the triangles drawn accurately? Can you identify the type of triangle?	Children build on prior learning to make links and recognise key features of specific types of triangle. They think about using this information to solve missing angle	

		How will this help you calculate the missing angle? Which angle can you work out first? Why? What else can you work out?	problems. They should also use their knowledge of angles on a straight line, angles around a point and vertically opposite angles.	
	Angles in special quadrilaterals	Is a rectangle a parallelogram? Is a parallelogram a rectangle? What do you notice about the opposite angles in a parallelogram? Is a square a rhombus? Is a rhombus a square? What do you notice about the opposite angles in a rhombus? What is the difference between a trapezium and an isosceles trapezium? If you know 3 of the interior angles, how could you work out the fourth angle?	Children use their knowledge of properties of shape to explore interior angles in a parallelogram, rhombus, trapezium etc. They need to learn that angles in any quadrilateral add up to 360°. If they are investigating by measuring, there may be accuracy errors which will be a good discussion point. Children need to have a secure understanding of the relationship between a rectangle, a parallelogram, a square and a rhombus.	
	Angles in regular polygons	What is a regular polygon? What is an irregular polygon? What is the sum of interior angles of a triangle? How can we use this to work out the interior angles of polygons? Can we spot a pattern in the table? What predictions can we make?	Children use their knowledge of properties of shape to explore interior angles in polygons. Children explore how they can partition shapes into triangles from a single vertex to work out the sum of the angles in polygons. They use their knowledge of angles on a straight line summing to 180˚ to calculate exterior angles.	
	Draw shapes accurately	What do you know about the shapes which will help you draw them? How can we ensure our measurements are accurate? How would you draw a triangle on a plain piece of paper using a protractor?	Children begin by drawing shapes accurately on different grids such as squared and dotted paper. They then move on to using a protractor on plain paper. Children use their knowledge of properties of shapes and angles, as well as	

			converting between different units of measure	
	Draw nets of 3d shapes	Looking at the faces of a three-dimensional shape, what two dimensional shapes can you see? What is a net? What shape will this net make? How do you know? What shape won't it make? If you make this net, what would happen if you were not accurate with your measuring?	Children use their knowledge of 2-D and 3-D shapes to identify three-dimensional shapes from their nets. Children need to recognise that a net is a two-dimensional figure that can be folded to create a three-dimensional shape. They use measuring tools and conventional markings to draw nets of shapes accurately.	