Year 6: Autumn Medium Term Plan:

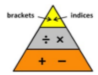
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13
Place value within 10,000,000		Number: Four operations			Position and Direction		Fractions			Decimals		Percentages

Place Value within 10.000,000				
NC Objective: •Read, write, order and compare numbers up to 10,000,000 and determine the value of each digit. •Round any whole number to a required degree of accuracy. •Use negative numbers in context, and calculate intervals across zero. •Solve number and practical problems that involve all of the above				
Week	**Small step**	**Key Questions**	**Notes and Guidance**	**Assessment**
	Numbers to ten Millions	What does a zero in a number represent? What strategy do you use to work out the divisions on a number line? How many ways can you complete the partitioned number?	Children need to read, write and represent numbers to ten million in different ways. Numbers do not always have to be in the millions –they should see a mixture of smaller and larger numbers.	
	Compare and order any number	What is the value of each digit? What is the value of _______ in this number? What is the value of the whole? Can you suggest other parts that make the whole? Can you write a story to support your part whole model?	Children will compare and order numbers up to ten million using numbers presented in different formats. They should use correct mathematical vocabulary (greater than/less than) alongside inequality symbols.	
	Round any number	Why do we round up if the following digit is 5 or above? Which place value column do we need to look at when we round to the nearest 100,000? What is the purpose of rounding? When is it best to round to 1,000? 10,000?	Children build on their prior knowledge of rounding. They will learn to round any number within ten million. They use their knowledge of multiples to work out which two numbers the number they are rounding sits between.	

<table>
<tr><td></td><td></td><td>Can you justify your reasoning?</td><td></td><td></td></tr>
<tr><td></td><td>Negative Numbers</td><td>Are negative numbers whole numbers?
Why do the numbers on a number line mirror each other from 0?
Why does positive one add negative one equal zero?
Draw me a picture to show 5 subtract 8</td><td>Children continue their work on negative numbers from year 5 by counting forwards and backwards through zero. They extend their learning by finding intervals across zero. Children need to see negative numbers in context.</td><td></td></tr>
<tr><td colspan="5">Four Operations:
NC Objectives:
•Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.
•Multiply multi-digit number up to 4 digits by a 2-digit number using the formal written method of long multiplication.
•Divide numbers up to 4 digits by a 2-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding as appropriate for the context.
•Divide numbers up to 4 digits by a 2-digit number using the formal written method of short division, interpreting remainders according to the context.
•Perform mental calculations, including with mixed operations and large numbers.
•Identify common factors, common multiples and prime numbers.
•Use their knowledge of the order of operations to carry out calculations involving the four operations.
•Solve problems involving addition, subtraction, multiplication and division.
•Use estimation to check answers to calculations and determine in the context of a problem, an appropriate degree of accuracy.</td></tr>
<tr><td></td><td>Add and subtract whole numbers</td><td>What happens when there is more than 10 in a place value column?
Can you make an exchange between columns?
How can we find the missing digits?
Can we use the inverse?
Is column method always the best method?
When should we use our mental methods?</td><td>Children consolidate their knowledge of column addition and subtraction. They use these skills to solve multi step problems in a range of contexts.</td><td></td></tr>
<tr><td></td><td>Multiply up to a 4 digit number by a 1 digit number</td><td>What is important to remember as we begin multiplying by the tens number?
How would you draw the calculation?
Can the inverse operation be used?
Is there a different strategy that you could</td><td>Children consolidate their knowledge of column multiplication, multiplying numbers with up to 4 digits by a 2-digit number. They use these skills to solve multi step problems in a range of</td><td></td></tr>
</table>

		use?	contexts.	
	Short division	What is different between dividing by 1 digit and 2digits? If the number does not divide into the ones, what do we do? Do we need to round our remainders up or down? Why does the context affect whether we round up or down?	Children build on their understanding of dividing up to 4-digits by 1-digit by now dividing by up to 2-digits. They use the short division method and focus on division as grouping. Teachers may encourage children to list the multiples of the number to help them solve the division more easily.	
	Division using Factors	What is a factor? How does using factor pairs help us to answer division questions? Do you notice any patterns? Does using factor pairs always work? Is there more than one way to solve a calculation using factor pairs? What methods can be used to check your working out?	Children need to use their number sense, specifically their knowledge of factors to be able to see relationships between the divisor and dividend. Beginning with multiples of 10 and moving on will allow the children to see the relationship before progressing forward.	
	Long division (1)	How can we use our multiples to help us divide by a 2-digit number? Why are we subtracting the totals from the starting number (seeing division as repeated subtraction)? In long division, what does the arrow represent? (The movement of the next digit coming down to be divided)	Children are introduced to long division as a different method of dividing by a 2-digit number. They divide3-digit numbers by a 2-digit number without remainders moving from a more expanded method with multiples shown to the more formal long division method.	
	Long division (2)	How can we use our multiples to help us divide by a 2-digit number? Why are we subtracting the totals from the beginning number? (Seeing division as repeated subtraction) In long division, what does the arrow represent? (The movement of the next digit	Building on using long division with 3-digit numbers, children divide four-digit numbers by 2-digits using the long division method. They use their knowledge of multiples and multiplying and dividing by 10 and 100 to calculate more efficiently.	

		coming down to be divided)		
	Long division (3)	How can we use our multiples to help us divide? What happens if we cannot divide our ones exactly by our divisor? How do we show what we have left over? Why are we subtracting the totals from the starting number? (Seeing division as repeated subtraction) Does the remainder need to be rounded up or down?	Children now divide using long division where their answers have remainders. After dividing, they check that their remainder is smaller than their divisor. Children start to understand when rounding is appropriate to use for interpreting the remainder and when the context means that this is not applicable.	
	Long division (4)	How can we use our multiples to help us divide? What happens if we cannot divide our ones exactly by our divisor? How do we show what we have left over? Why are we subtracting the totals from the starting amount? (Seeing division as repeated subtraction) Does the remainder need to be rounded up or down?	Children now divide four-digit numbers using long division where their answers have remainders. After dividing, they check that their remainder is smaller than their divisor. Children start to understand when rounding is appropriate to use for interpreting the remainder and when the context means that it is not applicable.	
	Common Factors	How do you know you have found all the factors of a given number? Have you used a system? Can you explain your system to a partner? How does a Venn diagram show common factors? Where are the common factors?	Children find the common factors of two numbers. Some children may still need to use arrays and other representations at this stage but mental methods and knowledge of multiples should be encouraged. They can show their results using Venn diagrams and tables.	
	Common Multiples	Is the lowest common multiple of a pair of numbers always the product of them? Can you think of any strategies to work out the lowest common multiples of different numbers?	Building on knowledge of multiples, children find common multiples of numbers. They should continue to use a visual representation to support their thinking. They also use more abstract	

		When do numbers have common multiples that are lower than their product?	methods to calculate the multiples and use numbers outside of times table facts	
	Primes	What is a prime number? What is a composite number? How many factors does a prime number have? Are all prime numbers odd? Why is 1 not a prime number? Why is 2 a prime number?	Building on their learning in year 5, children should know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers. They should be able to use their understanding of prime numbers to work out whether or not numbers up to 100 are prime. Using primes, they break a number down into its prime factors.	
	Squares and Cubes	What do you notice about the sequence of square numbers? What do you notice about the sequence of cube numbers? Explore the pattern of the difference between the numbers.	Children have identified square and cube numbers previously and now need to explore the relationship between them and solve problems involving these numbers. They need to experience sorting the numbers into different diagrams and look for patterns and relationships. They need to explore general statements. This step is a good opportunity to practice efficient mental methods of calculation.	
	Order of operations	Does it make a difference if you change the order in a mixed operation calculation? What would happen if we did not use the brackets? Would the answer be correct? Why?	Children will look at different operations within a calculation and consider how the order of operations affects the answer. The following image is useful when referring to the order of operations. 	
	Mental calculations and	Is there an easy and quick way to do this? Can you use known facts to answer the	We have included this small step separately to ensure that teachers	

	estimation	problem? Can you use rounding? Does the solution need an exact answer? How does knowing the approximate answer help with the calculation?	emphasise this important skill. Discussions around efficient mental calculations and sensible estimations need to run through all steps. Sometimes children are too quick to move to computational methods, when changing the order leads to quick mental methods and solutions.	
	Reason from Known facts.	What is the inverse? When do you use the inverse? How can we use multiplication/division facts to help us answer similar questions?	Children should use their understanding of known facts from one calculation to work out the answer of another similar calculation without starting afresh. They should use reasoning and apply their knowledge of commutativity and inverse operations.	
Geometry: Position and Direction **NC objectives:** **•Describe positions on the full coordinate grid (all four quadrants)** **•Draw and translate simple shapes on the coordinate plane, and reflect them in the axes.**				
	The first Quadrant	Which axis do we look at first? Does joining up the vertices already given help you to draw the shape? Can you draw a shape in the first quadrant and describe the coordinates of the vertices to a friend?	Children recap work from Year 4 and Year 5 by reading and plotting coordinates. They draw shapes on a 2D grid from coordinates given and use their increasing understanding to write coordinates for shapes with no grid lines.	
	Four Quadrants	Which axis do we look at first? If (0, 0) is the centre of the axis (the origin), which way do you move on the x axis to find negative coordinates? Which way do you move on the y axis to find negative coordinates?	Children use knowledge of the first quadrant to read and plot coordinates in all four quadrants. They draw shapes from coordinates given. Children need to become fluent in deciding which part of the axis is positive or negative.	
	Translations	What does translation mean?	Children use knowledge of coordinates	

		Which point are you going to look at when describing the translation? Does each vertex translate in the same way?	and positional language to translate shapes in all four quadrants. They describe translations using direction and use instructions to draw translated shapes	
	Reflections	How is reflecting different to translating? Can you reflect one vertex at a time? Does this make it easier to reflect the shape?	Children extend their knowledge of reflection by reflecting shapes in four quadrants. They will reflect in both the x and the y -axis. Children should use their knowledge of coordinates to ensure that shapes are correctly reflected.	

Fractions:

NC Objectives:

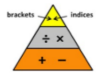
•Use common factors to simplify fractions
• use common multiples to express fractions in the same denomination.
•Compare and order fractions, including fractions >1
•Generate and describe linear number sequences (with fractions)
•Add and subtract fractions with different denominations and mixed numbers, using the concept of equivalent fractions.
•Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example 1 4×1 2=1 8]
• Divide proper fractions by whole numbers [for example 1 3÷2=1 6]
•Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example 1 8]
•Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

	Simplify Fractions	In order to make a simpler fraction, which direction do you move on the fraction wall? Up or down? Is the most efficient method dividing by two? Explain your reasoning. What is the highest common factor of the numerator and the denominator? How does this help you when simplifying?	Children build on their knowledge of factors to help them simplify fractions. They must choose which method is most efficient. Is it identifying if the denominator is a multiple of the numerator, or is it finding a highest common factor?	
	Fractions on a number line	How are the number lines similar and different? Are there any other fractions we can place	Children use their knowledge of equivalent fractions and ordering fractions to place fractions on a number	

		on the number line? Which fractions can't be placed on the number line? Which method have you used to help you place improper fractions on a number line?	line. They can draw their own divisions to help them place the fractions more accurately.	
	Compare and order fractions (denominator)	What has happened to the original fractions? What do you notice about the original denominators and the new denominator? Explain what has happened. What do you notice? How do you find a common denominator? What else could the common denominator be?	Children build on their equivalent fraction and common multiple knowledge to compare and order fractions where the denominators are not always multiples of the same number.	
	Compare and order fractions (numerator)	What's the same and what's different about the fractions on the bar model? Can we create a rule? How is this different to when the denominators are the same? Can you find a common numerator to help you compare? How will you do this? Why is finding a common numerator the most efficient method? What do you notice about all the denominators? How can we find a common numerator?	To build on finding common denominators, children explore how finding a common numerator can be effective too. It's important for children to develop number sense and discover which is the most effective strategy for a range of questions.	
	Add and subtract fractions (1)	What must we do if our denominator is different? Could your answer be simplified? How will you make a whole one? Are there any other ways? What do you notice about the denominators.	Building on their skills of finding common denominators, children will add fractions when the answer is less than 1. They will work with fractions with different denominators where one is a multiple of the other and where they are not. It is important that children find the lowest	

		Explain your method.	common denominator not just any common denominator.	
	Add and subtract fractions (2)	What do you notice about your answer? Can you convert it back into a mixed number? How might we approach this question? Do we need to convert the mixed number into an improper fraction? Explain why. Which is the most efficient method. Could you show me how you might use a number line to answer this question? Can you explain how you might solve this mentally?	Children are to build on their knowledge of adding and subtracting fractions within 1, finding common denominators and applying it to mixed numbers. At this stage children may choose to deal with the whole numbers and fractions separately, or convert the mixed numbers to improper fractions. Can they prove and explain why both methods work in this case? When might it not work?	
	Add Fractions	How can we represent 2/ 5and 4/ 5on a number line? When adding two fractions with sixths, how will we split our number line? What do you notice is happening when you add fractions with the same denominator? What can we do if our denominators are different?	To build on knowledge of adding fractions, children now add fractions that give a total greater than one. It is important that children are exposed to a range of examples e.g. adding improper fractions and mixed numbers.	
	Subtract Fractions	Which fraction is greatest? How do you know? We must look at the whole numbers to help us. Have we still got the same fraction? How do you know? What are the five wholes made up of? How do you know? Can you use one of these wholes to help you complete the calculation? What calculation will we complete to solve the problem?	Children build on their knowledge of subtracting fractions. This small step encourages children to use one of their wholes to create a new mixed number fraction so they can complete the calculation. It is vital that children know that fractions such as 3 ¼ and 2 5/4 are equal.	

	Mixed addition and subtraction	What other calculations could you write using the bar model? Can you draw a bar model to show the second calculation? Where would the '?' go? Explain how you know the fraction can be simplified. How many different ways can you show 6 7 /30? How might these different representations help you solve the calculation?	Children are given the opportunity to consolidate adding and subtracting fractions. The examples provided encourage the use of the bar model, part-whole models and word problems which include mixed numbers and improper fractions.	
	Multiply fractions by integers	How could you represent this fraction? What is the denominator? How do you know? How many whole pieces do we have? What is multiplying fractions similar to? (repeated addition) Why have you chosen to represent the fraction in this way? How many wholes are there? How many parts are there?	Children will use their understanding of fractions to multiply whole numbers and fractions together. It is important that they experience varied representations of fractions. They must also be able to multiply whole numbers and mixed numbers.	
	Multiply fractions by fractions	Using a piece of paper/drawing: Show me a whole, show me thirds, now split each third in half. Shade one section. What fraction do you have? What do you notice about the numerators and denominators when they are multiplied?	Children will use their understanding of multiplying fractions by an integer and find the link between multiplying fractions by fractions. It is important that children see the link between multiplying fractions by whole numbers and fractions by fractions.	
	Divide fractions by integers (1)	How could you represent this fraction? How many parts of the whole are there? How do you know? How do you know how many parts to shade? Is the numerator divisible by the whole number? Why doesn't the denominator change? What have you chosen to represent the fraction in	Children will use their understanding of fractions to divide fractions by whole numbers. In this small step they will focus on examples where the numerator is directly divisible by the divisor. It is important that they experience varied representations of fractions in different contexts.	

		this way?		
	Divide fractions by integers (2)	How could you represent this fraction? Which parts should you shade? What would happen if we divided each eighth into two? How many pieces would we have in total? How many sub-parts would you divide each section into? What is the value of the denominator? What is the value of the numerator? Can it be simplified?	Children will continue to divide fractions by integers, this time including fractions where the numerator isn't directly divisible by the integer. They should learn how to represent the fractions and divide it visually. They may find an alternative strategy for dividing fractions during this process.	
	Four rules with Fractions	What does it mean when we have a number or a fraction in front of the bracket? Which operation should we use first? Why? Is there another way we could answer this? What would happen if we did not use the brackets? Would the answer be correct? Why?	During this small step children will apply the rules of the four operations when working with fractions. They may need to be reminded of which operations to use first. 	
	Fraction of an amount	How can you represent the problem? How many parts should the bar model be split into? How many parts should you shade? What is the value of the whole? What is the value of the part? How many parts are shaded? So what is the value of the shaded bit?	Children will start to calculate fractions of an amount. They should recognise that the denominator is the number of parts the amount is being divided into, and the numerator is the amount of those parts we want. A bar model will help children visualise and calculate fractions of an amount	
	Fraction of an amount- find the whole	How could you represent this fraction? Which parts should you shade? What is the value of the shaded parts? What is the value of one part? What is the value of the whole?	Children will learn how to find the whole amount from the known value of a fraction. Children should use their knowledge of finding fractions of amounts and apply this when finding the whole amount	

Decimals

NC objectives:

•Identify the value of each digit in numbers given to 3 decimal places and multiply numbers by 10, 100 and 1,000 giving answers up to 3 decimal places.

•Multiply one-digit numbers with up to 2 decimal places by whole numbers.

•Use written division methods in cases where the answer has up to 2 decimal places.

•Solve problems which require answers to be rounded to specified degrees of accuracy.

	Three decimal places	How many tenths are in the number? How many hundredths? Can you make the number on the place value chart? How many hundredths are the same as 5 tenths?	Children recap their understanding of numbers with up to 3 decimal places. They look at the value of each place value column and describe the columns in words and digits. Children use concrete resources to investigate exchanging between columns e.g. 3 tenths is the same as 30 hundredths.	
	Multiply by 10, 100 and 1000	What number is represented on the place value chart? Why is 0 important when multiplying by 10, 100 and 1,000? What patterns do you notice? What is the same and what is different when multiplying by 10, 100, 1,000 on the place value chart compared with the Gattegno chart?	Children multiply numbers with up to three decimal places by 10, 100 and 1,000 They discover that digits move to the left when they are multiplying and look at when to use zero as a place value holder. Once children are confident in multiplying by 10, 100 and 1,000, they use these skills to investigate multiplying by multiples of these numbers. E.g. 2.4 × 20	
	Divide by 10, 100 and 1000	What happens to the counters/digits when you divide by 10, 100 or 1000? Why is the zero important? What is happening to the value of the digit each time it moves one column to the right? What is the relationship between tenths, hundredths and thousandths?	Once children understand how to multiply decimals by 10, 100 and 1,000, they can apply this knowledge to division, then later apply these skills to converting between units of measure. It is important that children continue to understand the importance of 0 as a place holder. Children also need to be	

			aware that 2.4 and 2.40 are the same, but the zero is not needed in this case.	
	Multiply decimals by integers	Which is bigger, 0.1, 0.01 or 0.001. Why? How many 0.1s do you need to exchange for a whole one? Can you draw a bar model to represent the problem? Can you think of another way to multiply by 5? (multiply by 10 and divide by 2).	Children use concrete resources to multiply decimals and explore what happens when you exchange with decimals. Children use their skills in context and make links to money and measures.	
	Divide decimals by integers	Are we grouping or sharing? Explain why. How are these different? How are they the same? How else could we partition the number 3.69? (For example, 2 ones, 16 tenths and 9 hundredths.) How could we check that our answer is correct using the inverse? Which method, sharing or grouping, shows the inverse more clearly?	Children continue to use concrete resources to divide decimals and explore what happens when exchanging with decimals. Children build on their prior knowledge of sharing and grouping when dividing and apply this skill in context.	
	Division to solve problems	How can we represent this problem using a bar model? How will we calculate what this item costs? How will we use division to solve this? How will we label our bar model to represent this?	Children will apply their understanding to use division to solve problems in cases where the answer has up to 2 decimal places. Children will continue to show division using place value counters and exchanging where needed.	
	Decimals as fractions	How would you record your answer as a decimal and a fraction? Can you simplify your answer? How would you convert the tenths to hundredths? What do you notice about the numbers that can be simplified in the table? Can you have a unit fraction that is larger	Children explore the relationship between decimals and fractions. They start with a decimal and use their place value knowledge to help them convert it into a fraction. Children will use their previous knowledge of exchanging between columns, for example, 3 tenths is the same as 30 hundredths. Once	

		than 0.5? Why?	children convert from a decimal to a fraction, they simplify the fraction to help to show patterns.	
	Fractions to decimals (1)	How many tenths are equivalent to one hundredth? How would you convert a fraction to a decimal? Which is the most efficient method? Why?	At this point children should know common fractions as decimals, including thirds, quarters, fifths and eighths. Children learn that finding an equivalent fraction where the denominator is 10, 100 or 1,000 makes it easier to convert from a fraction to a decimal. They investigate the most efficient method to convert fractions to decimals, for example, converting twentieths to hundredths or tenths depending on the numerator.	
	Fractions to decimals (2)	Do we divide the numerator by the denominator or divide the denominator by the numerator? Explain why. When do we need to exchange? Are we grouping or are we sharing? Explain why.	It is important that children recognise that ¾ is the same as 3 ÷ 4. They can use this understanding to find fractions as decimals by then dividing the numerator by the denominator. In the example provided, we cannot make any equal groups of 5 in the ones column so we have exchanged the 2 ones for 20 tenths. Then we can divide 20 into groups of 5	
Percentages **NC objectives:** •Solve problems involving the calculation of percentages [for example, of measures and such as 15% of 360] and the use of percentages for comparison. •Recall and use equivalences between simple fractions, decimals and percentages including in different contexts.				
	Fractions to percentages	What does the word 'percent' mean? How can you represent this? Which denominator is the easiest to convert into a percentage? Why is this easiest? Which other denominators are easier to convert into	It is important that children understand that 'percent' means 'out of 100', therefore they will need to use their knowledge of equivalent fractions to make the denominator 100 Children will	

		percentages? If the denominator is 50, 25, 20 or 10 how would you convert it in to 100? What would you need to do to the numerator?	recall and use equivalences between simple fractions and percentages in different contexts.	
	Equivalent FDP	How does converting a decimal to a fraction help us to convert it to a percentage? When I convert a decimal to a percentage, what do I need to multiply by? Can I use a place value grid to help me convert the decimal to a percentage?	Children convert between fractions, decimals and percentages. They use their knowledge of common equivalent fractions and decimals to find the equivalent percentage. Children start by focusing on converting decimals to fractions and then to percentages. They then look at how a decimal can be multiplied by 100 in order to find the equivalent percentage.	
	Percentage of an amount (1)	How many other ways could you find 25%? Which is the most effective? If you know how to calculate 10%, how can you use this to calculate 1%? What's the same and what's different about 10% of 300, 30 and 3? What do you notice?	Children use different representations to find percentages of amounts. For example 50%, 25%, 10%, 1%. Allow time for children to explore efficiency of methods and develop a deep understanding of why you can divide by ten to find 10%, but you do not divide by 25 to find 25%. Children need to understand percentages as parts of 100 and that the whole amount is 100%, therefore when finding 1% we divide by 100.	
	Percentage of an amount (2)	Why wouldn't the method of finding 10% of a number first be necessary when calculating 50%? Is there a fraction you could use to help you work out 5%? Which do you think is the most efficient method? Why?	Children use concrete resources and visual representations to find compound percentages of amounts. Allow time for children to explore efficiency of methods when finding any percentage. For example, when finding 20%, children could do: 20% = 20/100 = 2/10 = 1/5 -	

			then divide the amount by 5, or they could add two lots of 10%	
	Percentages- missing values	Is there more than one way to solve the problem? What is the most efficient way to find ___%? What diagrams could help you visualise this problem?	Children use their understanding of finding percentages of amounts to find missing values. They may choose to use a bar model to support their understanding and structure their ideas. It is important that children see that there may be more than one way to solve a problem and that some methods are more efficient than others.	
	Percentage increase and decrease	What does increase/decrease mean? How does the bar model show the percentage increase/decrease? If prices increase by 20%, what percentage will represent the new price? If the percentage decrease is ___, how can we work out the original price? What will the new price be?	Once children are secure in finding percentages of amounts and missing percentages, they move on to finding percentage increase and decrease. They use a bar model to represent what increase and decrease will look like.	
	Order FDP	What do you notice about the fractions, decimals or percentages? Can you compare any straight away? What is the most efficient way to order them? If you put them in ascending order, what will it look like? If you put them in descending order, what will it look like?	Children build upon their previous learning on fractions, decimals and percentages to see that there are different ways of expressing proportions. Children convert between fractions, decimals and percentages in order to order and compare them.	