National Curriculum 2014

Planning Materials

Year 5

Purpose of study

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

Aims

The National Curriculum for mathematics aims to ensure that all pupils:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils have conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

The principal focus of mathematics teaching Upper Key Stage 2

- The principal focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their 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.
- At this stage, pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems. Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them.
- By the end of year 6, pupils should be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.
- Pupils should read, spell and pronounce mathematical vocabulary correctly.

Year 5 programme of study (statutory requirements)

Number and place value

- read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers through zero
- 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
- read Roman numerals to 1000 (M) and recognise years written in Roman numerals.

Addition and subtraction

- add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
- add and subtract numbers mentally with increasingly large numbers
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Multiplication and division

- 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 recall prime numbers up to 19
- 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
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

Fractions (including decimals and percentages)

- compare and order fractions whose denominators are all multiples of the same number
- identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths
- recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [e.g. $^2/_5 + {}^4/_5 = {}^6/_5 = 1{}^1/_5$]
- add and subtract fractions with the same denominator and multiples of the same number
- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- read and write decimal numbers as fractions (e.g. 0.71 = $^{71}/_{100}$)
- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
- 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 hundred", and write percentages as a fraction with denominator hundred, and as a decimal
- solve problems which require knowing percentage and decimal equivalents of $^1/_2$, $^1/_4$, $^1/_5$, $^2/_5$, $^4/_5$ and those with a denominator of a multiple of 10 or 25.

Measurement

- convert between different units of measure (e.g. kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)
- understand and use basic equivalences between metric units and common imperial units such as inches, pounds and pints
- measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
- calculate and compare the area of rectangles (including squares), including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes
- estimate volume [e.g. using 1 cm³ blocks to build cuboids (including cubes)] and capacity [e.g. using water]
- solve problems involving converting between units of time
- use all four operations to solve problems involving measure [e.g. length, mass, volume, money] using decimal notation including scaling

Geometry: properties of shapes

- identify 3-D shapes, including cubes and cuboids, from 2-D representations
- know angles are measured in degrees; estimate and compare acute, obtuse and reflex angles
- draw given angles and measure them in degrees (°)
- identify:
  - angles at a point and one whole turn (total 360°)
  - angles at a point on a straight line and ½ a turn (total 180°)
  - other multiples of 90°
- use the properties of rectangles to deduce related facts and find missing lengths and angles
- distinguish between regular and irregular polygons based on reasoning about equal sides and angles.

Geometry: 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.

Statistics

- solve comparison, sum and difference problems using information presented in line graphs
- complete, read and interpret information in tables, including timetables.

Year 5 Notes and Guidance (non-statutory)

Number and place value

- 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 (e.g. 3, $3^1/_2$, 4, $4^1/_2$ ...), including those involving fractions and decimals, and find the term-to-term rule in words (e.g. add $^1/_2$).

Addition and subtraction

- Pupils practise using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency (see Mathematics Appendix) *(see school routeway)*
- They practise mental calculations with increasingly large numbers to aid fluency (e.g. 12 462 – 2 300 = 10 162).

Multiplication and division

- Pupils practise and extend their use of the formal written methods of short multiplication and short division (see Mathematics Appendix) *(see school routeway)*. 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 (e.g. 98 ÷ 4 = $^{98}/_4$ = 24 r 2 = 24½ = 24.5 ≈ 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 in preparation for using algebra.
- They understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalence statements (e.g. 4 x 35 = 2 x 2 x 35; 3 x 270 = 3 x 3 x 9 x 10 = 9^2 x 10).
- Pupils use and explain the equals sign to indicate equivalence, including in missing number problems (e.g. 13 + 24 = 12 + 25; 33 = 5 x □).

Fractions (including decimals and percentages)

- 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 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.
- 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 (e.g. 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 (e.g. 100% represents a whole quantity and 1% is $^1/_{100}$, 50% is $^{50}/_{100}$, 25% is $^{25}/_{100}$) and relate this to finding 'fractions of'.

Measurement

- Pupils 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 number questions such as these can be expressed algebraically 4 + 2b = 20 for a rectangle of sides 2 cm and b cm and perimeter of 20cm.
- They calculate the area from scale drawings using given measurements
- Pupils should use all four operations in problems involving time and money, including conversions (e.g. days to weeks, expressing the answer as weeks and days).

Geometry: properties of shapes

- 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.

Geometry: position and direction

- 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

- 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.

Number and Place Value

Yr 5 Statutory requirements

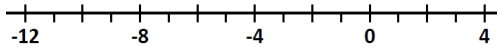
- **read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit**
- **count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000**
- **interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers through zero**
- **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**
- **read Roman numerals to 1000 (M) and recognise years written in Roman numerals.**

Autumn 1

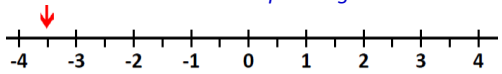
- count on and back in 10s, 100s and 1000s from any given number, crossing boundaries *e.g. Count on/back 500 in hundreds from 741, from 8610; count on/back 7000 in thousands from 6300, 95 300*
- read and write numbers to 1 million *e.g. Read this number 356 087. Write the number equivalent to 'four hundred and seventy-two thousand and fifty-nine', 'two hundred and seven thousand and nine'*
- know what each digit represents in numbers to 1 million *e.g. Explain which is the greater value, the 5 in 3 215 067 or the 5 in 856 207? What's the 3 worth in 23 564, in 301 245?*
- partition numbers in different ways
- compare numbers and explain thinking *e.g. Which is more 5 thousands or 51 hundreds? Which is shorter 154 123m or 145 123m? Suzy has cycled 23 356m, Jack has cycled 22 674m, who has cycled the furthest?*
- order numbers using place value *e.g. If you ordered these numbers which would be the third number 15 635, 152 324, 22 152, 1542, 16 541; 623 280, ☐, 623 310*
- know the number that is 1, 10, 100, 1000 more/less than any given number to at least 1 million *e.g. What is 10 more than 99 999, 10ml less than 100 005ml*
- solve problems *e.g. Make the biggest integer less than 1 million with the digits 7, 5, 9, 2, 0, 6, 4. What's the smallest number that can be made using all the digits?*

Spring 1

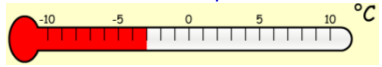
- count forwards and back through zero *e.g. Count back 1000 in 100s from 700; count back ten sevens from 21; count on ten sixes from -30*
- explore what happens when you count back in tens through zero, starting at any number *e.g. 17, 7, -3, 13*
- compare negative numbers, including using the <, > signs *e.g. -8 > ☐, -5 < ☐ < -2*
- order a set of positive and negative numbers *e.g. Explain how to order -2, -9, 2, -4, 5, -7. What could the missing numbers be -11, -8, ☐, -4, ☐, -1, ☐*
- position and recognise negative numbers on a number line *e.g. Where would -10, 3, -5 be?*



What number is the arrow pointing to?



- solve problems involving negative numbers in different contexts *e.g. The temperature falls from 11℃ to -2℃, how much did the temperature fall? The temperature is -3℃, how much must it rise to reach 7℃? A diver is below the surface of the water at -30m, he goes up 17m, then down 8m, where is he now? What's the temperature on the thermometer?*

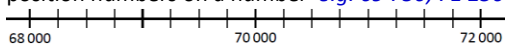


Summer 1

- count on and back in 10s, 100s, 1000s and 10 000s from any given number, including crossing boundaries and negative numbers *e.g. Starting with 19 374, how many 100s do you need to add to get more than 20 000?*
- extend and find missing numbers in linear sequences involving decimals and fractions *e.g. ☐, $3\frac{1}{2}$, 4, $4\frac{1}{2}$; 4.75, 4.5, ☐, 4, ☐, ☐, 3.25; 1025, 1150, ☐, 1400, ☐*
- describe the term-to-term rule of a sequence using words *e.g. Subtract 0.25; add ½; increase by 125*
- describe and extend sequences involving negative numbers *e.g. Continue the sequence –35, –31, –27, recognising that the rule is 'add 4'. Will -2 be in this sequence?*
- find missing numbers in a sequence *e.g. This sequence increases by the same amount each time, what are the missing numbers 1, ☐, ☐, 19*
- recognise simple non-linear sequences *e.g. 1, 4, 9, 16, 25 or 1, 8, 27, 64, 125 or 2, 3, 5, 7, 11*
- solve problems involving sequences and explain reasoning *e.g. The rule for the sequence is 'add 3' 1, 4, 7, 10, 13, 16, explain whether or not a multiple of 3 will ever be in the sequence. What's wrong with these sequences: 572 000, 582 000, 592 000, 612 000 or 1.5, 1.7, 1.9, 1.11, 1.13*

Autumn 2

- count forwards or backwards in steps of powers of 10 for any given number up to 1 million
- know what each digit represents in numbers to 1 million *e.g. In one step change 417 360 to 415 360*
- know the multiple of 10, 100, 1000, 10 000 and 100 000 that comes before and after any number to at least 1 million
- round a number to at least 1 million to the nearest 10, 100, 1000, 10 000 or 100 000 *e.g. 19 674 to the nearest 100. A number rounded to the nearest 1000 is 34 000 but rounded to the nearest 100 is 33 900*
- position numbers on a number *e.g. 69 750, 71 250*



Spring 2 or part of Summer 2

Roman Numerals

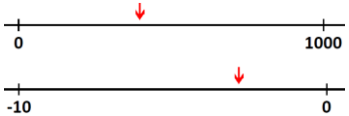
- know that I = 1, V = 5, X = 10, L = 50, C = 100, D = 500, M = 1000
- read numbers written in Roman numerals *e.g. LXX = 70, CM = 900, DCCCXC = 890, MDCCC = 1800*
- know how to write numbers as Roman *numerals e.g. Use a 'place value' chart to make numbers*

C	CC	CCC	CD	D	DC	DCC	DCCC	CM
X	XX	XXX	XL	L	LX	LXX	LXXX	XC
I	II	III	IV	V	VI	VII	VIII	IX

- order and compare numbers written in Roman numerals *e.g. MDLXVI, MCMXCIX, CXXV, MCI*
- explain how to 'decode' Roman numerals, what are the rules (see year 4)

Summer 2

- find a number that lies half way between two given numbers *e.g. 15 400 and 16 000, -15 and 7*
- estimate the position of a point on a blank number line using knowledge of place value *e.g. What number is the arrow pointing to? Where would the numbers 845, 56, -5.6 be on the number lines below*



- estimate how many objects and explain how the estimate was worked out *e.g. How many £1 coins will make a straight line 1m long? How many bricks there are in a wall? How many sweets in the jar*

Apply knowledge to solve mathematical problems or puzzles

Addition and Subtraction

Yr 5 Statutory requirements

- **add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)**
- **add and subtract numbers mentally with increasingly large numbers**
- **use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy**
- **solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.**

Autumn 1

- recall decimal bonds (tenths) with a total of 1 *e.g. 0.2 + 0.8, 0.6 + □ = 1*
- add decimals mentally using knowledge of place value and bonds to 1 and 10 *e.g. 3.6 + 6.4*
- add two or three, four-digit whole numbers using formal written methods of columnar addition systematically building number of exchanges involved *e.g. 7 234 + 1 668 + 5 492*
- subtract whole numbers with up to five digits using formal written methods of columnar subtraction systematically building number of exchanges involved *e.g. 75 565 – 4 396*
- solve two step problems in a range of contexts including money and measures deciding which operations and methods to use and why *e.g. 12 500 people visited the transport museum this year. This is 2 568 more than last year. How many people visited the transport museum last year?*

↓↓↓ ↓↓↓

Autumn 2

- add and subtract mentally multiples and near multiples of 10, 100, 1000, 10 000 and 100 000 to numbers with more than four digits *e.g. 10 000 + 10, 12 462 – 2 300, 8 006 – 2 993*
- add and subtract numbers and quantities mentally choosing an appropriate strategy based on the numbers involved and explain choices *e.g. Choosing three numbers 125, 237, 352, 77, 202, 477; what different totals can you make demonstrating a range of strategies and explain thinking*
- extend written methods of addition and subtraction to include any pair of three or four-digit numbers with decimals up to two decimal places *e.g. £45.49 + £28.25, £56.43 - £42.18*
- solve addition and subtraction problems, choosing whether to use a mental or known written method *e.g. Lee bought a £96.49 IPod nano and a set of earphones for £16.75, how much did he spend?*

Spring

- know what needs to be added to make the next whole *e.g. 4 = 3.6 + □*
- recall decimal bonds using bonds to 100 with a total of 1 *e.g. 0.83 + 0.17*
- solve problems mentally using knowledge of place value, inverse, bonds to 1 and 10 *e.g. 4.62 + □ = 10 Find ways to complete: □ + ◇ + ▽ = 1*
- solve addition and subtraction calculations understanding that 10 tenths make a whole and 10 hundredths make a tenth *e.g. Find the sum of 8.6m and 3.8m, 1.23kg + 2.49kg, find the difference between 2.65 litres and 8.25 litres*
- suggest sensible estimates to addition and subtraction calculations using knowledge of rounding *e.g. Choose the best approximation for 6 080 + 960 and explain why 6 000 + 1 000, 7 000 + 1 000, 6 100 + 1 000, 6 000 + 900*
- add and subtract whole numbers with up to five digits using formal written methods of columnar addition and subtraction in a variety of contexts *e.g. In 2012 the population of lions in Southern Africa was 11 846 and in Eastern Africa 19 772, how many more lions were there in Eastern Africa?*
- solve missing number calculations using knowledge of number facts, rounding and inverses *e.g. 3□67 – 192□ = 1539*
- solve multi-step problems in a range of contexts including money and measures choosing the most appropriate method *e.g. Sandra bought a trouser suit for £149.99, top for £57.98 and boots for £95.59. Rhiannon bought a dress for £99 and shoes for £85.49. Who spent the most and by how much?*

Summer

- find the difference by counting up using an empty number line *e.g. 36.8 – 17.34, 23 000 – 1 562*
- add and subtract near multiples of ten including decimals *e.g. £16.21 + £1.97, 17.32m – 1.95m*
- add and subtract mentally with decimals and increasingly large numbers choosing and using the most appropriate strategy *e.g. 49 620 + 31 000, 4.3 + □ = 4.9, 7 – 5.4, 41 300 = 41 286 + □ Paul says 65.11 – 3.4 = 62.7 is he correct, explain how you know. Find three consecutive numbers that total 201. Identify two two-digit numbers that have a total of 110 and a difference of 16.*
- confidently use and apply formal written methods of columnar addition and subtraction to solve multi-step problems in a range of contexts *e.g. A footballer paid £33 750 for a Mercedes and £17 660 for a Volkswagen Beetle How much change will he receive from £60 000? What are the missing numbers in the calculations below? □1□□ + 2346 = 5□18*

	4	5	2	□
+	□	3	□	5
	6	□	7	2

- use rounding to check level of accuracy when solving problems *e.g. Explain how you know £407.15 + £278.65 is nearly £700 and that the difference between £743 and £527 is around £200*
- use knowledge of addition and place value to reason about number e.g. *If you add a three-digit number to a three-digit number you cannot get a five-digit number. Is this correct? Explain why.*

Apply knowledge to solve mathematical problems or puzzles

Multiplication and Division

Yr 5 Statutory requirements

- **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 recall prime numbers up to 19**
- **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**
- **solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.**

Autumn 1

- rehearse and apply multiplication and division facts to 12 x 12 facts
- understand the term and identify common multiples, testing statements *e.g. All common multiples of 3 and 4 are multiples of 12*
- know that a factor is a whole number that divides exactly into another whole number *e.g. Factors of 20 are 1, 2, 4, 5, 10 and 20*
- know that factor pairs are two numbers that when multiplied together give a whole number *e.g. Factor pairs of 20 are 1 and 20, 2 and 10, 4 and 5*
- identify factors of two digit numbers by deriving division facts *e.g. The product of two numbers is 24. What could the numbers be?*
- investigate, identify and recognise square numbers *e.g. Using squared paper or peg boards identify which numbers make a square array*
- introduce the notation for square numbers (^{2})
- know that square numbers are numbers that can be represented by units in a square
- solve problems involving multiplication and division including knowledge of factors, multiples and squares *e.g. Is it sometimes, always, never true that 'All numbers have an even number of factors'. Explain why? 'All numbers that end in a 4 are multiples of 4.' Is this correct? Explain why.*
- multiply and divide whole numbers by 10, 100 and 1000, with whole and decimal numbers answers *e.g. 35 ÷ 1000 = ☐ What did I multiply by 17 to get 1 700? What did I divide 85 000 by to get 85?*
- multiply and divide by multiples of 10 and 100 mentally investigating patterns to extend known facts *e.g. 360 ÷ 40 = 9, 3 600 ÷ 40 = 90, 36 000 ÷ 40 = 900*
- multiply a 2-digit by a 1-digit number mentally by using partitioning *e.g. 23 x 6*

Spring 1

- know and apply multiplication and division facts to 12 x 12
- derive squares and squares of multiples of 10 using multiplication facts
- identify all factor pairs of a given number using knowledge of division facts *e.g. Factor pairs of 28 are 1 and 28, 2 and 14, 4 and 7. 56 has a factor pair of 7 and 8 so 560 has a factor pair of 70 and 8 or 7 and 80*
- understand the term and definition of a prime number as having only two factors, 1 and itself, and that non-prime numbers are referred to as composite numbers
- establish that some numbers have factors that are also prime numbers – these are referred to as prime factors e.*g. 2 and 3 being factors of 6 and also prime numbers*
- multiply and divide whole and decimal numbers by 10, 100 and 1000 *e.g. 3.27 x 10, 820 ÷ ☐ = 0.82*
- multiply and divide numbers mentally using known facts *e.g. Use factors to multiply such as 15 x 6 = 15 x 3 x 2*
- solve problems by scaling up and down using knowledge of multiplication and division facts *e.g. Sandra had 4 cakes, Tom had twice as many as Sandra, Mia had 6 times as many as Sandra, Jo had half as many as Mia. How many cakes did Tom, Mia and Jo have each? In total?*

Summer 1

- know and use multiplication and division facts to 12 x 12, extending range of known facts *e.g. 7 x 8 = 56, 7 x 0.8 = 5.6, 70 x 80 = 5600*
- identify common factors of two numbers *e.g. Write all the numbers that are factors of both 24 and 36*
- identify prime numbers within 100 and recall primes to 19 e.g. *Circle the two prime numbers 29, 39, 49, 59, 69 and explain why.*
- recognise cubed numbers as the product of an integer multiplied by itself twice *e.g. 4^3 being 4 x 4 x 4 = 64*
- introduce the notation for cube numbers (^{3})
- know that cube numbers are numbers that can be represented by units in a cube
- use knowledge of factors, primes, multiples, squares and cubes and knowledge of the equals sign to construct equivalent statements *e.g. 3 x 270 = 3 x 3 x 9 x 10 = 9^2 x 10*
- multiply and divide mentally drawing upon known facts *e.g. How many sevens are there in six hundred and thirty? Four biscuits cost twenty pence altogether. How much do twelve biscuits cost?(scaling) Which is the best deal a 1.5 litre bottle of orange juice for £4.50 or a 500ml bottle of orange juice for £1.75?*

↓↓↓ ↓↓↓

Autumn 2

Spring 2

Summer 2

Multiplication and Division continued

Yr 5 Statutory requirements	Autumn 2	Spring 2	Summer 2
identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers	know times tables to 12 x 12 and the related division facts	multiply two-digit then three-digit numbers by a two-digit number using a formal written method of long multiplication e.g. 27 x 34	divide numbers up to at least four-digits by a one-digit using the formal written method of short division expressing remainders as decimals
know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers	multiply and divide by multiples of 10 and 100 mentally using knowledge of times tables *e.g. 40 x 6, 270 ÷ 9, ☐ x 70 = 560*	divide numbers with up to four-digit numbers by a one-digit number using the formal written method of short division	solve division problems interpreting non-integer answers in different ways according to the context including with remainders, as fractions, as decimals, or by rounding *e.g. 5 people agree to split the bill of £136 evenly, how much do they each need to pay?*
establish whether a number up to 100 is prime and recall prime numbers up to 19	multiply numbers with up to four-digits by a one-digit number using a formal written method with at least exchange	divide numbers with up to four-digit numbers by a one-digit number using the formal written method of short division expressing remainders as fractions (mixed number) *e.g. 9 418 ÷ 7*	multiply numbers with up to four-digits by a one-digit number using a formal written method of multiplication with multiple exchanges
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	divide numbers with at least three-digits by a one-digit number using the formal written method of short division expressing remainders as whole integers *e.g. 984 ÷ 8, 421 ÷ 9*	solve division problems interpreting non-integer answers in different ways according to the context including with remainders, as fractions(mixed number) or by rounding *e.g. There are 6 eggs in a box. How many boxes will be needed for 195 eggs? How many complete weeks in 1250 days?*	begin to multiply two-digit numbers by two-digit number introducing the formal written method of long multiplication
multiply and divide numbers mentally drawing upon known facts	solve problems involving all four operations *e.g. The football club has 400 litres of soup for the fans. One cup of soup is 250ml. How many fans can have a cup of soup? I think of a number, subtract 17, and divide by 7. The answer is 23. What was my number? Is it true that the sum of three even numbers is divisible by 3?*	solve problems involving all four operations and combinations of these and the equals sign *e.g. ◇ and ▽ stand for different numbers. ◇= 34, ◇ + ◇ = ◇ + ▽ + ▽ What is the value of ▽? ☐ x 6 = 458 – 386, 6 x 40 = ☐ x 8*	use rounding to check answers *e.g. I can explain how I know 2 845 x 3 is nearly 9 000*
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			solve problems involving multiplication and division *e.g. Suggest different strategies to solve 15 x 12* 24 children are going on a trip to Dol-y-Moch, each child pays £126, how much money will the trip cost?
multiply and divide whole numbers and those involving decimals by 10, 100 and 1000			solve problems involving simple rates *e.g. Tom got paid £4 for each hour he worked, if he worked for 6 hours how much would he be paid? Fred was paid £72 for 8 hours work, how much was he paid per hour?*
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			
solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.			

Apply knowledge to solve mathematical problems or puzzles

Fractions (including decimals and percentages)

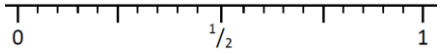
Yr 5 Statutory requirements

- **compare and order fractions whose denominators are all multiples of the same number**
- **identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths**
- **recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [e.g. $^2/_5 + ^4/_5 = ^6/_5 = 1^1/_5$]**
- **add and subtract fractions with the same denominator and multiples of the same number**
- **multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams**
- **read and write decimal numbers as fractions (e.g. 0.71 = $^{71}/_{100}$)**
- **recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents**
- **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 hundred", and write percentages as a fraction with denominator hundred, and as a decimal**
- **solve problems which require knowing percentage and decimal equivalents of $^1/_2, ^1/_4, ^1/_5, ^2/_5, ^4/_5$ and those with a denominator of a multiple of 10 or 25.**

AB BC MATHS

Autumn 1

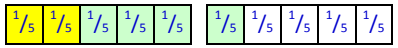
- count in simple fractions *e.g. Count on 4 thirds from $2\,^2/_3$, count back 7 tenths from $2\,^3/_{10}$*
- know that fractions are ways of expressing proportion *e.g. $^3/_5$ is 3 out of 5*
- identify equivalent fractions including tenths and hundredths *e.g. On fraction walls or other diagrams*
- understand that multiplying or dividing the numerator and denominator of a fraction by the same number creates an equivalent fraction *e.g. $^2/_3 = ^{\square}/_9$, $^3/_4 = ^{12}/_{\square}$, $^{\square}/_{10} = ^{70}/_{100}$*
- compare fractions where the denominators are multiples of the same number *e.g. Which are less than one half: $^1/_{10}, ^1/_{20}, ^2/_5, ^7/_{10}, ^{11}/_{20}, ^{60}/_{100}$; Which sign makes this correct $^2/_3 \square ^3/_5$*
- order fractions where the denominators are multiples of the same number *e.g. $^2/_3, ^4/_9, ^5/_6, ^7/_{12}$*
- place fractions on to a number line *e.g. $^3/_4, ^2/_5, ^3/_{20}, ^7/_{10}$ on*



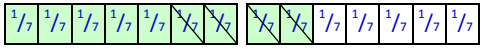
- know that a proper fraction has a numerator less than its denominator *e.g. $^3/_5, ^1/_8$*
- know that a mixed number consists of a whole number and a proper fraction *e.g. $3^1/_4$, $12^3/_5$*
- know that an improper fraction has a numerator larger than its denominator *e.g. $^5/_3, ^{78}/_{10}$*
- convert improper fractions to mixed numbers and vice versa *e.g. Change $^{37}/_{10}$ to $3^7/_{10}$*
- solve problems involving fractions and explain reasoning *e.g. I work for 8 hours and sleep for 10 hours. What fraction of the day do I work, what fraction do I sleep? Which is the odd-one-out $^{12}/_{36}$ or $^5/_{15}$ or $^3/_8$*

Spring 1

- count forwards and backwards in fractions using improper fractions *e.g. 0, $^1/_4, ^2/_4, ^3/_4, ^4/_4, ^5/_4$* and mixed numbers *e.g. 0, $^1/_3, ^2/_3$, 1, $1^1/_3, 1^2/_3$*
- add and subtract fractions with the same denominator converting between mixed numbers and improper fractions when necessary *e.g. $^2/_5 + ^4/_5 = ^6/_5 = 1^1/_5$*



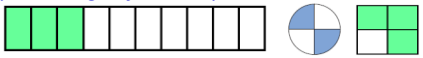
$1^2/_7 - ^4/_7 = ^9/_7 - ^4/_7 = ^5/_7$



- add and subtract fractions with denominators that are multiples of the same number, using knowledge of equivalence *e.g. $^3/_4 - ^1/_8$ becomes $^6/_8 - ^1/_8 = ^5/_8$ $^5/_6 - ^1/_3$ becomes $^5/_6 - ^2/_6 = ^3/_6 = ^1/_2$*
- solve problems involving the addition and subtraction of fractions *e.g. Sam eats a quarter of the pizza and Billy eats three eighths, how much pizza do they eat between them, how much more pizza does Billy eat than Sam? How much pizza is left?*
- find fractions of numbers and quantities using division and multiplication (seeing fractions as operators) *e.g. $^3/_4$ of £15, $^3/_4$ of 840m, $^3/_5$ of 125, Rachel had 240 marbles she lost $^5/_6$ of them, how many does she have left?*
- solve problems involving fractions of amounts *e.g. Rita bought a pack of 30 biscuits. She ate one fifth of them on Thursday. She ate one eighth of the remaining biscuits on Friday. How many biscuits did she have left?*

Summer 1

- recognise the % sign and know per cent relates to 'number of parts per 100', that one whole = 100%
- write percentages as a fraction with a denominator of 100 and then as a decimal *e.g. 37% = $^{37}/_{100} = 0.37$*
- know the percentage, decimal and fractions equivalents for $^1/_2, ^1/_4, ^3/_4, ^1/_5, ^2/_5, ^3/_5, ^4/_5$ and those with a denominator of a multiple of 10 or 25 *e.g. 10% = 0.1 = $^{10}/_{100} = ^1/_{10}$*
- identify a percentage of a shape *e.g. What percentage of the shape is shaded?*



Make a shape that is a 50% red or 25% blue or 10% green

- know percentages are ways of showing proportion
- solve problems involving percentages *e.g. 35% of the children in a class are boys. What percentage are girls? What is twenty out of forty as a percentage? Robbie got 40 marks out of 80 in his maths test. Susie got 45%. Who did better?*
- find 50%, 25% and 75% using knowledge of halves and quarters *e.g. 50% of 150m, 25% of £300, 75% of £300*
- find 10% by dividing by 10, use this to find other multiples of 10% *e.g. 10% of £120, 10% of 5kg, 10% of 1500, 30% of £50, 20% of 15m*
- find 1% by dividing by 100
- solve problems involving percentages *e.g. Tesco has 20% off their £35 trainers. Sainsbury has a 25% off their £38 trainers. Which trainers would be the cheaper?*

Autumn 2

Spring 2

Summer 2

Fractions (including decimals and percentages) continued

Yr 5 Statutory requirements	Autumn 2	Spring 2	Summer 2
compare and order fractions whose denominators are all multiples of the same number	know the value of the digits in numbers with up to three decimal places *e.g. 6.45 = 6 + 0.4 + □ What is the digit 7 worth in 5.375, 23.167*	read and write decimal numbers as fractions *e.g. What is $^{19}/_{100}$ as a decimal: 1.9, 10.19, 0.19, 19.1; write these fractions as decimals $^{27}/_{100}$ $^{3}/_{100}$ $2^{33}/_{100}$*	count forwards and backwards in fractions using mixed numbers and equivalence *e.g. 0, $^{1}/_{5}$, $^{1}/_{2}$, $^{3}/_{4}$, 1, $1^{1}/_{4}$, $1^{1}/_{2}$, $1^{3}/_{4}$, 2*
identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths	read and write decimal numbers *e.g. What is $4 + {}^{6}/_{10} + {}^{2}/_{100}$ as a decimal. Write the decimal equivalent to two tenths and five hundredths; fifteen and nine hundredths*	recognise that fractions with a denominator of 10, 100 or 1000 can be converted to their decimal equivalent by placing the numerator digits in the appropriate column, e.g. $^{8}/_{10}$ = 0.8, $^{3}/_{100}$ = 0.03, $^{65}/_{100}$ = 0.65, $^{27}/_{1000}$ = 0.027, $^{816}/_{1000}$ = 0.816	multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams *e.g. Using fraction tiles, counting on a fraction number line or track*
recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [e.g. $^{2}/_{5} + {}^{4}/_{5} = {}^{6}/_{5} = 1^{1}/_{5}$]	compare decimals with up to three decimal places *e.g. Which numbers that are greater than 0.6: 0.5, 0.8, 0.23, 0.09, 0.67? Which is longer 2.314m or 2.341m? If ◇ > 0.6 and ◇ < 0.7, ◇ is a decimal with two decimal places, what could it be?*	know that $^{1}/_{10} = {}^{10}/_{100} = {}^{100}/_{1000}$ and $^{1}/_{100} = {}^{10}/_{1000}$	multiply proper fractions and mixed numbers by whole numbers using repeated addition *e.g. $^{1}/_{5} \times 4 = {}^{1}/_{5} + {}^{1}/_{5} + {}^{1}/_{5} + {}^{1}/_{5} = {}^{4}/_{5}$ or $^{2}/_{3} \times 5 = {}^{2}/_{3} + {}^{2}/_{3} + {}^{2}/_{3} + {}^{2}/_{3} + {}^{2}/_{3} = {}^{10}/_{3} = 3^{1}/_{3}$ or $1^{2}/_{5} \times 3 = 1^{2}/_{5} + 1^{2}/_{5} + 1^{2}/_{5} = 3 + {}^{6}/_{5} = 3 + 1^{1}/_{5} = 4^{1}/_{5}$*
add and subtract fractions with the same denominator and multiples of the same number	order decimals with up to three decimal places *e.g. Order these 3.01, 13.0, 0.331, 1.30, 3.101; 1.23kg, 0.123kg, 1.223kg, 0.132kg, 1.059kg*	use equivalent fractions involving tenths, hundreds, thousandths to write the decimal equivalent *e.g. $^{1}/_{5} = {}^{2}/_{10} = 0.2$, $^{1}/_{4} = {}^{25}/_{100} = 0.25$*	connect multiplication by a fraction to using fractions as operators (finding fractions of) and to division *e.g. $^{1}/_{4}$ of 8 is the same as $^{1}/_{4} \times 8$ which is 2*
multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams	round decimals with two decimal places to the nearest whole number and to one decimal place *e.g. 6.38 to the nearest tenth, 2.72 to one decimal place; £4.27, £12.60 to the nearest pound*	know the decimal equivalent for the fractions $^{1}/_{2}$, $^{1}/_{4}$, $^{3}/_{4}$, $^{1}/_{5}$, $^{2}/_{5}$, $^{3}/_{5}$, $^{4}/_{5}$, $^{1}/_{10}$, $^{1}/_{100}$, $^{1}/_{1000}$	solve problems *e.g. 24 cubes, $^{3}/_{4}$ red, 4 blue, the rest are green. How many are green?*
read and write decimal numbers as fractions (e.g. 0.71 = $^{71}/_{100}$)	solve problems *e.g. Use the digits 9, 4, 1, 2 to make the decimal □□•□□ closest to 20 What's wrong with this sequence 0.098, 0.099, 1.0? What comes next in the sequence 2.268, 2.278, 2.288?*	reinforce the equivalence between fractions and decimals *e.g. Place these on the same number line $^{1}/_{10}$, $^{1}/_{2}$, 0.2, $^{4}/_{5}$, $^{1}/_{5}$, 0.5, $^{7}/_{10}$, 0.6*	
recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents			
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 hundred", and write percentages as a fraction with denominator hundred, and as a decimal			
solve problems which require knowing percentage and decimal equivalents of $^{1}/_{2}$, $^{1}/_{4}$, $^{1}/_{5}$, $^{2}/_{5}$, $^{4}/_{5}$ and those with a denominator of a multiple of 10 or 25.			

Apply knowledge to solve mathematical problems or puzzles

Measures

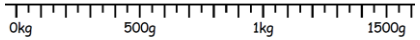
Yr 5 Statutory requirements

- **convert between different units of measure (e.g. kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)**
- **understand and use basic equivalences between metric units and common imperial units such as inches, pounds and pints**
- **measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres**
- **calculate and compare the area of rectangles (including squares), including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes**
- **estimate volume [e.g. using 1 cm³ blocks to build cuboids (including cubes)] and capacity [e.g. using water]**
- **solve problems involving converting between units of time**
- **use all four operations to solve problems involving measure [e.g. length, mass, volume, money] using decimal notation including scaling**

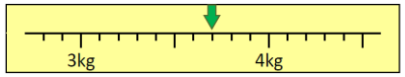
AB BC MATHS

Autumn

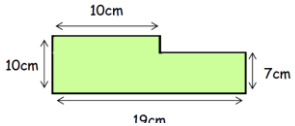
- convert between units of measure using known relationships and knowledge of multiplying by 10, 100, 1000 *e.g. How many km in 10 000m? What is 3.6 litres in millilitres? What is 2673g in kg?*
- read unnumbered divisions on a range of measuring scales in context *e.g. A piece of cheese has a mass of 350 grams. Show the mass of the cheese on the scale*



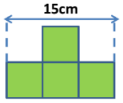
- solve problems reading a range of measuring scales converting between different units of measure *e.g. 300g of flour are taken off the scales. How much flour is left?*



- express the formula for the perimeter of a rectangle in words
- measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres *e.g. Find the perimeter of this shape*



- investigate the relationship between the area and perimeter of rectangles using prior knowledge (including squares)
- investigate the perimeter of regular and irregular polygons and calculate the perimeter by either totalling the side or by multiplying the length of one side
- estimate the area of irregular shapes by counting squares
- solve problems involving perimeter, decimal notation and scaling *e.g. A regular hexagon has a side of length 2.5 cm. Another regular hexaon has a side 3 times longer. What is the perimeter of both hexagons? Calculate the perimeter of this shape*



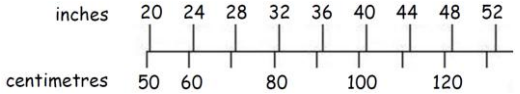
Spring

- become familiar with common imperial units and the relationship to metric units including:

Imperial / Metric equivalence

1 pint is roughly equivalent to 0.568 litre (l)
1 litre is equivalent to 1.760 pints (pt)
1 inch is equivalent to 2.54 centimetres (cm)
1 cm is equivalent to 0.394 inches (“)
12 inches is roughly 30 centimetres (cm)
1 pound = 0.4536 kilogram (kg)
1 kg = 2.205 pounds (lb)

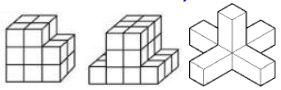
- solve problems converting between different units of measure *e.g. A carton of milk holds 2 litres. Roughly how many pints of milk would I need to fill it? Using the scale 36 inches is approximately ☐cm, 70cm is ☐ inches*



- compare and order measures using both metric and imperial units *e.g. Put these capacities in order 250ml, 0.3l, 1 pint, ½ litre. Who has more Peter with 2lb of chocolate or Robbie with 1kg of chocolate?*
- know how to calculate area of rectangles by multipling length by width
- use notation related to area *e.g. cm² and m²*
- measure the lengths of the sides of a rectangle (including squares) to calculate its area in cm²
- calculate area using measurements from scaled drawings
- calculate and compare the area of rectangles *e.g. Rectangles measuring 3cm by 7cm, 4cm by 6cm, 5cm by 5cm*
- investigate the areas of different rectangles with the same perimeter *e.g. A rectangle has a perimeter of 24cm, which rectangle would have the largest area*
- investigate statements about area and perimeter *e.g. When you cut off a piece of a shape you reduce its area and perimeter. Shapes with the same area have the same perimeter*

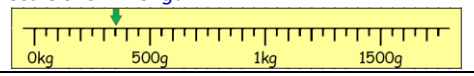
Summer

- know the relationship between key units of time *e.g. 60 seconds in a minute, 60 minutes in a 1 hour, 24 hours in 1 day, days in each month*
- solve problems involving time and converting units of time *e.g. How many hours are there in two days? How many minutes are there in two and a half hours? It took Mick 3 hours and 34 minutes to complete a triathlon, how many minutes did it take? Tom took 7 minutes and 43 seconds to run two laps of the field; it took Pat 504 seconds, who was the quickest? A film starts at 6:45 pm. It lasts 2 hours and 35 minutes. What time will the film finish?*
- investigate the different cuboids that can be made using a given number of 1cm³ blocks *e.g. 24 cubes would make a cuboid 2 cubes long, 3 cubes wide and 4 cubes high*
- estimate the number of 1cm³ blocks that will be needed to make a given cuboid or shape *e.g. Estimate how many cubes are needed to build*



- work out the volume of a cuboid (the space it takes up) by calculating the number of cubes in each layer and counting the number of the layers

- estimate the capacity of containers by filling with water and then measuring how much water was needed using a measuring cylinder
- solve measure and scaling problems involving all four operations and decimal notation *e.g. Mum’s car holds 40 litres of perol. Dad’s van holds two and a half times as much. How much petrol does the van hold? Max jumped 2.25m on his second try at the long jump. This was 75cm longer than his first try. How far in metres did he jump on his first try?*
- solve problems reading a range of measuring scales converting between different units of measure *e.g. How much more flour must be added to make the scale show 1.6kg?*



Tell the time to the nearest minute on analogue, 12 and 24hr clocks

Geometry: properties of shapes

Yr 5 Statutory requirements

- **identify 3-D shapes, including cubes and cuboids, from 2-D representations**
- **know angles are measured in degrees; estimate and compare acute, obtuse and reflex angles**
- **draw given angles and measure them in degrees (°)**
- **identify:**
  - **angles at a point and one whole turn (total 360°)**
  - **angles at a point on a straight line and ½ a turn (total 180°)**
  - **other multiples of 90°**
- **use the properties of rectangles to deduce related facts and find missing lengths and angles**
- **distinguish between regular and irregular polygons based on reasoning about equal sides and angles.**

Autumn 1

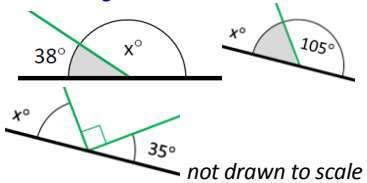
- know that angles are measured in degrees (°)
- know that a right angle is equivalent to 90°
- recognise and use the conventional marking for a right-angle
- know that a straight line is formed from two right angles and is equivalent to 180°
- know that an angle less than 90° is acute; an angle between 90° and 180° is obtuse; an angle between 180° and 360° is reflex
- identify if an angle is acute, obtuse, reflex or a right angle, including those within 2-D shapes
- order angles by size and check by measuring
- make sensible estimates of the size of angles using right angles and straight lines as a guide
- measure angles using a protractor to at least the nearest 5°
- draw given angles using a protractor and then measure to check accuracy

↓↓↓ ↓↓↓

Autumn 2

- measure the angles in triangles and decide if they are scalene, isosceles, equilateral, right angled *e.g. What can be said about the sum of the angles?*
- know that angles in a triangle add up to 180°
- identify and calculate angles within a right angle using angle sum facts *e.g.*

- identify and calculate angles on a straight line using angle sum facts *e.g.*



not drawn to scale

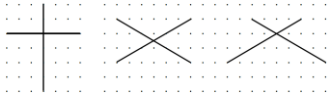
- find missing angles in triangles and relate to missing number problems *e.g. Two angles in a triangle are 26° and 64°, what is the other angle and what sort of triangle is it?*

Spring

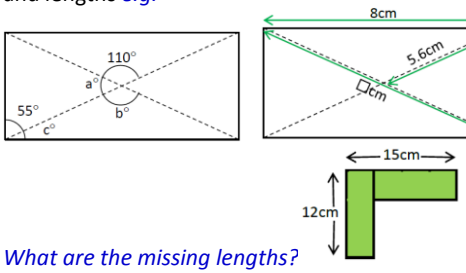
- know that a diagonal is a straight line drawn from a vertex of a polygon to a non-adjacent vertex *e.g.*

Draw all the diagonals of this pentagon

These are the diagonals of which quadrilaterals?



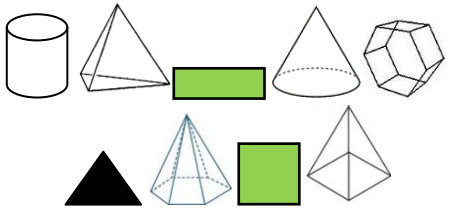
- know the conventions for marking parallel lines and use when drawing 2-D shapes
- identify parallel and perpendicular sides within 2-D shapes
- investigate the properties of diagonals and the angles they form in rectangles and other quadrilaterals *e.g. Draw in the diagonals and measure the length of each (to the nearest mm), then measure distance from each vertex to the point the diagonals cross, explaining what is noticed. Measure the angles made at the vertices when the diagonals are drawn, what can be said about the angles at the point the diagonals cross.*
- know the properties of rectangles *e.g. All four angles are right angles; opposite sides are equal and parallel; the diagonals bisect one another*
- use properties of rectangles to deduce missing angles and lengths *e.g.*



What are the missing lengths?

Summer

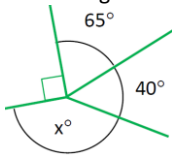
- identify 3-D shapes from 2-D representations *e.g. Name these shapes*



- understand how a net folds up to create a 3-D shape
- create nets for a range of 3-D shapes, including the nets of cubes, cuboids, prisms, pyramids
- investigate nets to see which will actually make a 3-D shape

- know that regular shapes have sides of equal length and angles of equal size
- identify whether a shape is regular or irregular by measuring the length of its sides and its angles if necessary
- investigate the lines of symmetry in regular polygons to discover that the number of lines of symmetry in a regular polygon is equal to the number of sides *e.g. A square has four lines of symmetry and an equilateral triangle has three…*

- know that a complete turn is four right angles and is equivalent to 360° (angles at a point)
- identify and calculate angles at a point using angle sum facts *e.g.*



- recognise turns that are multiples of 90° *e.g. 270° is equivalent to $^{3}/_{4}$ turn, 540° is equivalent to $1^{1}/_{2}$ turns*

Apply knowledge to solve mathematical problems or puzzles

Geometry: direction and movement

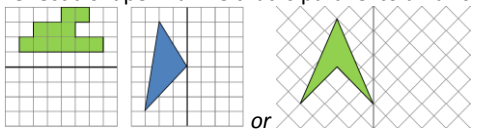
Yr 5 Statutory requirements

- **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.**

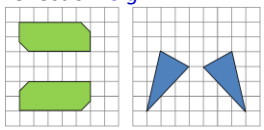
Autumn

Spring

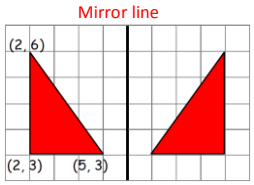
- reflect a shape in a line that is parallel to an axis *e.g.*



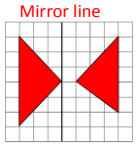
- describe a reflection, saying which axis it has been reflected in or whether the line of reflection (mirror line) is horizontal or vertical and draw in the line of reflection *e.g.*



- give the co-ordinates of a reflected shape when it's reflected in a line parallel to the x or y-axis within the first quadrant *e.g. What are the co-ordinates of the vertices of the other triangle?*



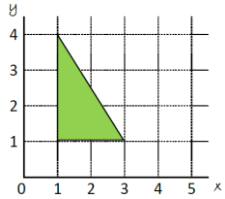
- recognise when a shape has not been reflected correctly and explain why *e.g.*



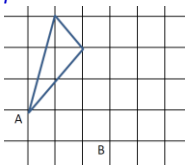
- know the original and reflected shapes are congruent, that is when a shape is reflected it's properties do not change
- use tracing paper to support reflection if necessary

Summer

- know that translation is when a shape moves (slides) from one place to another without rotating or reflecting
- translate shapes on a grid, giving the coordinates of the new position when required *e.g. Translate the triangle two squares to the right, what are the new co-ordinates? What about if it's translated one to the right and one down?*



This triangle is translated so that point A moves to point B. Draw the triangle in its new position



- describe the translation used to move the position of a shape or point using language such as to the left/right, up/down or horizontally/vertically *e.g. From (7,5) to (4,1)*
- recognise when a shape has not been translated correctly and explain why
- know the original and translated shapes are congruent, that is when a shape is translated it's properties do not change.
- use tracing paper to support translation if necessary

Apply knowledge to solve mathematical problems or puzzles

Statistics

Yr 5 Statutory requirements

- **solve comparison, sum and difference problems using information presented in line graphs**
- **complete, read and interpret information in tables, including timetables.**

Autumn

- read and interpret information from a range of timetables *e.g. Travel timetables, cinema times, daily timetable…*
- answer time problems related to timetables *e.g.*

am				pm	
10:35	10:55		11:50	12:20	1:15	2:15
Break	Maths		Computing	Lunch	P.E	

How long is lunch? Sally arrives 20 minutes late for the maths lesson, what time does she arrive?

Birmingham	09:40	10:05	11:05	12:35	13:40
Coventry	10:10	10:30	11:30	13:00	
Leamington	10:25	.....	11:45	13:15	15:15
Oxford	11:05	11:20	12:25	13:55	

Which is the fastest train from Birmingham to Oxford? You arrive at Leamington at 1:30 pm. Which train did you catch from Coventry? You get to Coventry at 09:30. How long will you have to wait for a train to Oxford?

- complete information on a timetable e.g. *The 13:40 from Birmingham takes 25 minutes to get to Coventry, what time does it arrive?*

Spring

- use a wide range of tables
- read and interpret information in a table to answer a question e.g.

		Manchester	London	Cardiff
Adult	single	£12.50	£15.60	£10.25
	return	£23.75	£28.50	£19.30
Child	single	£8.50	£10.80	£8.25
	return	£14.90	£17.90	£14.75

What is the total cost for a single journey to London for two adults and a child? How much more does it cost for a return journey for 2 adult to London than to Manchester?

Flight number	DS591	BG143	RC127	AB292	CV846
Destination	Paris	Dublin	Paris	Berlin	Rome
Take-off time	13:35	14:15	15:20	15:55	16:25

How many flights take off between 2pm and 4pm? How much later does the flight to Paris take off than the first?

	May	June	July
Walking	45	67	54
Climbing	23	49	53
Sailing	19	48	36

How many children went climbing in May, June and July altogether? How many fewer children went sailing than walking?

- suggest questions that could be asked about the information contained within a table
- collect data and decide on the most appropriate way to present it *e.g. Favourite authors of the class or year group presented in table, bar chart, pictogram*

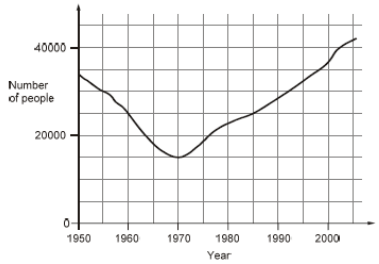
Summer

- know that line graphs should have a title and that each axis should be labelled
- use information from a table to plot a line graph, deciding on appropriate scales for the x and y axis and use this to answer questions *e.g. Plot a line graph to show how the temperature as water increases with time when it is heated*

Time (minutes)	0	1	2	3	4	5	6	7	8	9	10
Temperature (°C)	16	23	32	43	54	60	68	75	80	86	90

Approximately what would the temperature be after $4\frac{1}{2}$ minutes? Approximately how long does it take the water to reach a temperature of 50 °C?

- understand that intermediate points may or may not have meaning
- use knowledge of reading co-ordinates to interpret line graphs
- interpret line graphs including time graphs, to answer questions involving sums and differences *e.g. Shows the number of people living in a town*



What was the population in 1975? What is the increase population between 1980 and 1990? In what years was the population 20 000?

- construct line graphs the present the relationship between metric and imperial units *and answer questions about them e.g. Between pounds and kilograms*
- collate own information and complete a table *e.g. The average height of a boy at different ages, a person's heart rate during different activities, information from a science experiment*
- use own data to complete a line graph, deciding on an appropriate scale and answer questions relating to it

Where possible use meaningful data and experiences from across the curriculum