KS2 - Year 6		
National Curriculum	**Key Performance Indicators**	**Working at Greater Depth**
	Number and Place Value	
Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit	• Can explain the place value in numbers up to 10 000 000 • Can order a set of numbers to 10 000 000 • Understands how a number can be partitioned into different amounts • Can multiply and divide numbers by 10 and 1000 and explain the effect on the size of the digits in the number 6NPV–1 Understand the relationship between powers of 10 from 1 hundredth to 10 million, and use this to make a given number 10, 100, 1,000, 1 tenth, 1 hundredth or 1 thousandth times the size (multiply and divide by 10, 100 and 1,000). 6NPV–2 Recognise the place value of each digit in numbers up to 10 million, including decimal fractions, and compose and decompose numbers up to 10 million using standard and non-standard partitioning.	• Can solve logic and reasoning problems involving understanding of place value in numbers to 10 000 000
Round any whole number to a required degree of accuracy	• Can round numbers to the nearest 1 000 000 • Can estimate the answers to calculations by rounding and comparing answers 6NPV–3 Reason about the location of any number up to 10 million, including decimal fractions, in the linear number system, and round numbers, as appropriate, including in contexts. 6NPV–4 Divide powers of 10, from 1 hundredth to 10 million, into 2, 4, 5 and 10 equal parts, and read scales/number lines with labelled intervals divided into 2, 4, 5 and 10 equal parts.	• Can solve logic and reasoning problems involving rounding *e.g. guess my number with a range of clues such as, my number rounded to the nearest 10 000 is 60 000*

Use negative numbers in context, and calculate intervals across zero	• Can solve problems involving negative numbers linked to temperature, money and measures *e.g. find the difference between two temperatures when one is negative.*	• Can solve multi-step problems involving negative numbers *e.g. give debits and credits into a bank over a week with a starting balance of £100 and an overdraft of £150*
Solve number and practical problems that involve all of the above.	• Can solve problems involving place value, including word problems and problems linked to population of countries, money and measure	• Can solve complex multi-step problems involving place value, including decimal negative numbers linked to temperatures

Addition and Subtraction		
Perform mental calculations, including with mixed operations and large numbers	• Can mentally add and subtract numbers including decimals using a variety of strategies 6AS/MD–1 Understand that 2 numbers can be related additively or multiplicatively, and quantify additive and multiplicative relationships (multiplicative relationships restricted to multiplication by a whole number). 6AS/MD–2 Use a given additive or multiplicative calculation to derive or complete a related calculation, using arithmetic properties, inverse relationships, and place-value understanding.	• Reason about which method of addition and subtraction is most efficient and apply effective strategies to complex problem solving
Use their knowledge of the order of operations to carry out calculations involving the four operations	• Can understand and use brackets • Can understand the order of operations, BODMAS	• Can apply BODMAS to open ended investigations and explain reasoning
Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	• Can use addition and/or subtraction strategies to solve a complex problem. • Solve problems including those with more than one step • Can explain the steps and methods in an addition and subtraction problem and the reasons for them	• Can solve problems with a greater complexity and evaluate methods
Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy	• Can use rounding to estimate the answer • Can use estimating to consider whether their answer is appropriate • Can use the inverse to check the answer	• Can use estimating within more complex problem solving

Multiplication and Division		
Perform mental calculations, including with mixed operations and large numbers	• Can decide when to use a mental method, informal jottings or a written method for calculations with all four operations • Can identify an appropriate strategy to solve a mental *calculation e.g. calculate 24 × 15, they multiply 24 × 10 and then halve this to get 24 × 5, adding these two results together.* • Can approximate effectively using rounding • Can derive facts involving decimals • Can use knowledge of square numbers to derive square of multiples of 10 *e.g. 60 x 60* AS/MD–1 Understand that 2 numbers can be related additively or multiplicatively, and quantify additive and multiplicative relationships (multiplicative relationships restricted to multiplication by a whole number) 6AS/MD–2 Use a given additive or multiplicative calculation to derive or complete a related calculation, using arithmetic properties, inverse relationships, and place-value understanding.	• Can solve inverse problems involving multiplication and division • Can solve missing number and "I think of a number" problems involving multiplication and division
Identify common factors, common multiples and prime numbers	• Can identify common factors of 2 digit numbers • Can identify common multiples of 2 digit numbers • Can identify prime numbers to 100 and begin to recall these	• Can understand and use the term Lowest Common Multiple to investigate multiples • Can investigate prime numbers e.g. which 3 prime numbers multiply to make 231? • Can use known facts and divisibility tests to identify common factors of numbers
Use their knowledge of the order of operations to carry out calculations involving the four operations	• Can understand the order of BODMAS and use this to solve calculations	• Can solve reasoning questions involving the order of operations e.g. *True or False: Are these calculations equivalent?*

Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication	• Can use mental strategies to approximate answers to multiplication and division calculations • Can use an appropriate formal written method to multiply numbers up to ThHTU by TU	• Can identify the calculations needed to solve a multiplication word problem involving more than one step • Can solve complex word problems involving multiplication • Can solve multiplication word problems linked to money and measures • Can correct a multiplication calculation completed with errors and explain reasoning
Divide numbers up to 4 digits by a two-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	• Can use an expanded written method to divide ThHTU by TU • Can use a standard written method of long division to divide ThHTU by TU • Can interpret remainders accurately	• Can identify the calculations needed to solve a long division word problem involving more than one step • Can solve complex word problems involving long division • Can solve long division word problems linked to money and measures • Can correct a long division calculation completed with errors and explain reasoning
Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context	• Can use a standard written method of short division to divide ThHTU by U • Can use a standard written method of short division to divide ThHTU by TU • *Can interpret remainders accurately*	• Can identify the calculations needed to solve a short division word problem involving more than one step • Can solve complex word problems involving short division • Can solve short division word problems linked to money and measures • Can correct a short division calculation completed with errors and explain reasoning

Solve problems involving addition, subtraction, multiplication and division	• Can use addition and/or subtraction strategies to solve a complex problem. • Solve problems including those with more than one step	• Can explain the steps and methods in an addition and subtraction problem and the reasons for them
Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.	• Can use rounding to estimate the answer • Can use estimating to consider whether their answer is appropriate • Can use the inverse to check the answer	• Can use estimating to consider whether their answer is appropriate

Fractions, Decimals & Percentages		
Use common factors to simplify fractions; use common multiples to express fractions in the same denomination	• Understand equivalent fractions have common multiples • Using diagrams can see fractions are the same when simplified. • Can simplify fractions by dividing the numerator and denominator by a common factor. F–1 Recognise when fractions can be simplified, and use common factors to simplify fractions.	• Can identify which value is the odd one out by converting appropriately.
Compare and order fractions, including fractions > 1	• Can convert fractions into common denominators • Can use decimal equivalence to order and compare fractions. F–2 Express fractions in a common denomination and use this to compare fractions that are similar in value. F–3 Compare fractions with different denominators, including fractions greater than 1, using reasoning, and choose between reasoning and common denomination as a comparison strategy	• Can suggest fractions to go in between two given fractions
Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions	• Can use knowledge of equivalent fractions to add fractions • Can convert mixed numbers into improper fractions.	• Can identify possible missing fractions in a given calculation.
Multiply simple pairs of proper fractions, writing the answer in its simplest form	• Understand when multiplying by a fraction the answer will be smaller. • Using diagrams can understand when multiplying fractions by a fraction the answer will be smaller. • Can follow a standard method to multiply fractions.	• Can reason why the following statement is true or false: *The sum of two fractions is always greater than their product.*

Divide proper fractions by whole numbers	• Can divide a proper fraction by a whole number • Can explain how to divide a proper fraction, using diagrams if necessary to show understanding	• Can reason why the following statement if this is true or false: *If I divide a fraction by a whole number, the quotient is always smaller than the dividend.*
Associate a fraction with division and calculate decimal fraction equivalents	• Understand how to calculate a decimal from a fraction by dividing the numerator by the denominator. • Can explore recurring equivalence of decimals and fractions. • Can recall common fraction and decimal equivalents	• Can use a known fact to determine other decimal fractions
Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places	• Understands the effect of multiplying a decimal by 10, 100 and 100 • Understands the effect of dividing a decimal by 10, 100 and 100 NPV–1 Understand the relationship between powers of 10 from 1 hundredth to 10 million, and use this to make a given number 10, 100, 1,000, 1 tenth, 1 hundredth or 1 thousandth times the size (multiply and divide by 10, 100 and 1,000). NPV–2 Recognise the place value of each digit in numbers up to 10 million, including decimal fractions, and compose and decompose numbers up to 10 million using standard and non-standard partitioning. NPV–4 Divide powers of 10, from 1 hundredth to 10 million, into 2, 4, 5 and 10 equal parts, and read scales/number lines with labelled intervals divided into 2, 4, 5 and 10 equal parts.	• Can explain why 2.34 /10 is the same as 23.4/100 are the same.
Multiply one-digit numbers with up to two decimal places by whole numbers	• Can use an appropriate formal written method to multiply numbers up to U.th by U • Can use mental strategies to approximate answers to multiplication calculations • Can say why an answer to a multiplication involving 2 decimal places cannot be correct *e.g. Sam says the answer to 2.34 x 4 is 93.6 Explain why he cannot be correct.*	• Puja shares 6 apples between some friends. Each friend gets 0·75 of an apple. How many friends does she share the apples with?

Use written division methods in cases where the answer has up to two decimal places	• Can use an appropriate formal method to divide a number with U.th by a single digit *e.g. in the context of money £4.35 ÷ 3* • Can use an appropriate formal method to divide a whole number with a remainder by a single digit, extending their working into decimal places e.g. £178 ÷ *8* • Can interpret decimal answers in context e.g. What does 5.6 represent if it is in the context of money? mass? length?	• Create your own division calculation using a whole number where the answer has 2 decimal places.
Solve problems which require answers to be rounded to specified degrees of accuracy	• Can choose and use appropriate methods of calculation using all four operations. • Can decide whether to round an answer to the nearest tenth, whole number or higher value place, in context *e.g. Approximately how many metres of fabric should I buy if I need to make 3 dresses which each use 1.34m?*. • Can use rounding to estimate the answer • Can consider whether their answer is appropriate NPV–3 Reason about the location of any number up to 10 million, including decimal fractions, in the linear number system, and round numbers, as appropriate, including in contexts.	• Can suggest what number I was thinking of given what it rounds to *e.g. My number rounds to 4 when rounded to the nearest whole number, 3.5 when rounded to the nearest tenth.*
Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts	• Can recognise simple fraction, decimal and percentage equivalences in context including ½ = 0.5, ¼ = 0.25, ¾ = 0.75, 1/10 = 0.1, 1/5 = 0.2 • Can recognise other equivalent fractions, decimals and percentages with the same denominator e.g. If 1/10 = 0.1, 3/10 = ? • Can explain why 6/10 is more than 50%	• Jakob says to Peter, 'Last month I saved 0.5 of my pocket money and this month I saved 1/3 of my pocket money, so altogether I've saved 40% of my pocket money'. Do you think Peter should agree with Jakob? Explain your decision.

Ratio and Proportion		
Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts	• Understands ratio as a comparison of one part or amount with another • Can confidently use the language of 'for every' when describing a ratio. • Can use ratio to show the relative size of two quantities AS/MD–1 Understand that 2 numbers can be related additively or multiplicatively, and quantify additive and multiplicative relationships (multiplicative relationships restricted to multiplication by a whole number). AS/MD–3 Solve problems involving ratio relationships.	• Can use logic to solve ratio problems *e.g. Purple paint is made from read and blue paint in the ratio of 3:5. To make 40 litres of purple paint how much would I need of each colour? Explain your thinking.*
Solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison	• Understands proportion as a fraction of the whole amount • Can use percentages equivalents to describe a proportion	• Solve problems were a percentage has an impact on the whole number *e.g. In a class of children 25% are boys and the rest are girls. There are 18 girls.* *How many children are in the class?*
Solve problems involving similar shapes where the scale factor is known or can be found	• Understands direct proportion by scaling quantities up and down • Understands ratio as additive change or a multiplicative change • Can scale up/down recipes for a given number.	• Can unpick a problem *e.g. A recipe needs to include three times as much apple than peach. The total weight of apples and peaches in a recipe is 700g. How much apple do I need?*
Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.	• Can investigate possible answers to a question where one fraction has an impact on the other.	• Can apply the use of proportion and ratio to other areas of learning e.g. *interpreting pie charts.*

Algebra		
Use simple formulae	• Understands that a value can be replaced by a number or a symbol • Can solve missing box calculations by using inverse. • Can use formulae for other areas of learning e.g. perimeter and measure • Can substitute values into a formula to find an answer. • Can show a good understanding of the equals sign as a balancing symbol AS/MD–1 Use a given additive or multiplicative calculation to derive or complete a related calculation, using arithmetic properties, inverse relationships, and place-value understanding.	• Can write simple formulae for "I think of a number" problems and use it to explain the reason why they work.
Generate and describe linear number sequences	• Can create a number sequence given a rule to follow. • Understands a linear equation can be recursive, i.e. one number in the sequence is generated from the preceding number *e.g. by adding 3 to the preceding number* • Understands a linear equation can be ordinal, i.e. the position of the number in the sequence generates the number *e.g. by multiplying the position by 3, and then subtracting 2*	• Can create a linear equation to describe a visual pattern
Express missing number problems algebraically	• Can use symbols to express missing number problems • Can find values that satisfy the equation and make it a true statement. • Understands the associative law and can apply it to missing number problems • Understands the distributive law and can apply it to missing number problems	• Can solve missing facts in other areas of mathematics *e.g. use the properties of rectangles and triangles to deduce related facts and find missing lengths and angles*
Find pairs of numbers that satisfy an equation with two unknowns	• Can substitute numbers into unknowns to find a given value where there are limited answers. AS/MD–4 Solve problems with 2 unknowns.	• Can find whole number values that satisfy an equation where there is more than one possibility. *e.g. I bought some apples costing 10p and some pears costing 15p. The total cost was 90p. How apples and pears could I have bought?*

Enumerate possibilities of combinations of two variables	• Can identify different variables and consider the impact on one when one changes *e.g. list all the combinations of boys and girls in a class where there are twice as many boys as girls and between 25 & 35 children in the class altogether.*	• Can reason about the impact on one value if another was to be changed.

Geometry: Properties of Shape		
Draw 2-D shapes using given dimensions and angles	• Can identify, visualise and describe properties of rectangles, triangles and regular polygons • Can use knowledge of properties to draw 2-D shapes • Can use a ruler to measure accurately within 1mm • Can use a ruler to draw lines accurately within 2mm • Can use a protractor to measure angles accurately within 1 degree • Can use a protractor to draw angles accurately within 2 degrees • Can construct a triangle given two sides and the included angle G–1 Draw, compose, and decompose shapes according to given properties, including dimensions, angles and area, and solve related problems.	• Can solve problems using angle such as - *A triangle has been drawn carefully. You are told that the biggest angle is 20° larger than the second biggest angle and 40° larger than the smallest angle. Work out how big each angle is.*
Recognise, describe and build simple 3-D shapes, including making nets	Identify, visualise and describe properties of 3-D solids • Identify 3D shapes from their nets and explain why, including open and closed cubes • Draw nets of 3-D shapes with given dimensions	• Can reason whether statements are true or false e.g. *Pascal says that any net made with six squares can be folded to make a cube. Do you agree with him?*
Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons	• Can recognise the properties of isosceles, right angled, equilateral and scalene triangles • Can recognise the properties of squares, rectangles, rhombuses, parallelograms, trapeziums and kites • Can explain why a polygon is regular or irregular • Can identify whether a triangle is isosceles from known angles and sides • Can find unknown angles in all triangles, given one angle	• Can calculate the size of missing angles in a regular pentagon with its diagonals drawn in and given angles

Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius	• Can recognise that the circumference is the distance around a circle • Can explain that the radius is the distance from the centre to the circumference • Can explain that the diameter is 2x the radius	• Can solve problems and reasoning questions involving circles *e.g. Compare a circle and an oval. What's the same and what's different?*
Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.	Can estimate angles • Can use a protractor to measure and draw angles on their own and in shapes • Can explain that: • the angle sum of a triangle is 180° • the angles on a straight line add to 180° • the sum of angles around a point is 360° • Can recognise vertically opposite angles and know that they are equal • Can find missing angles in a variety of contexts	• Can use unknown angles and lengths using algebra
	Geometry: Position & Direction	
Describe positions on the full coordinate grid (all four quadrants)	• Can draw an axis for the four quadrants with equal spacing and negative numbers. • Can describe the vertices of a shape in all four quadrants • Can use the properties of a shape to complete the vertices of the shape.	• Can identify coordinates of a shape vertex after the shape has been reflected, translated or rotated.
Draw and translate simple shapes on the coordinate plane, and reflect them in the axes.	• Can draw a shape after a reflection of a simple shape in two mirror lines. • Can draw a shape after a shape has been translated across the four quadrants.	Can express translation using algebra *e.g. (a, b) is (a+2, b+3)*

Measurement		
Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate	• Can recall approximate conversions and is able to tell if an answer is sensible. • Can use decimal notation in a variety of formats to solve a problem.	• Can convert 2.3hrs into minutes
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 three decimal places	• Can explain the relationship between conversions • Can make estimates based on approximate conversions. ○ 1 litre is approximately 2 pints (more accurately, 1 ¾ pints) ○ 4.5 litres is approximately 1 gallon or 8 pints ○ 1 kilogram is approximately 2 lb (more accurately, 2.2 lb) ○ 30 grams is approximately 1 oz ○ 8 kilometres is approximately 5 miles	• Can solve problems where units of measure need to be converted more than once.
Convert between miles and kilometres	• Can use the conversion of miles to Km to apply to other facts.	• Can connect conversion (for example, from kilometres to miles) to a graphical representation.
Recognise that shapes with the same areas can have different perimeters and vice versa	• Can measure and calculate the perimeter and area of composite rectilinear shapes • Can calculate the perimeters of compound shapes that can be split into rectangles. • Can identify shapes that have the same area but have different perimeters	• Can reason about the area and perimeter of shapes e.g. *If you draw two rectangles and the second one has a greater perimeter than the first one, then the second one will also have a greater area*
Recognise when it is possible to use formulae for area and volume of shapes	• Understands when to use a formula to find the area of a shape. • Understands when to use the formula to find the volume of a shape.	• Can solve reasoning statements about area and volume.

Calculate the area of parallelograms and triangles	• Can calculate the area of right-angled triangles using their knowledge of a square • Can generalise how to find the area of a triangle • Can calculate the area of a parallelogram using their knowledge of squares and triangles.	• Can find the perimeter and area of a design where a mixture of shapes have been used.
Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units [for example, mm^3 and km^3].	• Can choose the appropriate measure to find the volume of a shape e.g. cm or m. • Can compare and order the volume of different shapes using estimates. • Can calculate the volume of a shape using the formula L x B x H	• Can create a list of top tips to calculate, estimate and compare volume.
Statistics		
Interpret and construct pie charts and line graphs and use these to solve problems	• Can use knowledge of fractions and percentages to interpret pie charts • Can construct a simple pie chart using common fractions • Can interpret a line graph when the answer lies between two given intervals • Can interpret a line graph that represents a conversion e.g. miles/kilometres	• Understands the size of angles within a pie chart and link these to common fractions and percentages • Can answer problems that require interpretation of line graphs and reasoning about the best value in a real life context *e.g. Which phone tariff would be best?*
Calculate and interpret the mean as an average.	• Can calculate the mean of a set of numbers • Understands that the mean is an average and understands when it is appropriate to find the mean of a set of data	• Can reason about the mean amount *e.g. if the mean of 5 numbers is 35 and the range is 12 what could the 5 numbers be?*

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