

Long Term Plan for Mathematics

The national curriculum for mathematics aims to ensure that all pupils:

- Become **fluent** in their understanding of mathematical concepts.
- Can **reason mathematically** by following a line of enquiry, making generalisations and justifying their ideas using mathematical language.
- Can **solve problems** by applying their mathematics to a variety of problems, including breaking down problems into simpler steps and persevering in seeking solutions.

These principles should underpin all mathematics at Littleport Community Primary School and pupils should make connections between the different areas of mathematics and use their mathematical skills throughout the rest of the curriculum.

Key Stage 1

The principle focus of mathematics teaching in key stage 1 is to ensure that pupils develop confidence and mental fluency in whole numbers, counting and place value. This should involve working with numerals, words and the four operations and include the use of practical resources. By the end of year 2, pupils should know the number bonds to 20 and be precise in using and understanding place value. An emphasis on this at an early stage will aid fluency as the child progress through school.

Lower Key Stage 2

Children become increasingly fluent with whole numbers and the four operations, including number facts and place value. They should develop efficient written and mental methods and calculate accurately with increasingly large whole numbers. They should develop their ability to solve a range of problems, including with simple fractions and decimals. They should develop their mathematical reasoning and describe mathematical relationships. By the end of year 4, pupils should have memorised their multiplication tables up to 12x12 and show precision and fluency in their work.

Upper Key Stage 2

Pupils extend their knowledge and understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio. They should develop their ability to solve a wider range of problems using efficient mental and written methods. Pupils are introduced to the language of algebra (which can be linked to prior learning on missing numbers) as a means for solving a variety of problems. By the end of year 6, pupils should be fluent in written methods for all four operations and in working with fractions, decimals and percentages.

Year 1

Area of Mathematics		Objectives	Guidance and examples
Number	Number and Place Value	- Count to and across 100, forwards and backwards, from 0,1 or any given number - Count, read and write to 100 in numerals - Read and write numbers 1-20 in numerals and words. - Count in multiples of twos, fives and tens. - Given a number, identify one more and one less. - Identify and represent numbers using objects and pictorial representations, including the number line. - Compare numbers and use the language of: equal to, more than, less than (fewer), most, least.	Daily counting should take place, including counting in 'things' eg 1 banana, 2 bananas and 2 metres, 3 metres etc. Pupils should also practise ordering (first, second, third). Pattern spotting should be encouraged when children are counting in twos, fives and tens. Children should see amounts and numbers represented in a variety of ways including number lines, number grids, counting objects eg making tens with lolly sticks before counting in tens.
	Addition and Subtraction	- Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) - Represent and use number bonds and related subtraction facts within 20 – beginning to develop understanding of inverse. - Add and subtract one-digit and two digit numbers to 20, including zero. - Solve one step problems that involve addition and subtraction, using objects and pictorial representations. - Solve missing number problems such as $7 = \square - 9$	Pupils memorise and reason with number bonds to 10 in several forms (for example $3+7=10$, $10=3+7$, $10-3=7$). When number bonds to 10 are secure then pupils should memorise and reason with number bonds to 20 in several forms. Pupils combine and increase numbers, counting forwards and backwards. Pupils discuss and solve problems in familiar practical contexts, using objects and quantities as well as number lines and number sentences. Pupils should become familiar with the terms: put together, add, altogether, total, take away, distance between, difference between, more than, less than.

	Multiplication and Division	- Count in multiples of twos, fives and tens. (also included in place value) - Solve one-step problems involving multiplication and division by using concrete objects, pictorial representations and arrays with the support of the teacher.	Arrays are used to represent counting in twos, fives and tens and children are encouraged to make the connections. Grouping and sharing small quantities allows children to develop understanding of division and multiplication. Using objects, children should begin doubling and halving.
	Fractions	- Recognise, find and name a half as one of two equal parts of an object, shape or quantity. - Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.	Pupils should find half and a quarter as ‘fractions of’ a wide variety of objects, discrete quantities and shapes. They should know that finding half means sharing into two equal groups and that finding a quarter means sharing into 4 groups. Children must see this in a variety of ways and not just the traditional “pizza” fractions. Eg sharing toys, there are 2 of us, what fraction will we get? They should also recognise and find half and quarter as ‘fractions’ of continuous quantities eg finding half a length, a quarter of the amount of juice. Children should recognise that two halves make a whole and four quarters make a whole.
	Algebra (both year 1 objectives are taken from Number: Addition and Subtraction)	<i>Represent and use number bonds and related subtraction facts within 20 – beginning to develop understanding of inverse.</i> <i>Solve missing number problems such as $7 = \square - 9$</i>	

Measure	Measure	- Compare, describe and solve practical problems for: -lengths and heights -mass/weight -capacity/volume - Measure and begin to record the following: -lengths and heights -mass/weight -capacity and volume - time (hours, minutes and seconds)	- Long/short, longer/shorter, tall/short, double/half - Heavy/light, heavier/lighter, heavier than/lighter than - Full/empty, more than/less than, full/empty Pupils move from comparing and non-standard units to using manageable common standard units (e.g. m, cm, L, ml) Children should have as much practical experience as possible using measuring tools such as rulers, weighing scales and containers.
	Time	- Sequence events in chronological order using appropriate language (before, after, next, first, today, yesterday, tomorrow, morning, afternoon, evening) - Recognise and use language relating to dates (days of the week, weeks, months, years). - Tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.	Children should tell the time throughout the day, first using o' clock and then half past.
	Money	Recognise and know the value of denominations of coins and notes.	Pupils should have opportunities to play with money and use it in a variety of role play situations. They should have opportunities to make links between values of coins e.g. counting out ten x10p to make £1.

Geometry	Properties of Shapes	- Recognise and name common 2-D and 3-D shapes 2-D shapes (for example, rectangles (including squares), circles and triangles. 3-D shape (for example, cuboids (including cubes), pyramids and spheres	Pupils handle common 2-D and 3-D shapes. They name them and relate them to everyday objects. They recognise the shapes in different orientations. They know that rectangles, triangles, cuboids and pyramids are not always similar to each other.
	Position and Direction	Describe position, direction and movement, including whole, half, quarter and three-quarter turns.	Pupils should use the language: left, right, top, middle, bottom, on top of, in front of, above, between, around, near, close, far, up, down, forwards, backwards, inside and outside. Pupils make whole, half, quarter and three quarter turns in both directions. Turning clockwise is connected with movement on clock face.
Statistics	Collecting, recording and interpreting data	- Interpret and construct simple pictograms and tables. - Ask and answer simple questions by counting the number of objects in each category.	There are no statutory statistics objectives in year 1 but these objectives should be covered to give children experience of handling data. This can be done by making links across the curriculum.

Year 2

Area of Mathematics		Objectives	Guidance and examples
Number	Number and Place Value	- Count in steps of 2, 3 and 5 from 0 and in tens from any number, forward and backward. - Recognise place value of each digit in a two-digit numbers (tens and units) - Compare and order numbers from 0 to 100, use $<$, $>$ and $=$ signs. - Read and write numbers to at least 100 in numerals and words. - Identify and represent numbers using different representations including the number line. - Use place value and number facts to solve problems.	Daily counting should take place, including counting in 'things' eg 2 bananas, 4 bananas and 3 metres, 6 metres etc. Counting in multiples of three will later support understanding of a third. Children should be encouraged to spot patterns and use number squares, number lines, bead strings etc to support counting. The understanding of $=$ as a balanced equation rather than just the answer is very important. They should know that what they have on the right of $=$ is the same as on the left. They should be able to partition two digit numbers in different ways (for example, $23=20+3$ and $23=10+13$). They should begin to understand 0 as a place holder. Problem solving should involve discussing and reasoning around the value of digits in each two digit number.

	Addition and Subtraction	- Recall and use addition and subtraction facts to 20 fluently and use this to derive and work with related facts to 100. - Add and subtract numbers using concrete objects, pictorial representations and mentally, including: *2 digit number and units *2 digit number and tens *two 2 digit numbers *adding three 1 digit numbers. - Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems (link to algebra) - Show that addition of two numbers is commutative (can be done in any order eg $2+4=6$, $4+2=6$) but that subtraction is not. - Solve problems with addition and subtraction. *using concrete objects and pictorial representations, including quantities and measure *apply their knowledge of mental and written methods.	Pupils memorise and reason with number bonds to 20 in several forms (for example $13+7=20$, $20=13+7$, $20-13=7$). They should be explicitly taught to relate these known facts to number facts to 100 (for example, if they know $8+2=10$, they know that $80+20=100$). Pupils should continue to recognise, understand and use the terms: put together, add, altogether, total, take away, distance between, difference between, more than, less than. They extend their language to include sum and difference. They can check their calculations by adding to check subtraction (for example, $12-3=9$ can be checked by $9+3=12$) and by adding numbers in a different order ($5+2+1= 1+2+5= 1+5+2$). This reinforces commutativity.
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	Multiplication and Division	- Recall and use multiplication and division facts for the 2, 5 and 10 times tables, including recognising odd and even numbers. - Recognise and use multiplication ($\times$), division ($\div$) and equals ($=$) and be able to write number sentences for multiplication and division within the times tables. - Show that multiplication of two numbers is commutative (can be done in any order) but division is not. - Solve problems involving multiplication and division, including in context, using *materials *arrays *repeated addition *mental methods	Pupils are introduced to the multiplication tables. They practise to become fluent in the 2, 5 and 10 times tables. Links to big maths and fact families to be made explicit to support understanding of the relationship between multiplication and division. The 10 x tables should be linked to place value. The 5 x table can be linked to counting round the clock face. The 2 x tables can be linked to doubling. Using practical equipment and representing multiplication in a variety of ways, including lots of and repeated addition will support understanding before moving on to mental and written methods. Division should continue to be taught as sharing and grouping in context with as much practical experience as possible. Links start to be made between division and fractions. For example, $40 \div 2 = 20$, half of 40 = 20.
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	Fractions	• Recognise, find and name and write $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity. • Write simple fractions for example, $\frac{1}{2}$ of 6=3. • Recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$.	They use unit fractions (fractions with 1 as the numerator) to look at equal groups and sharing. It is important that children develop this concept of sharing and dividing at an early stage. Pupils find fractions of discrete and continuous qualities. They find fractions of lengths, quantities, sets of objects and shapes. They solve problems using shapes, objects and quantities. Children must see fractions in a variety of ways and not just the traditional “pizza” fractions eg with toy cars, what fraction of the cars are blue? Pupils count in fractions up to 10 (for example $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{2}{4}$, $1\frac{3}{4}$, 2). This shows that fractions are numbers and can add up to more than one. Showing this with pictures or objects would reinforce the concept.
	Algebra (These objectives are taken from other areas)	• <i>Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems (taken from addition and subtraction)</i> • <i>Recall and use addition and subtraction facts to 20 fluently and derive and use related facts to 100 (taken from addition and subtraction)</i> • <i>Compare and sequence intervals of time (taken from measurement)</i> • <i>Order and arrange combinations of mathematical objects in patterns (taken from Geometry: Position and direction.</i>	

Measure	Measure	- Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to nearest appropriate unit, using rulers, scales, thermometers and measuring jugs/cylinders. - Compare and order lengths, mass, volume and capacity using > < and =	Children should compare measures for example twice as much, half as high They should use standard units of measurement with increasing accuracy. They should use the appropriate language and record using standard abbreviations. Children should have as much practical experience as possible using measuring tools such as rulers, weighing scales and containers.
	Time	- Compare and sequence intervals of time - Tell and write the time to 5 minutes, including quarter past and quarter to the hour. Draw hands on a clock face to show these times. - Know the number of minutes in an hour and number of hours in a day.	Children become fluent in telling the time on analogue clocks and recording it. Children should also be aware of digital clocks and some children may tell the time using them.
	Money	- Recognise and use symbols for pounds (£) and pence (p) - Combine amounts to make a particular value - Find different combinations of coins that equal the same amounts of money - Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change.	Pupils become fluent in counting and recognising coins (link to multiples of 2, 5 and 10). They read and say amounts of money confidently They record pounds and pence separately.

Geometry	Properties of Shapes	- Identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line - Identify and describe the properties of 3-D shapes, including number of edges, vertices and faces - Identify 2-D shapes on the surface of 3-D shapes (for example a circle on a cylinder and a triangle on a pyramid) - Compare and sort common 2-D and 3-D shapes and everyday objects	Pupils handle and name a wide variety of common 2-D and 3-D shapes including: -quadrilaterals -polygons -cuboids -prisms -cones And identify the properties of each shape (number of sides and faces). Pupils identify, compare and sort shapes on the basis of their properties and use vocabulary precisely -sides -edges -vertices -faces Pupils read and write names for shapes that are appropriate to their reading and spelling. Pupils draw lines and shapes using a straight edge.
	Position and Direction	- Order and arrange combinations of mathematical objects in patterns and sequences - Use mathematical vocabulary to describe position, direction and movement, including -movement in a straight line -rotation as a turn in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise)	Pupils should work with patterns of shapes, including those in different orientations. They should link to algebra by working out the missing shape. Pupils should explore the concept and language of turns by applying rotations in practical contexts. For example, moving themselves in turns, giving instructions to other pupils and programming robots using instructions given in right angles.

Statistics	Collecting, recording and interpreting data	• Interpret and construct simple pictograms, tally charts, block diagrams and simple tables. • Ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity • Ask and answer questions about totalling and comparing data.	Pupils record, interpret, collate, organise and compare information. They begin to use many to one correspondence in pictograms making links to 2, 5 and 10 times tables Make links across the curriculum by collecting, recording and interpreting data in science.
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Year 3

Area of Mathematics		Objectives	Guidance and examples
Number	Number and Place Value	- Count from 0 in multiples of 4, 8, 50 and 100. - Find 10 or 100 more or less than a given number. - Recognise the place value of each digit in a 3-digit number. (HTU) - Compare and order numbers up to 1000 - Identify, represent and estimate numbers using different representations. - Read and write numbers to 1000 in numerals and words. - Read and write the numbers I-XII in Roman numerals (refer to time objective) - Read Roman numerals to 100 (I to C) and know that over time, the number system changed to include 0 and place value - Read Roman numerals to 1000 (M) and recognise years written in Roman numerals - Solve number problems and practical problems using these ideas.	Pupils now use multiples of 2, 3, 4, 5, 8, 10, 50 and 100. They use larger numbers to at least 1000, applying partitioning related to place value using varied and increasingly complex problems, building on work in year 2 (for example $146 = 100 + 40 + 6$, $146 = 130 + 16$). Using a variety of representations, including those related to measure, pupils continue to count in ones, tens and hundreds, so that they become fluent in order and place value of numbers to 1000. Roman numerals should be put in their historical context so pupils understand that there have been different ways to write whole numbers and that the important concepts of zero and place value were introduced over a period of time.
	Addition and Subtraction	- Add and subtract numbers mentally, including: -a three digit number and units -a three digit number and tens -a three digit number and hundreds - Use a written method to add and subtract numbers with up to 3 digits. - Estimate the answer to a calculation and use inverse operations to check answers - Solve problems, including missing number problems, using number facts, place value, and more complex +-	Pupils practise solving varied addition and subtraction questions. For mental calculations with two digit numbers, the answers could exceed 100. Pupils develop efficient written methods – using partitioning and moving on to expanded method of addition. Missing number problems involve larger numbers eg $1\square5 + 23\square = 379$

	Multiplication and Division	- Count from 0 in multiples of 4, 8, 50 and 100 (refer to number and place value objectives) - Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables - Write and calculate mathematical statements for multiplication and division using the times tables they know, including for TUXU using mental and written methods - Estimate the answer to a calculation and use inverse operations to check answers - Solve problems, including: - missing number problems, involving multiplication and division - including positive number scaling (for example, 4 times as high, eight times as long) - correspondence problems in which n objects are connected to m objects (for example, 3 hats and 4 coats, how many different outfits, 12 sweets shared equally between 4 children)	Pupils continue to practise their mental recall of multiplication tables when they are calculating mathematical statements in order to improve fluency. Through doubling, they connect the 2, 4 and 8 times tables. Pupils develop efficient written methods, for example, using commutativity and associativity (eg $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$) and multiplication and division facts (eg using $3 \times 2 = 6$, $6 \div 3 = 2$ and $2 = 6 \div 3$) to derive related facts ($30 \times 2 = 60$, $60 \div 3 = 20$ and $20 = 60 \div 3$) Pupils develop written methods for multiplication and division starting with 2 digits by one digit. Progressing to chunking and grid method. Pupils solve simple problems in contexts, deciding which of the four operations to use and why.
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	Fractions (including decimals)	- Count up and down in tenths (as a fraction not decimal) - Recognise that tenths arise from dividing an object into 10 equal parts and in dividing one digit numbers or quantities by 10. - Recognise and use fractions (unit and non-unit) as numbers on a number line (go beyond 1) - Recognise and show, using diagrams, equivalent fractions with small denominators. - Recognise, find and write fractions of a discrete set of objects: unit fractions (1 as numerator) and non-unit (not 1 as numerator) with small denominators. - Compare and order unit fractions and fractions with the same denominator. - Add and subtract fractions with the same denominator within one whole (for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$) - Solve problems that involve all of the above.	Pupils understand that tenths come from division by 10. They begin to connect place value and decimal measures of tenths. They begin to understand unit ($\frac{1}{X}$) and non-unit ($\frac{2}{X}$ etc) fractions as numbers on the number line and deduce relations between them, such as size and equivalence. They should go past 1. Pupils understand the relation between unit fractions as operators (fractions of), and division by integers. They continue to recognise fractions in the context of parts of a whole, numbers, measurements, a shape, and unit fractions as division of a quantity. Children should be exposed to a number of images beyond 'pizza' fractions.
	Algebra Objectives in year 3 are taken from other parts of the maths curriculum	<i>Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction (taken from addition and subtraction)</i> <i>Solve problems, including:</i> <i>- missing number problems, involving multiplication and division (taken from multiplication and division)</i>	

Measure	Measure	- Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml) - Measure the perimeter of simple 2D shapes	Pupils continue to measure using the appropriate tools and units, progressing to using a wider range of measures, including comparing and using mixed units (for example, 1kg and 200g) and simple equivalents of mixed units (for example, 5m = 500cm). The comparison of measures includes simple scaling by integers (for example, a given quantity or measure is twice as long or five times as high) and this connects to multiplication.
	Time	- Tell the time from an analogue clock, including using Roman numerals from I to XII, and 12 and 24 hour clocks - Estimate and read time with increasing accuracy to the nearest minute. - Record and compare time in terms of seconds, minutes and hours. - Use vocabulary – o'clock, am/pm, morning, afternoon, noon, midnight. - Know the number of seconds in a minute and the number of days in each month, year and leap year. - Compare duration of events (for example to calculate time taken by particular events or tasks).	Pupils use analogue and digital 12 hour clocks and record their times. In this way they become fluent in and prepared for using 24 hour clock (introduced in year 3, consolidated in year 4).
	Money	Add and subtract amounts of money to give change, using both £ and p in practical contexts.	Pupils continue to become fluent in recognising the value of coins, by adding and subtracting amounts, including mixed units, and giving change using manageable amounts. They record £ and p separately. The decimal recording of money is introduced formally in year 4 (however, some children may be familiar with this concept and able to use it in year 3).

Geometry	Properties of Shapes	• Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them. • Recognise angles as a property of shape • Identify right angles • Identify whether angles are greater than or less than a right angle • Identify horizontal and vertical lines and pairs of perpendicular and parallel lines.	Pupils knowledge of the properties of shapes is extended to symmetrical and non-symmetrical polygons and polyhedral. They should be able to describe the properties of 2-D and 3-D shapes using accurate language, including lengths of lines and acute and obtuse for angles smaller than or greater than right angles. Pupils connect decimals and rounding to drawing and measuring straight lines in cm in variety of contexts.
	Position and Direction	• Recognise angles as a property of a turn • Recognise that two right angles make a half turn, three make three quarters of a turn and four complete a turn.	
Statistics	Collecting, recording and interpreting data	• Interpret and present data using bar charts, pictograms and tables. • Solve one-step and two-step questions (for example, 'How many more?' and 'How many fewer?') using information presented in scaled bar charts, pictograms and tables.	Pupils understand and use simple scales (eg 2, 5 and 10 units per cm) in pictograms and bar charts with increasing accuracy. They continue to interpret data presented in a variety of contexts.

Year 4

Area of Mathematics		Objectives	Guidance and examples
Number	Number and Place Value	• Count in multiples of 6,7,9,25 and 1000 • Count backwards through zero to include negative numbers • Recognise the place value of each digit in a 4 digit number (ThHTU) • Recognise place value for tenths and hundredths. • Find the effect of dividing by 10 and 100, identifying the value of digits in the answer (including units, tenths, hundredths) • Find 1000 more or less than a given number • Order and compare numbers up to 10,000 • Compare numbers with the same number of decimal places up to two decimal places (refer to fractions objectives) • Identify, represent and estimate numbers using different representations. • Round any number to the nearest 10,100 or 1000. • Round decimals with one decimal place to nearest whole number (refer to fractions objectives) • Solve number problems and practical problems that involve all of the above and with increasingly large positive numbers	Using a variety of representations, including measures, pupils become fluent in the order and place value of numbers beyond 1000, including counting in tens and hundreds, and maintaining fluency in other multiples through varied and frequent practice. They begin to extend their knowledge of the number system to include the decimal numbers and fractions that they have met so far. They connect estimation and rounding numbers to the use of measuring instruments.

	Addition and Subtraction	• Add and subtract numbers mentally with increasingly large numbers • Use a written method to add and subtract numbers with up to 3 digits. • Estimate the answer to a calculation and use inverse operations to check answers • Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why	Add and subtract using expanded method of addition and number line for subtraction. Children should recognise whether they can use a mental method to calculate or require a written method. They should become increasingly confident using written methods.
	Multiplication and Division	• Count in multiples of 6,7,9,25 and 1000 (refer to number and place value objectives) • Recall and use multiplication and division facts for multiplication tables up to 12x12 (6, 7, 9, 11, 12) • Use place value, known and derived, facts to multiply and divide mentally, including: *reinforcing concept of multiplying by 0 and 1 *reinforcing concept of dividing by 1. *multiplying together 3 numbers • Recognise and use factor pairs and commutativity in mental calculations • Multiply two digit and three digit numbers by a one digit number, using a written method. • Estimate the answer to a calculation and use inverse operations to check answers • Solve problems, including: -distributive law to multiply two digit by one digit (for example, $39 \times 7 = 30 \times 7 + 9 \times 7$) -associative law $(2 \times 3) \times 4 = 2(3 \times 4)$ -integer scaling problems -harder correspondence problems (for example number of choices on a menu or 3 cakes shared equally between 10 children).	Pupils continue to practise recalling and using multiplication tables and related division facts to aid fluency. Pupils practise mental methods and extend this to three-digit numbers to derive facts, (for example $600 \div 3 = 200$ can be derived from $2 \times 3 = 6$). Pupils practise to become fluent in the written method – chunking and grid method. They combine their knowledge of number facts and rules of arithmetic to solve mental and written calculations for example, $2 \times 6 \times 5 = 10 \times 6 = 60$.

	Fractions (including decimals)	- Count up and down in hundredths - Recognise that hundredths arise from dividing an object by one hundred and tenths by ten. - Find the effect of dividing by 10 and 100, identifying the value of digits in the answer as units, tenths, hundredths (refer to number and place value objectives) - Recognise and write decimal equivalents of any number of tenths or hundredths. - Recognise and write decimal equivalents to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ - Recognise and show, using diagrams, families of common equivalents - Compare and order unit fractions and fractions with the same denominator. - Recognise, find and write fractions of a discrete set of objects: unit fractions (1 as numerator) and non-unit (not 1 as numerator) with small denominators. - Add and subtract fractions with the same denominator. - Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit (denominator is not 1) fractions where the answer is a whole number. - Round decimals with one decimal place to the nearest whole number. - Compare numbers with the same number of decimal places up to two decimal places. - Solve simple measure and money problems involving fractions and decimals to two decimal places.	Pupils should connect hundredths to tenths and place value and decimal measure. This includes relating the decimal notation to division of whole number by 10 and later 100. They extend the use of the number line to connect fractions, numbers and measures. Pupils understand the relation between non-unit fractions and multiplication and division of quantities, with particular emphasis on tenths and hundredths. Pupils make connections between fractions of a length, of a shape and as a representation of one whole or set of quantities. Pupils use factors and multiples to recognise equivalent fractions and simplify where appropriate (for example $\frac{6}{9} = \frac{2}{3}$ or $\frac{1}{4} = \frac{2}{8}$) Pupils continue to practise adding and subtracting fractions with the same denominator, to become fluent through a variety of increasingly complex problems beyond one whole. Pupils are taught throughout that decimals and fractions are different ways of expressing numbers and proportions. They practise counting using simple fractions and decimals, both forwards and backwards. Pupils learn decimal notation and the language associated with it, including in the context of measurements. They make comparisons and order decimal amounts and quantities that are expressed to the same number of decimal places. They should be able to represent numbers with one or two decimal places in several ways, such as on number lines.
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	Algebra Objectives in year 4 are taken from other parts of the maths curriculum	• <i>Perimeter can be expressed algebraically as $2(a+b)$ where a and b are the same dimensions in the same unit (taken from measurement non-statutory guidance)</i> • Solve missing number problems using all four operations	
Measure	Measure	• Convert between different units (for example kilometre to metre) • Estimate, compare and calculate different measures • Measure and calculate the perimeter of shapes with straight lines (rectilinear) (including squares) in centimetres and metres. • Find the area of shapes with straight lines (rectilinear) by counting squares	Pupils build on their understanding of place value and decimal notation to record metric measures, including money. They use multiplication to convert from larger to smaller units. Perimeter can be expressed algebraically as $2(a + b)$ where a and b are the dimensions in the same unit. They relate area to arrays and multiplication.
	Time	• Convert between different units (for hour to minutes) • Read, write and convert time between analogue and digital 12 and 24 hour clocks. • Solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days.	
	Money	• Estimate, compare and calculate different measures, including money in pounds and pence. • Add and subtract amounts of money to give change, using both £ and p in practical contexts.	

Geometry	Properties of Shapes	• Compare and classify geometric shapes, including quadrilaterals (parallelogram, rhombus, trapezium) and triangles (isosceles, equilateral, scalene), based on their properties and sizes. • Identify acute and obtuse angles • Compare and order angles up to two right angles (180°) by size. • Identify lines of symmetry in 2-D shapes presented in different orientations. • Complete a simple symmetric figure with respect to a specific line of symmetry.	Pupils continue to classify shapes using geometrical properties, extending to classifying different triangles (for example, isosceles, equilateral, scalene) and quadrilaterals (for example, parallelogram, rhombus, trapezium). Pupils compare and order angles in preparation for using a protractor and compare lengths and angles to decide if a polygon is regular or irregular. Pupils draw symmetric patterns using a variety of media to become familiar with different orientations of lines of symmetry; and recognise line symmetry in a variety of diagrams, including where the line of symmetry does not dissect the original shape.
	Position and Direction	• Describe positions on a 2-D grid as coordinates in the first quadrant • Describe movements between positions as translations of a given unit to the left/right and up/down • Plot specified points and draw sides to complete a given polygon	Pupils draw a pair of axes in one quadrant, with equal scales and integer labels. They read, write and use pairs of coordinates, for example (2, 5), including using coordinate-plotting ICT tools.
Statistics	Collecting, recording and interpreting data	• Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs • Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.	Pupils understand and use a greater range of scales in their representations. Pupils begin to relate the graphical representation of data to recording change over time.

Year 5

Area of Mathematics		Objectives	Notes and guidance
Number	Number and Place Value	• Interpret negative numbers in context, count forwards and backwards with negative whole numbers, including through zero. • Read, write and order numbers to at least 1,000,000 and determine the value of each digit. • Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10,000 and 100,000. • Solve number problems and practical problems that involve all of the above. • <i>Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents (copied from Fractions)</i> • <i>Round decimals with two decimal places to the nearest whole number and to one decimal place (copied from Fractions)</i>	Pupils identify the place value in large whole numbers. They continue to use number in context, including measurement. Pupils extend and apply their understanding of the number system to the decimal numbers and fractions that they have met so far. They should recognise and describe linear number sequences, including those involving fractions and decimals, and find the term-to-term rule. They should recognise and describe linear number sequences (for example, 3, 3 $\frac{1}{2}$, 4, 4 $\frac{1}{2}$...), including those involving fractions and decimals, and find the term-to-term rule in words (for example, add $\frac{1}{2}$)
	Addition and Subtraction	• Add and subtract mentally with increasingly large numbers. • Use a written method to add and subtract whole numbers up to 100,000. • Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. • Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.	Pupils confidently use written methods with increasingly large numbers. Children may move from expanded addition to compact provided their understanding is solid. Number line for subtraction should use increasingly large jumps. They practise mental calculations with increasingly large numbers to aid fluency (for example 12462 -2300 = 10162).

	Multiplication and Division	• Multiply and divide numbers mentally drawing upon known facts. • Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000. • Multiply numbers up to 4 digits by a one or two digit number using a written method (grid method) including long multiplication for two digit numbers. • Divide numbers up to 4 digits by a one digit number using a written method (chunking) and interpret remainders appropriately for the context. • Use estimation to check answers to calculations. • Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. • 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 know the prime numbers up to 19. • Recognise and use square numbers and cube numbers and the notation for squared (²) and cubed (³)	Pupils practise and extend their use of written methods of multiplication and division. They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations. They use and understand the terms factor, multiple and prime, square and cube numbers. Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (for example, $98 \div 4 = 98/4 = 24 \text{ r } 2 = 24 \frac{1}{2} = 24.5 \approx 25$). Pupils use multiplication and division as inverses to support the introduction of ratio in year 6, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of a 1000 in converting between units such as kilometres and metres. Distributivity can be expressed as $a(b + c) = ab + ac$. They understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalence statements (for example, $4 \times 35 = 2 \times 2 \times 35$; $3 \times 270 = 3 \times 3 \times 9 \times 10 = 9^2 \times 10$). Pupils use and explain the equals sign to indicate equivalence, including in missing number problems (for example, $13 + 24 = 12 + 25$; $33 = 5 \times \square$).
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	Fractions (including decimals and percentages)	• Recognise and use thousandths and relate them to tenths, hundredths, and decimal equivalents. • Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths. • Recognise, find and write fractions of a discrete set of objects: unit fractions (1 as numerator) and non- unit (not 1 as numerator) with small denominators. • Compare and order fractions whose denominators are all multiples of the same number. • Add and subtract fractions with the same denominator and multiples of the same number. • Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number (for example, $2/5 + 4/5 = 6/5 = 1,1/5$) • Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams. • Read and write decimal numbers as fractions (for example, $0.71 = 71/100$) • Round decimals with two decimal places to the nearest whole number and to one decimal place. • Read, write, order and compare numbers with up to three decimal places. • Solve problems involving number up to three decimal places. • Recognise the per cent symbol (%) and understand that per cent relates to number of parts per 100, and write percentages as a fraction with denominator 100, and as a decimal.	Pupils should be taught throughout that percentages, decimals and fractions are different ways of expressing proportions. They extend their knowledge of fractions to thousandths and connect to decimals and measures. Pupils connect equivalent fractions > 1 that simplify to integers with division and other fractions > 1 to division with remainders, using the number line and other models, and hence move from these to improper and mixed fractions. Pupils connect multiplication by a fraction to using fractions as operators (fractions of), and to division, building on work from previous years. This relates to scaling by simple fractions, including fractions > 1. Pupils practise adding and subtracting fractions to become fluent through a variety of increasingly complex problems. They extend their understanding of adding and subtracting fractions to calculations that exceed 1 as a mixed number. Pupils continue to practise counting forwards and backwards in simple fractions. Pupils continue to develop their understanding of fractions as numbers, measures and operators by finding fractions of numbers and quantities. Pupils extend counting from year 4, using decimals and fractions including bridging zero, for example on a number line.
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		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 fractions with a denominator of a multiple of 10 or 25.	Pupils say, read and write decimal fractions and related tenths, hundredths and thousandths accurately and are confident in checking the reasonableness of their answers to problems. They mentally add and subtract tenths, and one-digit whole numbers and tenths. They practise adding and subtracting decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1 (for example, $0.83 + 0.17 = 1$). Pupils should go beyond the measurement and money models of decimals, for example, by solving puzzles involving decimals. Pupils should make connections between percentages, fractions and decimals (for example, 100% represents a whole quantity and 1% is $\frac{1}{100}$, 50% is $\frac{50}{100}$, 25% is $\frac{25}{100}$) and relate this to finding 'fractions of'
	Algebra	<i>Use the properties of rectangles to deduce related facts and find missing lengths and angles (copied from Geometry: properties of shapes)</i>	

Measure	Measure	- Convert between different units of measure (for example, km to m, m to cm, cm to mm; g to kg; litre and millilitre). - Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints. - Measure and calculate the perimeter of composite rectilinear (straight line) shapes in centimetres and metres. - Calculate and compare the area of rectangles (including squares) and including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes. - Estimate volume (for example using 1cm³ blocks to build cuboids and cubes) and capacity (for example, using water). - Use all four operations to solve problems involving measure (for example, length, mass, volume, money) using decimal notation, including scaling.	Pupils should use their knowledge of place value and multiplication and division to convert between standard units. Pupils calculate the perimeter of rectangles and related composite shapes, including using the relations of perimeter or area to find unknown lengths. Missing measures questions such as these can be expressed algebraically, eg $4 + 2b = 20$ for a rectangle of sides 2cm and bcm and perimeter of 20cm. Pupils calculate the area from scale drawings using given measurements.
	Time	Solve problems including converting between units of time.	Solve increasingly complex problems, related to real life where possible.
	Money	Use all four operations to solve problems involving measure (for example, length, mass, volume, money) using decimal notation, including scaling.	Solve increasingly complex problems, related to real life where possible. Link to enterprise curriculum driver.

Geometry	Properties of Shapes	- Identify 3-D shapes, including cubes and other cuboids, from 2-D representations. - Use the properties of rectangles to deduce related facts and to find missing lengths and angles. - Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles. - Draw given angles and measure them in degrees ($^{\circ}$). - Identify: *angles at a point and one whole turn (360°) *angles at a point on a straight line and $\frac{1}{2}$ a turn (total 180°) *other multiples of 90. - Distinguish between regular and irregular polygons based on reasoning about equal sides and angles.	Pupils become accurate in drawing lines with a ruler to the nearest millimetre, and measuring with a protractor. They use conventional markings for parallel lines and right angles. Pupils use the term diagonal and make conjectures about the angles formed between sides, and between diagonals and parallel sides, and other properties of quadrilaterals, for example using dynamic geometry ICT tools. Pupils use angle sum facts and other properties to make deductions about missing angles and relate these to missing number problems.
	Position and Direction	Identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.	Pupils recognise and use reflection and translation in a variety of diagrams, including continuing to use a 2-D grid and coordinates in the first quadrant. Reflection should be in lines that are parallel to the axes.
Statistics	Collecting, recording and interpreting data	- Solve comparison, sum and difference problems using information presented in a line graph. (distance/time graphs) - Complete, read and interpret information in tables, including time tables.	Pupils connect their work on coordinates and scales to their interpretation of time graphs. They begin to decide which representations of data are most appropriate and why.

Year 6

Area of Mathematics		Objectives	Notes and guidance
Number	Number and Place Value	• Read, write, order and compare numbers up to 10,000,000 and determine the value of each digit. • Count forwards and backwards in steps of powers of 10 for any given number up to 1,000,000. • Use negative numbers in context and calculate intervals across zero. • Round any whole number to a required degree of accuracy. • Solve number problems and practical problems that involve all of the above. • <i>Identify the value of each digit to 3 decimal places and multiply and divide numbers by 10, 100 and 1000 where answers are up to 3 decimal places (copied from Fractions).</i> • <i>Solve problems which require the answer to be rounded to specified degrees of accuracy (copied from Fractions).</i>	Pupils use the whole number system, including saying, reading and writing numbers accurately.
	Addition and Subtraction	• Perform mental calculations, including with mixed operations and large numbers • Add and subtract whole numbers with more than 4 digits, which may include using a formal written method. • Use knowledge of the order of operations to carry out calculations involving the four operations. • Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.	Pupils practise addition, subtraction, multiplication and division for larger numbers using an efficient written method. Children have some experience of formal written methods of using the formal written methods of columnar addition and subtraction, short and long multiplication, and short and long division. They undertake mental calculations with increasingly large numbers and more complex calculations.

	Multiplication and Division	• Perform mental calculations, including with mixed operations and large numbers. • Multiply multi-digit numbers up to 4 digits by a two-digit whole number using an efficient written method. • Divide numbers up to 4 digits by one-digit or two-digit whole numbers using an efficient written method, interpreting remainders as whole numbers, fractions or by rounding as appropriate to the context • Use knowledge of the order of operations to carry out calculations involving the four operations. • Solve problems involving multiplication and division. • Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy. • Identify common factors, common multiples and prime numbers. • <i>Use common factors to simplify fractions; use common multiples to express fractions in the same denomination (copied from Fractions).</i>	Pupils continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency. Pupils round answers to a specified degree of accuracy, for example, to the nearest 10, 20, 50 etc., but not to a specified number of significant figures. Pupils explore the order of operations using brackets; for example, $2 + 1 \times 3 = 5$ and $(2 + 1) \times 3 = 9$. (Brackets, division, multiplication, addition, subtraction) Common factors can be related to finding equivalent fractions.
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	Fractions (including decimals and percentages)	• Compare and order fractions, including fractions > 1. • Use common factors to simplify fractions; use common multiples to express fractions in the same denomination. • Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions. • Multiply simple pairs of proper fractions, writing the answer in its simplest form (for example, $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$) • Divide proper fractions by whole numbers (for example $\frac{1}{3} \div 2 = \frac{1}{6}$) • Associate a fraction with division and calculate decimal fraction equivalents (for example, 0.375) for a simple fraction ($\frac{3}{8}$). • Multiply one-digit numbers with up to two decimal places by whole numbers. • 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 3 decimal places. • 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 2 decimal places. • Solve problems which require answers to be rounded to specified degrees of accuracy. • Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.	Pupils should practise, use and understand the addition and subtraction of fractions with different denominators by identifying equivalent fractions with the same denominator. They should start with fractions where the denominator of one fraction is a multiple of the other (for example, $\frac{1}{2} + \frac{1}{8} = \frac{5}{8}$) and progress to varied and increasingly complex problems. 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. 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 a $\frac{1}{4}$ of a length is 36cm, then the whole length is $36 \times 4 = 144\text{cm}$). They practise calculations with simple fractions and decimal fraction equivalents to aid fluency, including listing equivalent fractions to identify fractions with common denominators. Pupils can explore and make conjectures about converting a simple fraction to a decimal fraction (for example, $3 \div 8 = 0.375$). For simple fractions with recurring decimal equivalents, pupils learn about rounding the decimal to three decimal places, or other appropriate approximations depending on the context. Pupils multiply and divide numbers with up to two decimal places by one-digit and two-digit whole numbers. 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. Pupils are introduced to the division of decimal numbers by one-digit whole number, initially, in practical contexts involving measures and money. They recognise division calculations as the inverse of multiplication. Pupils also develop their skills of rounding and estimating as a means of predicting and checking the order of magnitude of their answers to decimal calculations. This includes rounding answers to a specified degree of accuracy and checking the reasonableness of their answers.
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	Ratio Objectives only appear in year 6. However, links should be made to prior learning, particularly fractions and multiplication and division	- 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 the calculation of percentages (for example, of measures, and such as 15% of 360) and the use of percentages for comparison. - Solve problems involving similar shapes where the scale factor is known or can be found. - Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.	Pupils recognise proportionality in contexts when the relations between quantities are in the same ratio (for example, similar shapes and recipes). Pupils link percentages or 360° to calculating angles of pie charts. 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. Pupils solve problems involving unequal quantities, for example, 'for every egg you need three spoonfuls of flour', '3/5 of the class are boys'. These problems are the foundation for later formal approaches to ratio and proportion.
	Algebra	- Use simple formulae. <i>Recognise when it is possible to use formulae for area and volumes of shape (copied from Measurement).</i> - Generate and describe linear number sequences. - Express missing number problems algebraically. - Find pairs of numbers that satisfy an equation with two unknowns. - Systematically investigate all possible combinations of two variables.	Pupils should be introduced to the use of symbols and letters to represent variables and unknowns in mathematical situations that they already understand, such as: - missing numbers, lengths, coordinates and angles - formulae in mathematics and science - equivalent expressions (for example, $a + b = b + a$) - generalisations of number patterns - number puzzles (for example, what two numbers can add up to). Systematically investigating possible combinations of two variables eg you can have soup, salad or melon for a starter and beef, chicken or lamb for main course. How many different meal combinations are there?

Measure	Measure	• 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 up to three decimal places. • Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate. • Convert between miles and kilometres. • Recognise that shapes with the same area can have different perimeters and vice versa. • Recognise that it is possible to use formulae for area and volume of shapes. • Calculate the area of parallelograms and triangles. • Calculate, estimate and compare volume of cubes and cuboids, using standard units, including cubic centimetres (cm³) and cubic metres (m³), and extending to other units (for example, mm³ and km³).	Pupils connect conversion (for example, from kilometres to miles) to a graphical representation as preparation for understanding linear/proportional graphs. They know approximate conversions and are able to tell if an answer is sensible. Using the number line, pupils use, add and subtract positive and negative integers for measures such as temperature. They relate the area of rectangles to parallelograms and triangles, for example, by dissection, and calculate their areas, understanding and using the formulae (in words or symbols) to do this. Pupils could be introduced to compound units for speed, such as miles per hour, and apply their knowledge in science or other subjects as appropriate.
	Time	• Solve problems including converting between units of time.	
	Money	• Use all four operations to solve problems involving measure (for example, length, mass, volume, money) using decimal notation, including scaling.	

Geometry	Properties of Shapes	• Draw 2-D shapes using given dimensions and angles. • Recognise, describe and build simple 3-D shapes, including making nets. • Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals and regular polygons. • Illustrate and name parts of circles, including radius, diameter and circumference. Know that diameter is twice the radius. • Recognise angles where they meet at a point/are on a straight line/ vertically opposite, and find missing angles.	Pupils draw shapes and nets accurately, using measuring tools and conventional markings and labels for lines and angles. Pupils describe the properties of shapes and explain how unknown angles and lengths can be derived from known measurements. These relationships might be expressed algebraically for example, $d = 2 \times r$; $a = 180 - (b + c)$.
	Position and Direction	• Describe positions on the full co-ordinate grid (all four quadrants) • Draw and translate simple shapes on the co-ordinate plane and reflect them in the axes.	Pupils draw and label a pair of axes in all four quadrants with equal scaling. This extends their knowledge of one quadrant to all four quadrants, including the use of negative numbers. Pupils draw and label rectangles (including squares), parallelograms and rhombuses, specified by coordinates in the four quadrants, predicting missing coordinates using the properties of shapes. These might be expressed algebraically for example, translating vertex (a, b) to $(a - 2, b + 3)$; (a, b) and $(a + d, b + d)$ being opposite vertices of a square d

Statistics	Collecting, recording and interpreting data	• Interpret and construct pie charts and line graphs and use these to solve problems. • Children follow a line of enquiry and collect relevant data. They choose the best way to present the data and interpret their findings accordingly. • Calculate and interpret the mean as an average.	Pupils connect their work on angles, fractions and percentages to the interpretation of pie charts. Pupils both encounter and draw graphs relating two variables, arising from their own enquiry and in other subjects. They should connect conversion from kilometres to miles in measurement to its graphical representation. Pupils know when it is appropriate to find the mean of a data set.
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