

Multiplicative reasoning 6.3		Length of unit: 3 weeks	Week beg:	Year: 6	Teacher:
<p>Success Criteria</p> <p>Pupils can solve problems involving multiplication, division, fractions and percentages in different contexts, appropriately choosing and using numbers facts, understanding of place value and mental and written methods. They can explain their decision making and justify their solutions.</p> <p>Pupils can explain the relationship between multiplication, division, ratio and proportion. They use this understanding to derive facts and solve problems.</p>	<p>Prior Learning:</p> <p>Check that children can already</p> <ul style="list-style-type: none"> ● involving measure [for example, length, mass, volume, money] using decimal notation including scaling ● identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers ● multiply numbers up to 4 digits by a one- or two-digit number using a formal written method including long multiplication for two-digit numbers ● multiply and divide numbers mentally drawing upon known facts ● divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context ● multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 recognise and use square numbers and cube numbers, and the notation for squared (²) and cubed (³) ● solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes ● solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign ● know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers ● establish whether a number up to 100 is prime and recall prime numbers up to 19 ● solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates ● solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those with a denominator of a multiple of 10 or 25 ● identify, name and write equivalent fractions of a given fraction, represented visually including tenths and hundredths ● multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams ● understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints 	<p>Resources</p> <p>Maths vocabulary book</p> <p>Using and Applying in every maths lesson</p> <p>Assessment through guided maths</p> <p>Think Maths!</p> <p>Pitch and Expectations Y6 and Y7</p> <p>Mind the Gap (L3 to L4)</p> <p>Overcoming Barriers to Learning – L3 to 4 and L4 to 5 (available online)</p> <p>Securing Level 4 and Securing Level 5 documents</p> <p>Errors and Misconceptions in Maths at KS2</p>			
<p>Guidance</p> <p>Pupils multiply decimals by whole numbers, starting with the simplest cases, such as $0.4 \times 2 = 0.8$, and in practical contexts, such as measures and money.</p> <p>Pupils are introduced to the division of decimal numbers by one-digit whole numbers, initially, in practical contexts involving measures and money. They recognise division calculations as the inverse of multiplication.</p> <p>Pupils know when it is appropriate to find the mean of a data set.</p> <p>Pupils should consolidate their understanding of ratio when comparing quantities, sizes and scale drawings by solving a variety of problems. They might use the notation a:b to record their work.</p> <p>Pupils recognise proportionality in contexts when the relations between quantities are in the same ratio (for example, similar shapes and recipes).</p> <p>Pupils solve problems involving unequal quantities, for example, 'for every egg you need three spoonfuls of flour', '$\frac{3}{5}$ of the class are boys'.</p> <p>Pupils link percentages of 360° to calculating angles of pie charts.</p> <p>Pupils connect their work on angles, fractions and percentages to the interpretation of pie charts.</p> <p>Pupils use their understanding of the relationship between unit fractions and division to work backwards by multiplying a quantity that represents a unit fraction to find the whole quantity (for example, if $\frac{1}{4}$ of a length is 36 cm, then the whole length is $36 \times 4 = 144$ cm).</p> <p>Pupils should use a variety of images to support their understanding of multiplication with fractions. This follows earlier work about fractions as operators (fractions of), as numbers, and as equal parts of objects, for example as parts of a rectangle.</p>					

Learning objectives

Addition, subtraction, multiplication and division

- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- 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
- 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
- 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

Fractions (including decimals and percentages)

- multiply one-digit numbers with up to two decimal places by whole numbers
- use written division methods in cases where the answer has up to two decimal places

Ratio and proportion

- solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison
- solve problems involving the relative sizes of two quantities, where missing values can be found by using integer multiplication and division facts
- solve problems involving unequal sharing and grouping using knowledge of fractions and multiples

Algebra

- use simple formulae
- generate and describe linear number sequences
- express missing number problems algebraically
- find pairs of numbers that satisfy an equation with two unknowns
- enumerate possibilities of combinations of two variables

Measurement

- solve problems involving the calculation and conversion of units of measure, using decimal notation to three decimal places where appropriate
- use, read, write and convert between standard units, converting measurements of length, mass and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to three decimal places
- convert between miles and kilometres

Statistics

- interpret and construct pie charts and line graphs and use these to solve problems
- calculate and interpret the mean as an average.

Pupil outcomes:

I can explain and represent different ways of solving $2170 \div 70$ and 2020×15 , give reasons for which would be the most efficient and suggest contexts where these calculations might be needed. I can explain and represent why the solution to $345 \div 6$ is different in the following contexts: "£345 is won on the lottery by six people. How much do they each get?", "345 people have bought tickets to the summer concert and the chairs are in blocks of 6. How many blocks are needed?", "345 cup cakes have been baked for the summer fair and will be sold in bags of six. How many full bags can be sold?" and "345 m of bunting is available to use to decorate six rooms. How much do they each get if it is shared equally?"

I can explain and represent how I know the ingredients I will need for a cake if the ratio is 4:2:1, flour: sugar: cocoa and I am using 250g flour. I can identify data which would be best represented in a pie chart and explain how I constructed a pie chart from data showing the percentage of children that travel to school in different ways.