Mathematics Journey Planner: Year 6

BIG IDEAS & OVERVIEW

AUTUMN

2 weeks	**The Number System: big and small numbers** The value of a digit is determined by its position. Place value must be explored in terms of the value of each digit (additive partitioning) and its overall value, as well as its position relative to other numbers. Large numbers are named in patterns of 3. However, decimals are not necessarily larger if they have more digits.
4 weeks	**Calculating, Patterns & Algebra : all operations** Deciding which calculation method to use is supported by being able to take apart and combine numbers in many ways. The associative, distributive and commutative laws are useful in making decisions and adjusting equations. Standard written algorithms use the structures of the maths to produce efficient methods of calculation. Standard written multiplication involves a series of partial products which are then recombined. There are connections between factors, multiples and prime numbers and between fractions, division and ratios.
2 weeks	**The Number System: Fractions *as* numbers** **Equivalence and calculating with fractions** Fractions express a relationship between a whole and equal parts of a whole. Fractions that look very different in their notation may be equal or linked to the same idea. Equivalent fractions are connected to the idea of ratio: keeping the numerator and denominator of a fraction in the same proportion creates an equivalent fraction. Putting fractions in place on the number line helps understand fractions as numbers in their own right
1 week	**Statistics & Percentages (Ratio & Proportion)** Fractions express a relationship between a whole and equal parts of a whole. Fractions that look very different in their notation may be equal or linked to the same idea. Inference and deduction must be used and not just retrieval when interpreting pie charts.
3 weeks	**Calculating, Patterns & Algebra; Ratio & Measures** Ratio problems and problems with multiple unknowns can be visualised using bar models. It is important to distinguish between situations with an additive change or a multiplicative change (which involves ratio).
1 week	**Properties of Shapes: Angles** Angles are a measure of turn and have relationships between them, based on intersecting lines. They can be worked out from reasoning as well as measuring. Angle properties are a mix of necessary conditions (angles on a straight line combine to make a half turn) and conventions (we measure half a turn as 180^0) Shapes are categorised according to their properties and can belong to more than one category. 2D shapes in nets define the 3D shapes they can fold into. 3D shapes have faces as well as sides and vertices.

SPRING

2 weeks	**The Number System; Measures** The value of a digit is determined by its position in a number. Place value must be explored in terms of the value of each digit (additive partitioning) and its overall value, as well as its position relative to other numbers. Ordering decimal numbers uses the same process as for whole numbers: looking at the value of the most significant digits. To read a scale, first work out how much Each mark on the scale represents. The unit of measure must be identified before measuring and has a bearing on the accuracy and practicality of the measurement taken.
3 weeks	**Calculating Patterns & Algebra: all operations; Position; Statistics & Measures!** There are connections between factors, multiples and prime numbers and between fractions, division and ratios. Letters of symbols are used to represent unknown numbers in a symbol sentence (i.e. an expression or equation) or instruction. Usually, but not necessarily, in any one equation or instruction, different letters or different symbols represent different unknown numbers. A value is said to 'solve' a symbol sentence if it satisfies it i.e. it results in a true statement. A linear sequence of numbers is where the difference between neighbouring terms is constant. The relationship can be generated in two ways: the rule can be recursive (finding one number based on the preceding number) = term to term; or ordinal (the position of the number in the sequence generates the term) = position to term.
1 week	**Geometry, Algebra, Ratio & Measures** **AREA, PERIMETER SCALE FACTORS FORMULAE FOR AREA** Variance and invariance are important ideas. A set of quadrilaterals may vary in the length of their sides and the size of angles. However, there are a set of invariant properties which remain common to all quadrilaterals. What's the same? What's different? are useful questions for this big idea. Shapes can be congruent (same in all ways) or similar (sharing same geometric properties but different sizes) Area is a measure of square units but with rectilinear shapes, it is linked to multiplication and it has an inverse relationship with side length. However, the relationship is not simple. Increasing or decreasing perimeter does not necessarily increase or decrease area.
	From this point on you may wish to do your own gap analysis and teach from this formative assessment, if you have not started this before now.
2 wks	**Calculating, Patterns & Algebra: all operations; Fractions of numbers** Fractions can be seen as operators on other numbers or other fractions.
1 wk	**Measures & Statistics** Line graphs show continuous data and any point on the line can have meaning.

SUMMER

4 weeks	**Revision & SATS** INCLUDE THE PARTS OF A CIRCLE, 3D shapes, position and direction Decimals are an extension of our whole number system. Decimals are a type of fraction.
4 weeks	**Calculating, Patterns & Algebra: all operations** Solving problems using bar models.
2 weeks	**Geometry: Spirals** Shapes and patterns can be generated by number sequences. Maths is beautiful!
3 weeks	**Problem Solving** Maths is about more than finding 'the right answer'. It's about reasoning and proving your thinking to convince yourself, a friend and others. It is also about extrapolating from that answer to generalise.

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To be used as a basis for unit planning, combined with the calculation or progression policy. Each unit of work should include several problem solving lessons. NRICH is a great resource for this and has problems mapped to the curriculum here. NCETM progression maps are useful for dialling it back for children working below Y6 levels. NCETM mastery assessment document is wonderful for deepening. ***Remember the aims of the National Curriculum are: fluency, reasoning and problem solving!***			
Timing		**Fluency**	**Destinations for reaching expected Y6 level** with teaching notes.
AUTUMN	3 WEEKS	Count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000 Halving (this supports number line work by estimating where half way is) Counting in decimals in small steps from 0.001 to 0.1 Finding mystery numbers or marking them on differently scaled number lines. Making and comparing numbers using digits cards and completing equations with digit cards to make statements correct.	**The Number System: big numbers and small numbers!** ***Read and write numbers to at least 10,,000,000 and determine the value of each digit (the significance of each digit's position)*** Noting the pattern of three digits and commas. Do lots of practice reading these numbers aloud, noting zero as a place holder. ***Round any whole number to a required degree of accuracy (numbers relative to each other)*** Partitioning using arrow cards, base ten and place value counters. Making numbers using digits cards. Partition numbers in different ways i.e. 12,256 = 10,000 + 2000 + 200 + 50 + 6 = 10,000 + 2,000 + 200 + 40 + 16 etc. Explore these patterns. Explore the idea of = as equivalence and balance using empty box partitions Review from Y4: Find 1000 more or less than a given number. Explore empty boxes on number lines, broken number squares (e.g. a cross shape or L shape) Ask questions such as 'how many 1,000s in 80,000?' to deepen understanding. ***Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1,000 giving answers to 3 d.p. (the significance of each digit's position)*** Placing on a number line (with different scales and starting points). Focus particularly on numbers greater than 1,000 as this is when children start to have problems visualizing. Use a number line to support rounding; this as a key image. Remember that number lines do not need to sit horizontally, or start at zero! Work on working out the size of the intervals, finding half way if that helps, positioning the number and then checking it makes sense. Teach away from the misconception that 36,800 is 7,000 rounded to the nearest thousand. Explore questions such as 'how many hundredths in a tenth?' 'How many thousandths in a tenth?' to deepen understanding. Explore 'zoomed in' number lines which break 1 into tenths, hundredths and then thousandths. Use base 10 to review learning from Y4 with one whole represented by a 100 slab, a tenth being a rod of ten and a hundredth being a small cube. We can't represent a thousandth… imagine this cube divided into 10 tiny pieces! Count up in 0.001 and show what happens after 0.009 as it becomes 0.01 etc. Use number lines with different starting points and different scales to place decimal numbers. Examine misconceptions about 0.011 or 0.11 etc. ***Solve number and practical problems that involve all of the above.*** Solve empty box problems that rely on understanding of place value. Include problems with = and inequalities <>

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Timing		Fluency	Destinations for reaching expected Y6 level with teaching notes.
AUTUMN	4 WEEKS	KS1 and LKS2 review: basic but still important! Mental addition strategies without counting on! **Calculate don't count and apply all these strategies to larger or decimal numbers**: Quick adds e.g. 20 + 7 then 23 + 6 'because I know 3 + 6 = 9'; Using bonds to 10; Partitioning single digit numbers in different ways to bridge 10 e.g. 27 + 5 = 27 + 3 + 2; Finding near doubles rather than adding e.g. 30 + 31; Adding nearly numbers like 19 by adding 20 and adjusting; Add strings of numbers by finding bonds and doubles. Reinforce law of commutativity for + so we don't have to do it from left to right! ***Identify common factors, common multiples and prime numbers.*** Investigate patterns in multiples and rules of divisibility. Investigate common factors. Venn or Carroll diagrams are a great way to do this. At EP we use factor bugs as a key recall image. Split composite numbers into its prime factors. Find rules for and complete number sequences. Making and comparing numbers using digits cards and completing equations with digit cards to make statements correct.	**Calculating, Patterns & Algebra: all operations** ***Perform mental calculations, including with mixed operations and large numbers.*** Write calculations horizontally and tell children to assess whether mental methods will be quick and efficient. Use numbers which are close to each other where finding the difference mentally supported by number line jottings would be most efficient. Explore the rule 'if it's looking at you' find the difference e.g. 2,003 – 1,899. Find the difference between amounts of money that involve finding change, times and dates on time lines, mentally. Use the distributive and commutative law and find equivalent calculations or to manipulate calculations … this is an important mental skill i.e. 14 X 8 = 10 X 8 + 4 X 8. Find equivalent short multiplications for trickier long multiplications e.g. 16 X 17 = 8 X 34 Teach BIDMAS and explore the order of operations, and how it can alter the outcome of a calculation once we know the order. *Y5 Review: Add numbers with more than four digits (different amounts of digits and more than 2 numbers) using columnar addition* *Y5 Review: Subtract numbers with more than four digit numbers using compact columnar subtraction* Design calculations using intelligent practice and ensure they don't lend themselves to mental methods. *Y5 Review: Multiply numbers up to 4 digits by one digit (short multiplication) using the formal written method.* ***Multiply multi-digit numbers up to 4 digits by a two digit whole number using the formal written method of long multiplication.*** Show expanded columnar multiplication next to grid method, examining the links. Show expanded columnar method next to compact multiplication, examining the links. Explore misconceptions e.g. 500 X 8 within a grid is often mistakenly recorded as 400 rather than 4,000 *Use estimation (inverse and rounding) to check answers and determine, in the context, appropriate degree of accuracy.* ***Divide numbers up to 4 digits by a two digit number (Y5 review: by a one digit number) and interpret remainders as whole number remainders, fractions or by rounding as appropriate for the context.*** ***Use written division methods in cases where the answer has up to two dp.*** Explore mental methods of short and long division. e.g. dividing by 10 and doubling when dividing by 5; dividing by 100 and multiplying by 4 when dividing by 25 etc. For long division, chunking should be taught as an informal method where we make informal jottings of 'how many multiples of… make …' and subtract this from our dividend. Make links with mental methods to teach the formal method of short and long division. Refer back to images of using place value counters. Explore why decimal remainders are so! e.g. 435 ÷ 6 = 72.5 = 72 ½ = 72 r3 Don't just teach decimal remainders automatically with no understanding! This is a great area for delving deeper. Explore remainders which are 0.33333 0.125 0.25 and 0.75 Explore problems that require us to round up or down when there are remainders. ***Solve addition, subtraction, multiplication and division problems in contexts, deciding which operations should be used and why.*** ***Use estimation (inverse and rounding) to check answers and determine, in the context, appropriate degree of accuracy.*** ***Recognise and use inverse relationships and use this to check calculations and solve missing number problems.*** ***Use knowledge of the order of operations to carry out calculations involving the four operations.*** Write equations in different ways e.g. 2.3 = ? + 1.2 ; 4.3 + 2.5 = ? – 0.8; and 1,002 + 1,005 < ? – 2 but with larger or decimal numbers. Where there is more than one possible solution, explore what the largest or smallest could possibly be. Use bar models to show whole part-part inverse relationships and to help children decide which operation to carry out. Pose word problems and problems in different contexts which require different calculation strategies.

Timing		Fluency	Destinations for reaching expected Y6 level with teaching notes.
AUTUMN	2 WEEKS	Review from Year 4: Count in fractional steps starting from any number and using different fraction families i.e. 1/5 family or ¼ family. Explore equivalence as you go. Use a counting stick to count in 1/3s beyond 1 whole! Discuss equivalence and improper fractions how else could we say 4/3? Find rules and missing fractions in sequences.	**The Number System: Fractions *as* numbers** *LKS1 Review: Recognise and show, using diagrams, families of common equivalent fractions* Review equal and unequal pieces and understanding of families of fractions whose denominators have a common factor. Use fraction cards. *Equivalence* *Y5 Review: Recognise mixed numbers and improper fractions and convert from one form to the other. Write mathematical statements >1 as a mixed number for example 2/5 + 4/5 = 6/5 = 1 1/5* ***Use common factors to simplify fractions; use common multiples to express fractions in the same denomination.*** ***Compare and order fractions, including fractions > 1.*** ***Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths.*** Find fractions of shapes linking to equivalence e.g. If you have 3/6 shaded on a shape, this is the same as ½. Extend this to tenths and hundredths. Discuss the term 'simplest form' and how you need to find the lowest denominator to do so. Use and build fraction walls showing equivalence between families. Use fraction cards to explore equivalence within one family e.g. 1/3 1/6 1/12 Ensure enough visual models are used to support writing equivalences such as 4/10 = 40/100 including fraction cards, fraction walls, bar models, 100 grids representing one whole, or Numicon. ***Recall and use equivalence between simple fractions, decimals and percentages including in different contexts.*** Refer to work done on % in Y5, working with the tenth family. Make sure children know common equivalence e.g. 0.25 = 25% and 0.2 = 2/10 = 1/5 *Calculating with fractions* ***Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.*** Use fraction cards to add and subtract fractions within the same family, starting with those with the same denominator. These may tip over one whole into improper fractions and mixed numbers. https://www.ncetm.org.uk/resources/43609 Bar models are also useful for exploring addition and subtraction of fractions Y5 Review: *Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.* In this context, it can be useful to read the X symbol as 'of' e.g. 1/3 x 18 = 1/3 of 18 (this needs to be altered to '18 groups of 1/3' if it is written as 18 X 1/3. You could demonstrate how if we count up in 1/3s 18 times we will get to 9 whole ones. Explore lots of examples of this, drawing diagrams with the children to picture what is happening. This can also be modelled using Numicon where 1 whole = 3. Write related equations e.g. if we know ½ X 6 =3 then is 3 ÷ 6 = ½ ? This challenges misconceptions about x always making a bigger product

Timing		Fluency	Destinations for reaching expected Y6 level with teaching notes.
AUTUMN	1 WEEK	Counting in 10s 5s 20s 25s Finding missing numbers on scales and working out the intervals. ***Calculate and interpret the mean as an average.***	**Statistics & Percentages (Ratio & Proportion)** ***Solve problems involving the calculation of percentages [e.g. of measures, and such as 15% of 360] and the use of percentages for comparison.*** The percentage 'cloud' lesson is essential here (and should have been taught in Y5). This requires children to find 10%, 1% and 50% of a number and then work from there, using these percentages as a basis for finding 20% (double 10%) or 95% (subtract 5%) etc. ***Recognise the per cent symbol and understand that % relates to 'number of parts per hundred'.*** ***Write percentages as a fraction with a denominator of 100 and as a decimal fraction.*** ***Solve problems which require knowing percentage and decimal equivalents of ½ ¼ 1/5 2/5 4/5 and those fractions with a denominator of 10 or 25.*** 100 squares where each square represents 1% are a good starting image for this. It is also useful to discuss percentages in a real-life or colloquial context e.g. 'Have you given 100%?' or 'This price has 50% off!' Colour different percentages on a 100 square and find vulgar fraction and decimal equivalents, emphasising 'parts per 100'. Find simplified equivalents e.g. ½ = 50% = 50/100 = 25/50 All of the above focuses on percentages as a thing you can count out of 100. Now shift to percentages *of* numbers. Your whole can be anything! Create problems where children have to find 50% or 25% etc. of a number. Percentage clouds are a useful way of thinking about this. If you can find 50%, 10% and 1% of a number, you can build other percentages from these starting points. Prices and discounts are a useful context. Deepen understanding by asking inverse questions or missing number questions e.g. 25% of a number is 8, what's the number? ***Interpret pie charts and use these to solve problems. Construct pie charts.*** Ensure the idea of a pie chart showing 100% and representing different numbers is fully understood. Pose problems where two pie charts show different proportions <u>but</u> the totals are different so they need careful interpretation. i.e. 1/3 = 24 on one chart and ½ = 18 on the other! It is good to base statistics work on other science or geography lessons etc. to put it in context. However, constructing pie charts may require you to provide comfortable data. Excel or other statistics apps can be very useful as they automatically convert data into different charts and graphs.

Timing		Fluency	Destinations for reaching expected Y6 level with teaching notes.
AUTUMN	3 WEEKS	Doubling and halving by partitioning Multiply and divide numbers by 10 and 100 and 1000 Divide multiples of 100 by 20 and 25 by chunking in 20s or 25s. Estimating where numbers should be placed on different number lines (scales) Find rules and missing numbers in multiplicative sequences. (Not always horizontally… show sequences with circles and arrows between, for example. Include missing numbers on measuring scales too!) Making and comparing numbers using digits cards and completing equations with digit cards to make statements correct.	**Calculating, Patterns & Algebra; Ratio & Measurement** ***Recall and use equivalence between simple fractions, decimals and percentages including in different contexts.*** ***Solve problems involving the relative sizes of two quantities where missing values can be found by using multiplication and division facts.*** ***Solve problems involving the calculation and conversion of units of measure, using decimal notation up to 3 dp where appropriate.*** ***Use, read, write and convert between standard units, converting measurements of capacity, length, mass and volume using decimal notation.*** Focus on measuring capacity, mass and length accurately using practical equipment. Relate scales to a different type of number line and addition and subtraction methods used in the previous unit of work. Explore this under the banner of 'equivalence'. Compare and estimate different masses, lengths and capacities. Use measuring equipment to show equivalence on scales. E.g. show 0-1kg on a line next to 0-1,000g and find equivalences. Include scales and parts of scales which do not go from 0-1 … i.e. 3 – 4 kg next to a line of 3,000 – 4,000 g Solve ratio problems (recipes are a great context for this) relating to measures. Length and capacity are also common context that we find ourselves solving ratio problems. **One of the best methods of visualising ratio problems is the bar model. Investigate this and use it!** ***Use simple formulae*** ***Express missing number problems algebraically*** ***Convert between miles and kilometres*** Conversions are a great way to explore formulae and also combine ratio work. e.g. how many km = mile?

Timing		Fluency	Destinations for reaching expected Y6 level with teaching notes.
AUTUMN	1 WEEK	Review 2D shape names and properties. Recognise and describe 3D shapes linked to their 2D faces. Solve missing number problems.	**Properties of Shapes: Angles** ***Draw 2-D shapes using given dimensions and angles – geometric construction.*** Review the properties of 2D shapes and always require children to use correct geometric vocabulary. Review how to use a protractor and require accuracy in construction. These skills will help them with the reasoning required in the next two objectives… ***Recognise angles where they meet at a point, are on a straight line, or are vertically opposite and find missing angles.*** ***Express missing number problems algebraically.*** There are two elements here. One is that children must be confident at estimating and measuring angles first, then the other is to use visualisation, reasoning and calculation to work out missing angles without measuring. The second is a deeper skill and requires lots of exploration through measuring first. Children must be familiar with missing angles being labelled algebraically. ***Illustrate and name the parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius.*** Investigate the ratio between the diameter, circumference and the area of a circle. Children love pi!

Timing		Fluency	Destinations for reaching expected Y6 level with teaching notes.
SPRING	2 WEEKS	Count forwards or backwards in steps of powers of 10 for any given number up to 10,000,000 Halving (this supports number line work by estimating where half way is) Rounding numbers to the nearest 10, 100, 1000 etc. Counting in decimals in small steps from 0.001 to 0.1 Making and comparing numbers using digits cards and completing equations with digit cards to make statements correct.	**The Number System: big *or* small numbers; negative numbers** ***Review the Autumn term Number System first unit of work and repeat or deepen exploration of either larger or smaller numbers based on your assessment:*** *Autumn review:* *Read and write numbers to at least 10,,000,000 and determine the value of each digit (the significance of each digit's position)* *Round any whole number to a required degree of accuracy (numbers relative to each other)* *Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1,000 giving answers to 3 d.p. (the significance of each digit's position)* ***Use negative numbers in context, and calculate intervals across zero.*** Use temperature as a context to explore negative numbers and use number lines to find increases and decreases bridging zero. ***Solve number and practical problems that involve all of the above.*** Solve empty box problems that rely on understanding of place value. Include problems with = and inequalities <> Use scales on measuring equipment and link this with work on number lines and decimal fractions. Express missing numbers algebraically. ***Solve problems involving conversion of units of measure, using decimal notation up to 3 dp where appropriate*** Use measures as a context for solving missing number and scaling problems. Use equipment to explore equivalent scales so the children don't rely on 'tricks' to convert but develop understanding. Use number lines next to one another to show the connection between different units of measurement and work with practical contexts. Make sure that children link their place value number line work with reading scales on measuring equipment.

Timing		Fluency	Destinations for reaching expected Y6 level with teaching notes.
SPRING	3 WEEKS	Chant and memorise weaker times tables. *Y5 Review: Recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3}).* Create 'If I know this… I know that…' statements to supersize numbers e.g. 6 X 7 = 42 so 6 X 70 = 420. Identify common factors, common multiples and prime numbers. Find rules and missing numbers in multiplicative/doubling or halving sequences. (Not always horizontally… show sequences with circles and arrows between, for example.)	**Calculating, Patterns & Algebra: all operations; Position; Statistics *and* Measures** *Autumn review:* *Perform mental calculations, including with mixed operations and large numbers.* *Use knowledge of the order of operations to carry out calculations involving the four operations.* *Solve addition, subtraction, multiplication and division multi-step problems in contexts, deciding which operations and methods to use and why.* Children may be very familiar with using + and – methods by now so spend longer on looking at and teaching away from errors, particularly in X and division. As you practice and use multiplication and division methods, you will simultaneously be rehearsing and recalling x table facts, rules of divisibility etc. Mental Maths (remember this can and should include jottings!) ***Find pairs of numbers that satisfy an equation with two unknowns.*** ***Enumerate possibilities of a combination of two variables*** It is very useful to look at this type of algebra when practising mental mathematics. It forms an investigative basis for mental arithmetic practice. e.g. 3g – w = 10 there are different possibilities for what g and w might represent. Here is a nice exploration of this with Numicon. ***Generate and describe linear sequences*** ***Describe positions on a full coordinate grid (all four quadrants)*** Investigate both term-to-term sequences e.g. adding 7 each time, and position to term sequences. Children need to be able to both describe the rule for a sequence algebraically, and to use a formula to generate terms. It is a great deepening exercise to plot terms of a sequence as a line graph and find the 'equation of the line'. Times tables can be useful for this. More Complex Multi-Step Calculations (combination of mental and written methods) ***Solve problems involving the calculation and conversion of units of measure using decimal notation up to 3 d.p. where appropriate.*** ***Solve problems which require answers to be rounded to specified degrees of accuracy.*** Time, timetables and money are useful contexts that have not been covered or used extensively in the Autumn term. They also lend themselves to mental jottings and the use of a number line to find the difference. Children should use all operations in combinations to solve word or other problems using measures or everyday situations as a context. Recalling calculation methods needs to be accurate and children must reason about their answer. Is it sensible? Does it match my estimation? Could I check with the inverse operation? Does it need to be rounded to a specified degree? If so, how? Does the answer require a fraction, decimal or percentage as an answer?

Timing		Fluency	Destinations for reaching expected Y6 level with teaching notes.
SPRING	2 WEEKS	Chanting 8 times table and finding 1/8 of different numbers.	**Geometry, Algebra, Ratio & Measures** ***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.* All of this work is based on understanding how to find the area of rectilinear shapes. Investigate how area is related to perimeters and vice versa. Children can fold rectangles in half diagonally to find the link between the side lengths, the area of the rectangle and the area of the resulting right-angled triangle, thus finding that half (length x width) = area of the right angled triangle. They can cut an isosceles triangle in half from apex to base (its height) to form two halves of a rectangle, thus finding that half the height x length of the base = area. Lots of rich reasoning here! Children can then use similar cutting techniques to find the area of a parallelogram. ***Solve problems involving similar shapes where the scale factor is known or can be found.*** This is about ratio. Children should scale shapes themselves and then work from scaled shapes to work out the scale factor. How does scaling the side length of a rectangle affect its area? ***Calculate, estimate and compare the volume of cubes and cuboids using standard units, including cubic centimetres and metres, and extending to other units [for example mm^3 and km^3]*** Investigate the relationship between area of a cube or cuboid's face and the volume. Review Y5 filling shapes to find the volume.

Timing		Fluency	Destinations for reaching expected Y6 level with teaching notes.
SPRING	2 WEEKS	Making and comparing numbers using digits cards and completing equations with digit cards to make statements correct. Step counting in multiples of 19 or 21 … or 1.9s etc. you could use different starting points! Find rules and missing numbers in additive sequences. (Not always horizontally… show sequences with circles and arrows between, for example.)	**Calculating, Patterns & Algebra; all operations; Fractions of numbers** *Autumn and Spring review:* *Solve multi-step problems using formal methods for all four operations.* Keep ensuring accuracy, understanding of the inverse and application in a range of problems. *KS2 review: find non-unit fractions of numbers.* Bar models are fantastic for visualising fractions of numbers, and the inverse… 1/3 of the class were boys, there were 18 girls. How many boys were there? Not 6 but 9! Express problems using missing numbers including missing denominators or numerators. ***Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.*** One of the best methods of visualising ratio problems is the bar model. Investigate this and use it! ***Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example ¼ X ½ = 1/8*** A form of grid method can be used to visualise this. Alternatively, saying 'of' in place of 'multiplied by' can make these simple. It is important that children grapple with this complex idea of using fractions as operators, rather than simply learning to multiply the denominators and the numerators… however, they should be encouraged to make this link and to test out the 'rule'. ***Divide proper fractions by whole numbers e.g. 1/3 ÷ 2 = 1/6*** If equivalence and understanding of fractions as numbers has been built in previous fraction lessons, splitting 1/3 in two should be able to be drawn, visualised etc. The inverse can also be applied e.g. 2 X 1/6 = 1/3 to check the calculation.

Timing		Fluency	Destinations for reaching expected Y6 level with teaching notes.
SPRING	1 WEEK	Calculate the mean as an average.	**Measures & Statistics** ***Use, read, write and convert between standard units, converting measurements of time from a smaller unit of measure to a larger unit and vice versa.*** Ensure children can now all tell the time and can use a number line /informal jottings to calculate time durations and differences. Use multiplication and division to find out how many minutes in a set number of hours, for example, and how many hours in a number of days. ***Calculate and interpret the mean as an average.*** Ensure that the data has some meaning (e.g. collected from the class or from science experiments etc.). Does a mean of 10.5 make sense if it is age? How do we interpret this? What about if it is teacher shoe size? What about if it is children per table?! ***Interpret line graphs and use these to solve problems.*** ***Construct line graphs.*** Line graphs show continuous data where each point on the line could represent data. Changing data over time is a great context for a line graph. Investigate the shape of different graphs without labelled axes and discuss what they could represent. Collect data and construct line graphs e.g. changing temperature over time. Show children how to mark a point on a line and then use a ruler to find its position on the axes. How would we draw the average on this graph? What is the mean average of our data?

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<table>
<tr><th colspan="2">Timing</th><th>Fluency</th><th>Destinations for reaching expected Y6 level with teaching notes.</th></tr>
<tr><td rowspan="2">SUMMER</td><td rowspan="2">3-4 WEEKS</td><td rowspan="2">Any mental maths to develop fluency and confidence.
Mental maths papers (though not used now) are useful for spotting gaps and building speed as part of revision.</td><td>Revision & SATS
By this point you will have covered the objectives for Y6 except:
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.
These objectives can be covered in about 4 lessons.

The rest of your teaching will be driven by gap analysis using your own school assessments or previous SATs questions; and what you know about the children.
Key areas to be repeated may be:
- rapid recall of multiplication and division facts
- answering questions about number sequences presented in different ways
- missing number equations that require mental calculation
- applying the four operations to multi-step problems.
- finding fractions (%, vulgar and decimals) of numbers
- calculating with fractions (both pure arithmetic and in contexts)
- answering questions about place value (including decimal and vulgar fractions)
- calculating with measures and finding missing angles</td></tr>
<tr><td rowspan="2">SUMMER</td><td rowspan="2">2 WEEKS</td><td rowspan="2">Investigate sequences: look at term to term and position to term sequences

Keep practising times tables and related facts - this is essential for transition into secondary school.</td><td>THE MATHS DOESN’T END WITH THE SATS!
Spirals
Appreciate and be inspired by the beauty of mathematics.
Look for mathematics in the world in which they live.
Reason about fractions, angles and number patterns in the context of spirals.
Suggest and test conjectures by representing and interpreting sequences and relationships.
Investigate the Archimedean spiral, the Baravelle spiral and Fibonacci spiral.</td></tr>
<tr><td rowspan="2">SUMMER</td><td rowspan="2">4- 5 Weeks</td><td>Problem Solving
Finding starting points and working logically
Solving visual problems
Solving problems using reasoning and convincing
Solving problems using conjecturing and generalising.
Use NRICH collections to find problems that will deepen your class’s thinking. Aim to tackle some ‘live problems’ on NRICH and send in their solutions.
Take the opportunity to solve problems that use algebraic proof and to develop children’s understanding of proof, digging deeper into generalisation.
Ensure arithmetic and number work continues to be used in problem solving contexts.</td></tr>
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