Year 5 Mathematics Curriculum Objectives

Mathematics – Year 5
Number & Place Value
Read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit.
Similar work with decimals is covered in the fractions objectives.
Read large numbers, recognising when to change between hundreds, thousands, millions, etc., by counting the digits to the left of any decimal place in chunks of three.
Write large numbers accurately, optionally inserting commas every three places to the left of the decimal place for numbers larger than 999 (but not to the right - 4,567·123456 is correct).
Partition numbers into millions, hundred thousands, ten thousands, thousands, hundreds, tens and ones, using apparatus if require, e.g., digit cards or a place value grid.
Know the value of any digit in a number up to 1 million, e.g., Explain which has the greater value, the 5 in 3,215,067 or the 5 in 856,207.
Complete missing numbers in a place value number sentence, e.g., 51,320 = 50,000 + 1,000 + □+ 20.
Partition up to seven-digit numbers in different ways, e.g., 92,150 = 80,000 + 12,000 + 100 + 50.
Order whole numbers with up to seven-digits and know that the number of digits to the left of any decimal place is the first consideration followed by the size of the digits in the corresponding position (column), e.g., If you wrote these numbers in order starting with the smallest, which number would be second? 665,104, 656,401, 661,504, 665,410, 616·045.
Compare large numbers, e.g., Use 3 different six-digit numbers to make this number sentence true - □ < □ > □.
Multiply and divide whole numbers and those involving decimals by 10, 100 & 1,000. (Number: Multiplication and Division, Year 5)
Count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000.
Count in steps of 10, 100, 1,000, 10,000, and 100,000 from any given number.
Understand the result of counting in steps of powers of 10, e.g.: 'True or False? When I count in 100s from 50 I will say the number 500,005 and / or 20,500.' 'True or False? When I count in 1,000s from 69 I will say the number 969 and / or 230,069.'
Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero.
Count forwards and backwards in different step numbers of equal size through the zero boundary. (Continuation from Year 4)
Understand that the further away from zero a negative number is, the smaller the size, e.g., -36 is further to the left than -14 so it is a smaller number.
Position negative numbers accurately on a blank number line and compare them.
Use the < and > signs to record statements such as -13 < -1 > -2.
Predict numbers in a sequence, e.g., 'If I keep on subtracting 5 from 19, will -13 be in the sequence?'
Understand negative numbers in different contexts, e.g., temperature in graphs or owing money such as in a negative bank balance.
Order negative and positive numbers in context, e.g., pictures of thermometers.
Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10 000 and 100,000.
Confidently round larger numbers to round to the nearest 10, 100 and 1,000.
Round numbers to the nearest 10,000, 100,000 and 1,000,000 using a number line to visualise and position a number between relevant powers of 10, e.g., round 227,842 to the nearest 10,000.
Apply the rule of 5 when rounding to the nearest 10 and the scaling of this when rounding to powers of 10 (nearest 50 if rounding to nearest 100, etc.).
Use rounding when estimating answers to calculations, e.g., I think the answer will be about 5000 because . . ..
Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy. (Number: Addition and Subtraction, Year 5)

Year 5 Mathematics Curriculum Objectives

Solve number problems and practical problems that involve all of the above.

Use and apply number and place value into word problems, e.g.:

The temperature is -2 °C. How much must it rise to reach 3 °C?

What is the smallest number that can be rounded to the nearest 100 where the rounded number is 763,300?

Use and apply number and place value investigations in different real life contexts and other curriculum areas, e.g.:

Compare winter temperatures in different cities on Earth.

Compare the distances of planets from the sun.

Round numbers in context, e.g.:

population figures;

visitor numbers to a place of interest;

spectators at sports venues.

Solve missing numbers, missing symbols and sequence problems involving both large numbers and negative numbers, explaining the 'rules' and patterns within the numbers, e.g.:

□ -8, -5, □, 1, 4 (rule is +3).

285, 266, 247, □, □.

Solve estimation problems with both large numbers and negative numbers, e.g.

Read Roman numerals to 1000 (M) and recognise years written in Roman numerals.

Know the values of Roman numerals, I = 1, V = 5, X = 10, L = 50, C = 100, D = 500, M = 1,000

Consolidate, and extend understanding of the rules for reading and writing Roman numerals:

When a smaller symbol appears after a larger symbol it is added, e.g., MC = M + C = 1,000 + 100 = 1100.

When a smaller symbol appears before a larger symbol it is subtracted, e.g., XC = C - X = 100 - 10 = 90.

Don't use the same symbol more than three times in a row.

Some letters canot be put in front of others to be subtracted:

I is only used in front of V and X e.g., 99 is not IC (100 – 1);

X in only used in front of L and C;

C is only used in front of D and M;

D is only used in front of M.

Write dates in Roman numerals by partitioning the date into Th H T U first, converting each part to the Roman numeral, then re- combining the Roman numerals, e.g., 1894.

Read dates in Roman numerals, e.g., buildings, films, TV programmes.

Year 5 Mathematics Curriculum Objectives

Mathematics – Year 5

Addition & Subtraction

Solve addition and subtraction multi step problems in contexts, deciding which operations and methods to use and why.

Use inverse operations to check answers, e.g., 3·42 + y = 10.

Record methods using diagrams (such as number lines) or jottings, and explain their methods to others.

Compare alternative methods for the same calculation and discuss any merits and disadvantages.

Understand the mathematical vocabulary used in a problem.

Identify the order of the steps needed to solve a problem.

Compose a similar problem using different numbers or different contexts.

Solve problems including those in real life contexts and other curriculum areas, e.g.:

Find three consecutive numbers that total 171.

Place each of the digits from 0 to 9 into this calculation so it is correct □□□□ - □□□ = □□□;

Find as many different combinations of four numbers from a grid for random numbers (target board) to equal 1,000.

Countdown - using the numbers given, what is the closest you can get to 567? (Pupils might also use x and ÷ unless told they cannot.)

I buy presents costing £9·63, £5·27 and £3·72. How much change do I have from £20?

Make up 'number stories' to reflect statements such as or 3·5 – 1·7 = 1·8.

I double a number then add 1·52. The answer is 1·88. What number did I start with?

Find the difference in weights of large animals, e.g., blue whale is 136,000 kg and a white rhino is 2,175 kg. What is the difference in their weights?

Compare the height and span of two bridges.

Add and subtract whole numbers with more than 4 digits.

Formal columnar methods for addition and subtraction are not part of the Key Performance Indicator. However, when working with multi-digit numbers, it is most probable that a written method of calculation will be required.

Choose when it is appropriate to use formal written methods of addition and subtraction involving numbers with more than 4 digits, e.g., Finding the difference between 45,687 and 45,699 could be calculated by counting on or recognising that only the tens and ones are involved in the calculation.

Demonstrate an understanding of the place value that underpins written methods, e.g., explain the size of each digit in calculations such as 0·816 kg + 5·567 kg or 23·26 m - 17·78 m.

Add numbers with more than 4 digits with equal amounts of decimal places, e.g., £4506·35 and £205·68.

Add numbers with more than 4 digits where one of the numbers has a different amount of decimal places from the other, e.g., 245·26 + 675·2.

Subtract two or three large whole numbers without decimals with answers within one million.

Subtract numbers with more than 4 digits with equal amounts of decimal places, e.g., £4506·35 - £205·68.

Subtract numbers with more than 4 digits where one of the numbers has a different amount of decimal places from the other, e.g., 675·2 - 245·26.

Estimate the approximate range of where an answer will fall and use this to check for reasonableness.

Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction).

See Mathematics programmes of study: key stages 1 and 2: Mathematics Appendix 1 (formal methods).

Add two or more multi-digit whole numbers using short columnar addition.

Add two or more multi-digit decimal numbers using short columnar addition.

Add two multi-digit whole numbers using short columnar subtraction.

Add two multi-digit decimal numbers using short columnar subtraction.

Be able to explain when to exchange and regroup in subtraction and why.

Year 5 Mathematics Curriculum Objectives

Demonstrate an understanding of how to subtract with numbers including a zero, e.g., 27,053 - 19,476.
Add and subtract numbers mentally with increasingly large numbers (example, 12,462 – 2300 = 10,162).
Know when it might be appropriate to use a mental method of addition and subtraction, e.g.:
When numbers are close together so that counting on or back in the head is possible; When only one digit is involved in the calculation and can be visualised, e.g., 5·632 - 5·432.
Choose the most efficient known mental strategy and explain why, e.g., 0·28 + 0·46, or 9·7 – 3·9.
Demonstrate an understanding of when it is appropriate to work with large numbers mentally (which can include jottings), e.g., Make up an example of an addition or subtraction calculation involving decimals and / or multi-digits that you would do in your head.
Explain / discuss how a mental calculation has been done.
Adapt own methods of mental calculations to become more efficient, perhaps in response to listening to others.
Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.
Pick up on rounding errors and correct.
Round any number up to 1,000,000 to the nearest 10, 100, 1,000, 10,000 and 100,000. (Number: Number and Place Value, Year 5)
Demonstrate a secure understanding of appropriate rounding, e.g., Round to the nearest 10, 100, 1,000 or 10,000.
Use rounding of numbers in a calculation to estimate answers.
Understand when numbers need to be rounded up or down in context of a problem, i.e., how the left overs need to be accounted for.

Year 5 Mathematics Curriculum Objectives

Mathematics – Year 5
Multiplication & Division
Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.
Know what the terms multiple, factor and common factor mean.
Instantly recall all the multiplication facts to 12 × 12 and the related division facts.
Know and find factor pairs for times table answers up to 12 × 12, e.g., I'm thinking of the number 84. One of a pair of its factors is 12. What is the other?
Select the most appropriate factor pair of a number in the context of a problem if there are alternatives.
Use tables facts to find extended factor pairs, e.g., 45 has a factor pair of 9 and 5, therefore 450 has a factor pair of 90 and 5 or 9 and 50.
Find common factors, e.g.: What are the common factors of 16 and 12? Take two number cards from a pack and investigate how many common factors they have. Sort a set of number cards into Venn and Carroll diagrams (2 or 3 sets) by factor. The common factors of two numbers are 1, 2, 5 and 10. What could the two numbers be?
Identify, name and write equivalent fractions of a given fraction. (Fractions, Year 5)
Know and use the vocabulary of prime numbers, prime factors and composite (non prime) numbers.
Understand the mathematical terms:
prime number – a whole number greater than one and only divisible by 1 and itself;
prime factor – a factor that is a prime number;
composite number - a whole number greater than one that is not a prime number.
0 and 1 are special numbers that are neither prime nor composite.
Use prime numbers, prime factors and composite numbers as properties of numbers in problems solving activities.
Establish whether a number up to 100 is prime and recall prime numbers up to 19.
Know that any even number other than 2 is a composite number (not prime).
Using diagrams / visual representation to work out whether any number up to 100 is a prime number or a composite number, e.g., Colour a 100 square grid systematically with one colour for the primes (1 is not prime) and another for the multiples of the primes.
Know the prime numbers to 19, e.g., List the numbers 1 to 19 in a table and write every factor for each number. Use the table to write down the prime numbers and learn these.
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.
See Mathematics programmes of study: key stages 1 and 2: Mathematics Appendix 1 (formal methods).
Set calculations in real-life contexts.
Compare methods of multiplication by a two-digit number understanding the place value of each digit, the process, advantages and disadvantages, e.g., grid multiplication, extended column multiplication.
Estimate and check answers for sense.
Use formal written methods of multiplication for any starting whole number with up to four digits multiplied by a single-digit number, e.g., Sofas are £1,265 each. Mr Smith needs 7 to refurnish his flats. How much will it cost him?
Use formal written methods of multiplication for any starting whole number with up to four digits multiplied by a two-digit number, e.g., Each carton of milk holds 1,454 ml. How much milk is in 25 cartons?
Multiply and divide numbers mentally drawing upon known facts.
Use jottings to support mental methods, e.g., Do part of the calculation mentally and jotting down the answer to each part before completing the final calculation.
Know multiplication and corresponding division facts up to 12 × 12.
Know multiplication can be done in any order but division cannot.

Year 5 Mathematics Curriculum Objectives

Use doubling and halving, including repeated doubling and halving, for numbers to be multiplied or divided by 4 and 8.

Recognise 'nearly' numbers and use this to simplify calculations where appropriate, e.g.:

40 × 99 = (40 × 100) – 40.

11 is 10 + 1, 998 is 1,000 – 2.

Understand the law of distribution (distributivity) and factor pairs and select the most efficient method, e.g.:

12 x 35 can be written as (2 × 35) + (10 × 35) or 2 × 6 × 5 × 7 = 10 × 42.

150÷ 6 can be written as (150 ÷ 3 ÷ 2) because 3 and 2 are a factor pair of 6.

Discuss different strategies for solving an equation, e.g., 580 ÷ 20.

Refine strategies to make them more efficient.

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.

See Mathematics programmes of study: key stage 1 and 2: Mathematics Appendix 1 (formal methods).

Estimate and check answers for sense.

Compare methods of division understanding the place value of each digit, the process, advantages and disadvantages, e.g.

Know that zeros may need to be added to calculate an answer to a problem that has a remainder, e.g., A piece of cloth 29 m long is cut into 5 equal pieces. How long is each one?

Interpret remainders in context:

Express as a mixed number, e.g., Share pieces of pizza, such as, 20 ÷ 8 = $2\frac{4}{8}$ or $2\frac{1}{2}$ if simplified.

Express as a decimal, e.g., Divide a 210 g block of butter into quarters, i.e., 42·5 g.

Round up, e.g., How many boxes holding 6 eggs do I need to buy so that I have 160 eggs altogether?

Round down, e.g., How many boxes holding 6 eggs each can be filled from 160 eggs?

Use formal written methods for division of up to four-digit numbers by a one-digit number.

Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.

Set the following in the context of measures, e.g., g to kg, l to ml, cm to m, km to m, etc.

Read, write, order and compare numbers to at least 1,000,000 . . . (Number: Place Value, Year 5)

Know the place value of any number up to one million with up to three decimal places.

Know how many places digits move to the left or right when multiplying / dividing by 10 / 100 / 1,000.

Know that multiplying by a power of 10 should not be expressed as 'adding 0's' but is the movement of place.

Know when 0 is required as a place holder and when it is not, e.g., 23 ÷ 100 = 0·023, 0·06 × 100 = 6.

Recognise the relationships when multiplying / dividing by 10 twice then multiplying / dividing by 100.

Recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3}).

Know that when a number is multiplied by itself it produces a square number, e.g., Investigate square numbers using a growing array on grid paper.

Understand and use superscript ^{2} meaning that a number is multiplied by itself, i.e., 2 × the number.

Know that when the same number is multiplied together 3 times it is a cube number, e.g., Use visual images to support this such as a base ten 1,000-block, Multilink models.

Understand and use superscript ^{3} meaning that a number is multiplied by itself twice, i.e., 3 × the number.

Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes.

Solve problems using factors and multiples, e.g.:

Any number that ends in the digits 64 is divisible by 4, true of false?

Make a factor tree for a number such as 60.

Year 5 Mathematics Curriculum Objectives

How many multiples has 360?

Solve problems with squared and cubed numbers, e.g.:

□, □, □, 9, □, 25, □.

The sum of the cubes of two numbers is 1,062. What are the numbers?

Find the perimeters or squares from a known side length and / or vice versa.

Find the volume of cubes with sides of given length. Do you know how many blocks you would need to make a cube that was 12 blocks tall? Write a formula for making cubes.

Estimate volume [for example, using 1 cm^3 blocks to build cuboids (including cubes) . . .. (Measurement, Year 5)

Solve problems involving multiplication and division, e.g.:

The answer is 270. How many different ways could you write equations to represent it? Example solutions: 3 × 3 × 9 × 10 or 9^2 × 10 or 3^3 × 1.

Place three digits to make a U · t × U calculation where the answer is a whole number;

The perimeter of an equilateral triangle is 234 cm. What is the length of each side?

Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign.

Use the equals sign in missing number problems and simple formulae, recognising that each side of the equation must be balanced, e.g.:

20 × 10 = □ + 600.

140 = □ × □ × 35.

5 × n = n + 8. What could n be? Is there more than one possible answer?

Solve word problems and number puzzles involving all four rules, e.g.:

I buy presents costing £9·63, £5·27 and £3·72. How much change do I have from £20?

Classify numbers according to their properties and record in Venn and Carroll diagrams;

Create different calculations using the digits 3, 4 and 5 in every equation and any combination of symbols (-, +, ×, ÷). What is the largest / smallest answer you can make? Can you make 2·4?
What number lies halfway between 2·47 and 2·83 on a number line?

Use function machines;

Pose 'I'm thinking of a number' problems.

Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

Solve problems involving multiplication and division in context, e.g.,

How many £50 notes would you need to make £12,000?

Lines are drawn 200m apart. How many can be drawn in 1km?

Solve problems involving scaling, including fractions, e.g.:

Construct an equilateral triangle by dividing or multiplying a given measurements, e.g., make sides 3 times as long one-third as long, etc;

Reduce and increase given recipes.

Solve problems involving rates, e.g.:

Convert between units such as kilometres and metres or kilograms and grams.

The travel agents are giving €1.40 for every £1. How many euros will I get for £200?

Convert between different units of metric measure . . .. (Measurement, Year 5)

Solve comparison, sum and difference problems using information presented in a line graph. (Statistics, Year 5)

Solve problems involving multiplication and division where larger numbers are used by decomposing them into their factors.

Through problem solving activities:

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Estimate the approximate outcome of a calculation.
Check answers against estimates.
Explain how a problem was solved.
Use the distributive and / or commutative laws to simplify multiplication of multi-digit numbers in problems, e.g., Each can of cola holds 450 $m\ell$. How many $m\ell$ in 16 cans? Solution might be: 450 × 16 = (50 × 9 × 2 × 8) = (50 × 2) × (9 × 8) = 100 × 72 = 7,200.
Use inverse operations and factor pairs (a version of chunking), where appropriate, to simplify division of a multi-digit number by a single-digit number, e.g., 165 ÷ 3 can be found by first realising that 50 × 3 = 150 and 5 × 3 = 15 so 165 ÷ 3 = 55.

Year 5 Mathematics Curriculum Objectives

Mathematics – Year 5

Fractions (including decimals & %)

Read, write, order and compare numbers with up to three decimal places.

Make sure that pupils understand that it is not the number of digits after the decimal point that defines its size, e.g., 0·578 is smaller than 0·6.

Partition and re-combine any number less than 1 with up to three decimal places, e.g., 0·23 is two tenths and three hundredths, so, the $^{2}/_{10}$ and $^{3}/_{100}$ is read as $^{23}/_{100}$; twenty three hundredths, etc.

Order a set of numbers, appreciating that the most significant digit defines the size of a number and is the left-most non-zero digit, e.g.,

Which is the heaviest / lightest from 1·25 kg, 0·125 kg, 2·105 kg, 0·2 kg, 0·251 kg?

Arrange in order of capacity — 1·025 l, 0·12 l, 2·1 l, 0·215 l, 0·251 l.

Solve problems involving numbers up to three decimal places

Solve problems involving numbers up to three decimal places, e.g.:

Find pairs of two-digit decimal numbers that make 1 where the hundredths are . . ..

Play games, e.g.:

Play Calculator Zap. (Choose a decimal number to enter into a calculator, e.g., 47·135. Remove each digit in turn with one subtraction calculation and record.)

Play Concentration Pairs. (Place a pack of equivalent pairs face down on the table, e.g., 0·145kg and 145 g, $^{3}/_{10}$ of 1kg and 0·3kg. Players try to turn over a matching pair. Keep them if they are equivalent, replace them if not. Player with the most cards wins.)

A litre bottle is shared fairly between four children, how much will each receive?"

There is 1·3kg of flour left in the bag. Half of it is used. How much is left?

Find a number whose double lies between 1·3 and 1·4.

What number lies halfway between 2·47 and 2·83 on a number line?

2057 ÷ 10 = ▢ ÷ 10 = ▢ ÷ 10 = ▢ ÷ 10 = ▢.

Function machines with operators and numbers.

Fill in the missing symbol and multiple (such as x 10 or ÷ 1,000).

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 100, and as a decimal.

Know that one percent is a special kind of fraction, it is one hundredth ($^{1}/_{100}$) and understand the link to the division operation, e.g., 12% is twelve divided by one hundred ($^{12}/_{100}$).

Understand percentage as the number of parts in every 100, e.g., Shade 35 squares in a 10 x 10 grid to represent 35% and 0·35.

Find 1% of quantities and amounts, applying place value understanding, e.g., 1% of 16·3 m is 0.163 m.

Find 10% of quantities and amounts, applying place value understanding, e.g., 10% of 16·3 m is 1·63 m.

Find other simple amounts, such as, 25% (¹⁄₄), by applying proportional reasoning, e.g., Find 50% of 60, or 25% of 240.

Find the percentage equivalence for fractions, e.g., Shade ½ in a 10 x 10 grid and understanding this is 50% because 50 out of 100 squares are coloured.

Understand the equivalence between simple fractions, decimals and percentages, e.g., Complete a relationship table.

Solve problems which require knowing percentage and decimal equivalents of ½, ¼, ⅕, ⅖, ⅘ and those fractions with a denominator of a multiple of 10 or 25.

Promote the use of the language of percentages at every opportunity; e.g., refer to half as 50% of something.

Use scaling to find answers to problems involving tenths, hundredths, thousandths and twenty-fifths of a value applying known facts, e.g.:

Move digits to the right when finding 10% or 1% of 844.

Use efficient calculation strategies, e.g., Find 75% of 360 - could be finding 25% by quartering 360, then multiplying by 3.

Solve problems, e.g.:

Descriptor Gaps in Learning

Shopping problems, such as:

20% off sales;

50% off everything;

10% off original sale prices;

best buys;

buy one get second half price.

35% of the children in a class are girls. What percentage are boys?

What percentage of a day is 6 hours?

Asif buys a 1 kg bag of flour. He uses 30% of it to make biscuits and $\frac{2}{5}$ of it to bake a cake. How much of the flour is left?

Make comparisons, e.g., Richard got 40 marks out of 80 in a test. Sarah got 45%. Who had the better score, Richard or Sarah?

25% of the apples in a basket are red. There rest are green. There are 21 red apples. How many green apples are there?

Add and subtract fractions with the same denominator and denominators that are multiples of the same number.

Confidently add and subtract fractions with the same denominator.

Understand the term common denominator.

Understand that, when adding and subtracting fractions not having the same denominators, each can be changed into an equivalent fraction, all with the same common denominator, e.g., James, Shane and Chelsea have bought a pizza. They eat $\frac{1}{4}$, $\frac{5}{8}$ and $\frac{1}{8}$. How much is eaten?

Add and subtract within fraction families, including some mixed numbers and more than two fractions.

Simplify answers to fractions calculations by cancelling where necessary, e.g., $\frac{6}{8}$ to $\frac{3}{4}$ or $1\frac{4}{8}$ to $1\frac{1}{2}$.

Check answers using inverse operations.

Solve fraction problems, e.g.:

I have cycled $\frac{7}{10}$ of a distance of 50 km. How far do I still have to go?

Misha buys a 2 litre bottle of pop. She drinks $\frac{1}{4}$ of the bottle and spills $\frac{1}{4}$, $\frac{2}{5}$ of the bottle. How many millilitres are left?

Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams

The following should be presented in real-life contexts of quantity and measures.

Interpret and represent multiplication of proper fractions, e.g., $4 \times \frac{2}{5}$.

Accurately multiply proper fractions by whole numbers.

Convert mixed numbers to improper fractions before multiplying.

Accurately multiply mixed numbers by whole numbers by:

partitioning, e.g., $3\frac{2}{3} \times 4 = (3 \times 4)$ and $4 \times \frac{2}{3} + 2/3 + \frac{2}{3} + \frac{2}{3}$;

converting mixed numbers to improper fractions before multiplying, e.g., $1\frac{2}{3} \times 4 = 1\frac{1}{3} = 3\frac{2}{3}$.

Read and write decimal numbers as fractions [for example, 0.71 = $\frac{71}{100}$].

Understand the relationship between hundredths as a fraction ($\frac{1}{100}$) and hundredths as a decimal (0·01), e.g.: label number lines / 100 squares with decimals on the top and fractions on the bottom and 'read' both scales.

Know that decimals and fractions are different ways of expressing numbers and proportions.

Recognise and write the decimal equivalent of a tenths / hundredths fraction amount and vice versa, e.g., 'Which of these fractions is equal to 0·27 – $\frac{207}{100}$, $\frac{270}{100}$, $\frac{27}{10}$, $\frac{270}{10}$, $\frac{207}{10}$.

Find the fraction equivalents of decimal numbers to the lowest denominator, e.g., $0{\cdot}4 = \frac{4}{10} = \frac{2}{5}$.

Convert decimals to mixed numbers, e.g., 2·5 to $2\frac{5}{10}$ or 53·13 to $53\frac{13}{100}$.

Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents.

Year 5 Mathematics Curriculum Objectives

Use of calculators could support this objective.
Understand the relationship between thousandths as a fraction ($\frac{1}{1,000}$) as a decimal (0·001).
Understand 0 as a place holder in numbers with up to three decimal places, e.g., Write 'one and four thousandths' as 1·004.
Know what each digit is worth in any number with up to three decimal places.
Say, read and write decimal fractions and related tenths, hundredths and thousandths accurately, understanding where a place keeping 0 is necessary.
Understand the relationship between thousandths, hundredths and tenths, e.g., 'How many thousandths in four hundredths?'
Understand the effect of dividing one-, two- and three-digit numbers by 1,000, e.g., 0·6, 9, 6·16.
Round decimals with two decimal places to the nearest whole number and to one decimal place.
Set these in the context of quantities, measures and money.
Two Decimal Places to the Nearest Integer
Place numbers with two decimal places accurately on a number line between two whole integers, e.g., put 4·76 between 4 and 5 (but closer to 5) on a 0 to 10 number line.
Know, when rounding to the nearest integer, that the tenths determine which is the closest.
Recall that if the tenth is a 5 this is rounded up, otherwise down (rule of 5).
Two Decimal Places to One Decimal Place
Place numbers with two decimal places accurately on a number line, marked in tenths, between tenths markers, e.g., put 0·42 between 0·4 and 0·5 but closer to 0.
Know, when rounding to the nearest tenth, that the hundredths determine the closest tenth.
Use the 'rule of 5' when rounding hundredths.
Estimate by using rounding techniques
Use rounding of numbers to estimate answers to calculations, deciding on the most appropriate degree of accuracy required, e.g.:
56·46 + 33·67 is approximately 56 + 34 or approximately 56·5 + 33·7.
5·56 – 1·93 is approximately 6 – 2 or approximately 5·6 – 1·9.
Compare and order fractions whose denominators are all multiples of the same number.
Demonstrate practically that one fraction is larger / smaller than another, e.g., Which is the largest, $\frac{2}{3}$ or $\frac{5}{9}$? Make two strips of paper the same length, dividing one into thirds and one into ninths. Arrange the pieces.
Create and interpret diagrams to support fractions work, e.g., a fraction wall.
Order a set of fractions from the same family, including mixed numbers.
Understand the terms denominator and numerator.
Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths.
Develop the language of ratio and proportion where there are opportunities.
Count forwards and backwards in unit and non-unit fraction amounts relating to work being undertaken.
Recognise equivalence between non-unit fractions such as $\frac{3}{4}$ and $\frac{6}{8}$ or $\frac{3}{10}$ and $\frac{30}{100}$ using apparatus if required, e.g., number lines, fractions walls or grid paper.
Understand how equivalent fractions are calculated, relating this to multiplication and division and recognising patterns in the numerators and denominators, e.g., ▢, $\frac{6}{10}$, $\frac{9}{15}$, ▢, ▢. What would be the 12th term? Can you work it out without writing them all down?
Investigate / illustrate / write equations / solve problems with practical apparatus for equivalent fractions families, including tenths and hundredths and those not covered in Year 4 – sixths, sevenths, ninths).
Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. (Number: Multiplication and Division, Year 5)
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, $\frac{2}{5} + \frac{14}{5} = \frac{6}{5} = 1\frac{1}{5}$].
Know that when the numerator is larger than the denominator it is an improper fraction.

Year 5 Mathematics Curriculum Objectives

Write a mixed number as an improper fraction, e.g., $2\frac{1}{3}$ = seven thirds = $\frac{7}{3}$.
Write an improper fraction as a mixed number, e.g., $\frac{7}{3}$ is two ones and one-third = $2\frac{1}{3}$.
Know that mixed numbers in a fraction calculation should be changed to improper fractions before adding or subtracting, e.g., $2\frac{1}{3} - 1\frac{2}{3} = \frac{7}{3} - \frac{5}{3} = \frac{2}{3}$.
Add and subtract fractions with the same denominator, including pairs that make one and mixed numbers, e.g.:
$\frac{13}{10} + \frac{29}{10}$ or $\frac{31}{6} + \frac{45}{6}$. $\frac{37}{8} - \frac{23}{8}$ or $\frac{41}{3} - \frac{12}{3}$.

Year 5 Mathematics Curriculum Objectives

Mathematics – Year 5

Measurement

Convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre).

Recall the meaning of kilo (one thousand), centi (one hundredth) and milli (one thousandth).

Know the range of units of a measure and how place value is used, e.g., Construct a table and answer questions such as, What would you divide by to change kilograms into grams?, What would you multiply by to change milligrams into kilograms?

Order measurements given in mixed units, e.g., 1.34 l, 225 ml, 0.034 l.

Practise multiplying and dividing by powers of 10, changing the units to those easy to read if appropriate, e.g., a function machine.

Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints.

Solve comparison, sum and difference problems using information presented in a line graph. (Statistics, Year 5)

Use conversion rates for different measures, e.g., make a table from information on the internet and use it to find simple equivalences, such as, 'I only have an old tape measure that measures in inches. Where would I measure to so I could cut a piece of string 10 cm long?'

Learn some commonly used benchmarks and check with these to see if an answer is sensible, e.g.:

5 miles ≈ 8 kilometres;

1 kilogram is just over 2 pounds;

10 cm ≈ 4 inch.

Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres.

This is an extension of work in Year 4 where the simplest form of rectilinear shapes was covered (rectangles and rectilinear shapes made from a maximum of two rectangles joined together). It is suggested that shapes used in this section are made from three or more joined rectangles.

Measure and draw lines accurately with a ruler to the nearest mm.

Calculate the perimeter of composite rectilinear shapes by measuring each side and totalling.

Measure and calculate the perimeter of large rectilinear objects, e.g., school grounds.

Calculate the perimeter of a composite rectilinear shape from scaled drawings where the unit of measurement could be in cm or m and decimals could be involved.

Calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm^2) and square metres (m^2).

Know how big 1 cm^2 is and how big 1 m^2 is and the relationship between them, e.g.:

Cut out 1 cm^2 and see what can be fitted onto it, such as 20 grains of rice.

Draw a 1 m^2 on the playground and see how many people fit into it

Understand and use the notation of cm^2 and m^2.

Understand that multiplication can be used to calculate the area of a rectangle, e.g., compare the area of rectangles by making arrays, recognising that area can be found by multiplying length by width.

Understand that length by width = area can be written as the formula l × w = a; interpret this in context and use in diagrams.

Know the area of a square is l^2 ($length^2$).

Solve problems about area and perimeter, e.g., Find unknown lengths of the perimeter of a rectangle of sides 2 cm and b cm and perimeter of 20 cm.

Recognise how rectilinear shapes can be dissected into rectangles and use this to find the area of blocks of the shape which can then be totalled.

Estimate and find the area of irregular shapes that are not rectilinear, e.g., Find the area of a leaf drawn on cm^2 paper or a kite made on a geoboard.

Solve area problems, e.g.:

Ben has drawn this shape to scale on plain paper instead of on cm^2 paper. Can you find its area? Explain how you did this.

A play area is 5 m long and 10 m wide. Draw a scaled diagram on cm^2 paper.

Year 5 Mathematics Curriculum Objectives

Estimate volume [for example, using 1 cm^3 blocks to build cuboids (including cubes)] and capacity [for example, using water].

Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes. (Number: Multiplication and Division, Year 5)

Volume

Have an idea of how big 1 cm^3 is, e.g., Find a cube that measures 1 cm on each edge.

Estimate and check how many centimetre cubes will pack tightly into a range of containers.

Know that the simple formula, l × w × h, can be used to find the volume of cuboids and cubes, e.g., Make small cuboids with centimetre cubes, measure each dimension (length, width, height), count cubes and record in a table. Use the table information and knowledge from Year 4 about the area of rectangles to work out the formula for the volume of cuboids.

Understand and use the notation of cm^3 and m^3.

Capacity

Have an idea how much 1 ml is and how much 1 l is and the relationship between them.

Estimate how many millilitres / litres a range of unmarked containers will hold and check.

General

Compare 1 ml of liquid with a 1 cm^3 and recognise that they take up the same amount of space.

Compare a 10 centimetre cube, such as a base 10 cube, with a litre container and recognise that they take up the same amount of space.

Solve problems involving converting between units of time.

Understand that the units of time are not decimal, so care needs to be taken with time calculations.

Convert times from analogue time to 24-hour digital time, and vice versa, e.g., complete time conversion table or investigate TV schedules.

Work out fractions of time, e.g., 3.5 hours means 3 hours and ▫ minutes.

Solve time problems, e.g., What time is it in Sydney, Australia, when it is 13:00 in London?

Solve money problems involving changing pounds into pence and vice versa.

Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.

Solve temperature problems, e.g., How much hotter / cooler is it in London than New York today?

Solve measurement problems, e.g.:

Find all the measurement attributes of an object such as an orange – juice, mass, surface area, volume.

Each tin of paint covers 10 m^2. How many tins of paint would be needed to paint the four vertical walls of this room?

Solve perimeter and area problems, e.g., Find the area and perimeter of rectilinear figures from scaled drawings.

Solve money problems, e.g.:

Investigate the cost of sending different parcels by first-class post.

Work out sale prices.

How much would it cost to carpet a room with a floor area of 35 square metres if it costs £12·99 per square metre?

Year 5 Mathematics Curriculum Objectives

Mathematics - Steps 28 to 30 (0% of descriptors marked)

Geometry : Properties of Shapes (0% of descriptors marked)

Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles.

Reflex angles can be found on the internal angles of concave shapes.

Draw given angles, and measure them in degrees (°). (Geometry: Properties of Shape, Year 5)

Know that angles are measured in degrees and that there are 360^0 in one full turn, i.e., 4 right angles.

Label angles in shapes as acute, obtuse, right angle or reflex, comparing them with the known angle of 90^0.

Compare the size of angles, e.g., Sort pictures or concrete objects into sets by angle size.

Sort 2-D and 3-D shapes into groups according to whether they have right angles, acute, obtuse and / or reflex angles, e.g., Venn and / or Carroll diagrams.

Draw given angles, and measure them in degrees (°).

Circular protractors are a better 'turning' concept than semi-circular ones and also help with reflex angles.

Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles. (Geometry: Properties of Shape, Year 5)

Draw and measure angles with a protractor.

Estimate angles, check and become increasingly more accurate (to nearest 90^0, 10^0, 5^0), e.g., Use an unmarked angle indicator to show an angle of 70° and check with a protractor.

Angles at a point and one whole turn (total 360^0).

Working with a floor robot or ICT program will consolidate understanding.

Know that the angles around a point add up to 360°, e.g., Measure the angles around a point in different pie charts.

Know that turning one complete turn is a rotation of 360^0.

Angles at a point on a straight line and $^1/_2$ a turn (total 180^0).

Recognise that angles on a straight line add up to 180^0, e.g., From diagrams, be able to say which angles total 180^0 between them.

Know that the angles of every triangle always add up to 180^0, e.g., cut up and fit many different examples.

Know that turning half a turn is a rotation of 180^0.

Other multiples of 90^0.

Know that turning three-quarters of a turn is a rotation 270^0.

Know other multiples of 90^0 turns that are greater than 360^0, e.g., Two turns is 720^0.

Know that the angles of every quadrilateral always add up to 360^0 but that only rectangles have four angles of exactly 90^0, e.g., Cut up and fit many different examples.

Use the properties of rectangles to deduce related facts and find missing lengths and angles.

Use conventional markings for parallel lines and right angles, e.g., When constructing / illustrating a rectangle of given dimensions.

Solve problems relating to the properties of rectangles, e.g.:

A rectangle has sides of 5cm and 12cm. Construct the shape and measure its diagonals.

The diagonal of a rectangle is 10.5cm. Draw the rectangle.

Investigate angles at the intersection of the diagonals of different rectangles and generalise about them.

Investigate the four triangles made by drawing diagonals in a rectangle.

Investigate the angles in squares with diagonals drawn.

Distinguish between regular and irregular polygons based on reasoning about equal sides and angles.

Know that the angles and sides of a regular polygon are always equal, e.g., Complete a table from measuring a range of polygons, both regular and irregular, and draw conclusions.

Solve problems involving polygons, e.g.:

Year 5 Mathematics Curriculum Objectives

Investigate the angles and side lengths of parallelograms and make comparison with rectangles.

Explain the relationship between the number of sides on a regular polygon and the number of lines of symmetry and / or diagonals that can be drawn.

Construct named regular and irregular polygons from given angles and / or side measurements.

Combine polygons in different ways to make 3-D shapes and name them, e.g., Clixi or Polydron.

Identify 3-D shapes, including cubes and other cuboids, from 2-D representations.

Recognise, name and visualise an extended range of 3-Dshapes, e.g., octahedron, a slice of a cone or oblique cylinder.

Sort photographs / illustrations / diagrams of 3-D shapes and objects by their properties in a variety of ways, explaining what has been done.

Draw recognisable 3-D cuboids (rectangular prisms) on isometric, dotted and squared paper, e.g., Draw a set of four cubes increasing in size in the same proportion each time.

Construct a model from a photograph, picture or series of diagrams, e.g.:

Make a solid with interlocking cubes, take a digital photograph of it or make a 2-D drawing of it on grid paper, and challenge others to recreate it.

Follow diagrams for construction, e.g., Make a Lego model.

Work out how many blocks have been used in an illustration of a model or building.

Year 5 Mathematics Curriculum Objectives

Mathematics – Year 5
Geometry : Position & 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.
Symmetry work should extend the work done in Year 4 in Geometry: Shape and Space.
Explain what translation means as a mathematical term and how it is not the same as reflection.
Identify / sort given shapes by whether they are translated, reflected or neither.
Describe the movement of two shapes on a co-ordinate grid in the following terms: type – reflection or translation (no rotation); direction – horizontally left or right and vertically up or down; distance – the number of co-ordinate points moved both vertically and horizontally.
Translate a simple shape on a co-ordinate grid by a specified number of x points and y points in given directions, e.g., Use an ICT program, such as Word, make a shape, copy it and translate it. Print it out and say how the shape has moved. (Keep in first quadrant – no negatives until Year 6 objectives.)
Reflect interesting shapes around one axis of symmetry, keeping it in first quadrant, e.g., A tree above or below a horizontal axis to represent reflection in water. Give the co-ordinates.
Reflect a shape around two axes of symmetry giving the co-ordinates of the other portions, if applicable.
Translate simple shapes in directions parallel to the axes of a co-ordinate grid (giving the co-ordinates of the new position, e.g.), Work in pairs and both draw a shape the other hasn't seen. Write down the co-ordinates of their shape, translated a specific number of points in any direction, remaining within the first quadrant. Give the instructions to the other who translates it back. Compare the shape.
Shapes do not necessarily have to be perpendicular to an axis.
Know that translation and reflection of shapes does not change either the shape itself or the size. Only its position changes.

Year 5 Mathematics Curriculum Objectives

Mathematics – Year 5
Statistics
Solve comparison, sum and difference problems using information presented in a line graph.
Know that line graphs are used to present continuous data.
Understand that the tops of the bars on a bar-line column chart can be joined to create a line graph because all the points along the line have meaning; e.g., Draw and label a line column chart for the 7 times table and join the tops of the lines. Answer questions such as 'What is 84 divided by 7?', 'What is the product of 7 and 7?
Work out what each interval on a scaled axis is worth.
Read data accurately, drawing a line or lines, if necessary, onto the graph to read required information accurately; e.g., Find the approximate answer to 3·8 × 7 or 40 ÷ 7.
Solve line graph problems, including comparison, sum and difference; e.g.:
How quickly after exercise does the heart rate return to normal? What distance was travelled between 10 a.m. and noon? How many pupils have foot lengths between 25 cm and 28 cm? Write a story about this bath time line graph. Create and use conversion line graphs for metric into imperial measures.
Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints. (Measurement, Year 5)
Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates. (Number: Multiplication and Division, Year 5)
Complete, read and interpret information in tables, including timetables.
Decide what calculations need to be done in order to use data to answer a question or solve a problem.
Interpret information given in a two-way frequency table; e.g., Download a tram, train or bus timetable and ask / answer questions.
Collate information into a two-way frequency table; e.g., Construct / complete a frequency table from information supplied, possibly in the form of a word problem.
Explain orally and in writing how data was used to solve a problem, e.g.:
Do children in our class eat enough fruit and vegetables in a week? Use a timetable to work out what time you would need to set off to complete a two-stage journey in time to arrive for 4 p.m. Answer questions about knock out tables. Identify an object or creature using a tree sorting question and answer diagram.