

# Year 7 Ways of Doing- Mathematics

## Number

## Algebra

## Geometry & Measures

## Statistics & Probability

Exceeding

- Use the lattice method (and proportional adjustment) to efficiently multiply 2 decimals together
- Add and subtract algebraic fractions
- Increase or decrease by a fraction of an amount
- Simplify algebraic fractions by factorising and/or using index laws
- Round decimals to certain significant figures (e.g. 0.00035 to 1sf)
- Explore surds
- Make estimates for the square roots of surds by recalling square numbers
- Use proportion to solve similar shape problems
- Increase or decrease by a fraction of an amount
- Find the percentage of an amount with a calculator
- Solving compound interest and depreciation problems
- Solve original value problems with or without a calculator by finding reverse percentages

- Solve inequations
- Form bracket expressions from word problems
- Apply laws of indices to simplify expressions
- Substitute into scientific and mathematical formulae
- Prove, using an algebraic method, whether a number can be a term in a given sequence
- Recognise, describe and continue non-arithmetic sequences such as Fibonacci, quadratics, etc.

- Find missing angles that require forming, simplifying and solving algebraic equations
- Find missing angles in parallel lines that require forming, simplifying and solving algebraic equations
- Justify whether two lines are parallel
- Can construct quadrilaterals using compasses and ruler
- Find the perimeter of shapes by forming, simplifying and solving algebraic equations
- Calculate with exact multiples of  $\pi$
- Calculate the arc length of a sector using proportional reasoning
- Draw the plan, side or front view of a shape when given a 3D view or net
- Explore how units of measurement and dimensions are related and can be proven algebraically

- Explore how to avoid bias when asking a sample of the population
- Collect data in a two way table
- Explore why and how industries use misleading graphs. -What misconceptions are there with bar charts?
- Explain why pie charts can be misleading when used for comparisons e.g. can't tell which shows a higher frequency
- Find the mean and median from a frequency table
- Interpret averages (e.g. why you might choose to use the mode instead of the median for this data set)
- Interpret whether averages represent the data well (outliers)
- Find the probability of two dependent events using fractions or decimals
- Explain what happens to the relative frequency if you repeat the experiment again and again

Expected

- Use the column method for subtraction (borrowing)
- Choose an appropriate multiplication method to solve worded problems
- Use short division to divide numbers by a decimal (using proportional adjustment)
- Choose an appropriate division method to solve worded problems
- Use long/short division methods for dividing decimals by a decimal
- Evaluate negative indices with base 10
- Multiply and divide numbers with negative powers of ten (0.1, 0.01, 0.001)
- Add and subtract mixed numbers
- Multiply and Divide two fractions including mixed numbers
- Calculate with powers of negatives e.g.  $(-3)^3$

- Solve linear equations with unknowns on both sides
- Expand single brackets with negative terms outside the brackets
- Expand and simplify 2 single brackets with variable outside bracket
- Simplifying expressions involving multiplying and dividing terms
- Simplify expressions when applied in context (e.g. perimeter or area)
- Substitute fractions or decimals into an expression to find its value
- Use formulae to find unknown quantities
- Substitute into expressions involving powers
- Explain the difference between expression, formula, equation

- Find missing angles by applying your knowledge of geometric notation
- Explain why, using angle facts, their answer is correct (angle reasoning)
- Find missing angles which require combining alternate, corresponding and vertically opposite angles
- Explain why, using angle facts, their answer is correct (angle reasoning)
- Construct angle bisectors and perpendicular bisectors using compasses and a ruler
- Solve problems involving missing side lengths when given the perimeter
- Solve word problems involving circumference
- Find the perimeter of more complex shapes involving parts of a circle

- Explain the difference between discrete and continuous data
- Identify the words used in a question that makes it leading
- Ask a variety of open, closed, option questions
- Construct a frequency table to record data
- Interpret data from compound bar charts
- Match the same data sets together when they are represented by a pie chart or bar chart
- Give examples of when pie charts are not effective
- Find the mode from a frequency table
- Find numbers in a set when given the averages
- Compare the consistency of results by making reference to the spread (range)
- Find the probability of two independent events using fractions or decimals

# Year 7 Ways of Doing- Mathematics

- Perform calculations accurately and fluently with negative numbers in different contexts
- Apply accurately the correct order of operations to complex calculations including those involving fractions
- Round whole numbers to certain significant figures
- Round decimals which require carrying over tenths, hundredths etc. (e.g. 0.598 rounded to 2 dp)
- Estimate the value of calculations by rounding each number to 1 significant figure first
- Find the cube root of a number
- Use a calculator to find squares, cubes and roots
- Square and square root decimal numbers
- Use the products of prime factors to find the LCM and HCF of two or more numbers
- Apply proportional reasoning to solve problems
- Relate ratios to fractions and percentages
- Use the unitary method to solve inverse proportion questions
- Use proportion to draw or interpret scale drawings
- Find any fraction of an amount
- Find percentages of amounts involving decimals (e.g. 2.5%) without a calculator
- Find the percentage change using a calculator

- Find the nth term rule of a descending sequence
- Find the nth term rule from a sequence of shape patterns or sequences in practical situations e.g. car hire cost per day

- Identify a specific triangle or quadrilateral from a description of its properties using correct mathematical vocabulary
- Give examples of platonic solids
- Convert between metric units including area and volume

- Find the number of times an outcome would occur using the theoretical probability
- Explain how you could conduct an experiment to test if a dice or spinner is biased

# Year 7 Ways of Doing- Mathematics

Developing

- Use the column method for addition
- Use the column method for subtraction (no borrowing)
- Use the column or grid methods to multiply numbers with more than 2 digits together
- Use long division for dividing numbers with remainders
- Use short division to leave answer as a decimal or mixed number
- Divide numbers by factors when the divisor is not a 2-digit multiple of 10
- Use the chunking method to divide numbers with more than 3 digits
- Multiply and divide numbers by 0.1, 0.01 etc.
- Use the lattice method to multiply decimals by first removing the decimal point
- Order decimals
- Multiply and divide decimals with positive powers of ten
- Add and subtract fractions with different denominators
- Multiply and dividing fractions with whole numbers
- Add and subtract with negative numbers
- Apply accurately the correct order of operations with calculations involving indices
- Insert brackets into a calculation to change the answer
- Round decimals to a certain amount of decimal places
- Use approximation to check the magnitude of a calculation before or after the proper calculation
- Find the cube and square root of a number
- Express a number as a product of its prime factors using index notation
- Recall that a proportion is described as a fraction
- Divide an amount into a given ratio
- Use the unitary method to solve proportion problems
- Find any fraction of an amount where the numerator is 1
- Use 1%, 10%, 25% and 50% to find 20%, 30%, 5% etc. of amounts
- Find the single multiplier for decrease and increase problems
- Find the percentage change for simple non-calculator examples (was \$100, now \$150)

- Solve linear equations with two steps, including ones with brackets
- Expand brackets where the x term inside the bracket has a coefficient  $>1$
- Simplifying expressions by adding and subtracting involving terms with indices
- Substitute positive or negative integers into formulae
- Explain the difference between expression, formula, equation
- Recognise an arithmetic sequence
- Find the nth term rule of an ascending sequence
- Writing sequences given the nth term rule

- Find missing angles by combining two or more angle facts
- Recognise the common conventions for geometric notation
- Find missing angles in parallel lines using alternate and corresponding angles
- Draw circles and arcs using compasses
- Construct SSS triangles using compasses and ruler
- Can construct quadrilaterals using protractor and ruler
- Find the perimeter of compound shapes
- Find the radius or diameter given the circumference
- Identify angles using letter notation
- Find the order of rotational symmetry of a shape
- Justify whether a shape will have certain angles using angle facts
- Classify quadrilaterals based on their properties using geometric notation
- Give examples (and counterexamples) of polyhedra
- Recognise common 3D objects from their nets
- Draw different orientations of the same 3D object (made from cubes) using isometric paper
- Sketch pyramids, cylinders and spheres
- Convert between metric units for capacity and metric units for mass units e.g. ml to l, or kg to g etc.

- Explain the difference between primary and secondary data
- Determine whether questions give a qualitative or quantitative response
- Create questions with qualitative and quantitative responses
- Improve a question and/or the response boxes
- Distinguish between continuous and discrete data
- Construct comparative bar charts
- Interpret data from comparative bar charts
- Construct pie charts accurately when you need to use a calculator
- Interpret data from pie charts by considering proportion
- Find the median from an even numbered data set
- Compare simple averages (e.g. mean of goals scored by boys vs mean of goals scored by girls)
- Find the probability of an outcome NOT happening
- Find the probability of events by knowing that all the (mutually exclusive) outcomes must sum to 1
- Identify a spinner based on the results of an experiment
- Compare the relative frequency with the equivalent theoretical probability

# Year 7 Ways of Doing- Mathematics

Supported

- Use partitioning and a number line to add two numbers together
- Subtract by counting on using a number line
- Use the column method to multiply 2 digit numbers together
- Use the grid method to multiply 2 digits together
- Use long division to divide numbers with no remainders
- Use the bus stop method (short division) to divide numbers with no remainders
- Find factors of numbers
- Divide numbers by factors when the divisor is a 2-digit multiple of 10
- Use the chunking method to divide up to a 3 digit number
- Add and subtract decimals using the column method
- Multiply and divide numbers by 10, 100 and 1000 etc.
- Read, write and say numbers in figures and in words
- Identify the place value of a digit in a number
- Multiply and divide whole numbers with positive powers of ten
- Identify the missing operation between whole numbers using powers of ten (10, 100, 1000 etc.)
- Convert between improper and mixed numbers
- Simplify fractions
- Add and subtract fractions with the same denominator
- Convert between improper and mixed numbers
- Find equivalent fractions
- Simplify fractions
- Multiply and divide with negative numbers
- Apply accurately the correct order of operations with no indices
- Round to nearest unit, 10, 100 and 100
- Check the accuracy of a calculation by using inverse operations
- Express a number as a product of its prime factors
- Find the square of a number
- Use index notation
- Write ratios in the correct order
- Simplify and find equivalent ratios

- Use function machines to find the input from the output
- Solve linear equations (one step) using inverse operations
- Expand simple single brackets (positive integer outside the bracket)
- Simplifying expressions by collecting ( adding and subtracting) like terms
- Substitute into formulae or expressions (positives only) using the correct order of operations
- Explain the difference between expression, formula, equation
- Recognise a sequence of patterns made from shapes and be able to draw the next pattern
- Recognise a number sequence and be able to continue the sequence
- Describe a sequence using the term-to-term rule e.g. add 5
- Write the numbers in a sequence if given the rule e.g. start at 5 and add 3

- Identify acute, obtuse and reflex angles
- Identify vertically opposite angles
- Identify types of angles by estimating their size
- Find one missing angle in triangles, straight lines, quadrilaterals and around a point
- Identify and label vertically opposite angles
- Identify and label alternate and corresponding angles on a parallel line
- Find missing angles using vertically opposite angles
- Identify types of angles by estimating their size
- Draw acute, obtuse and reflex angle using a protractor
- Measure an angle using a protractor
- Construct ASA or SAS triangles using a protractor and ruler
- Find the perimeter of rectangles, triangles, parallelograms and trapezia
- Find the missing side lengths of regular shapes when given the perimeter
- Find the circumference of a circle when given the diameter
- Using geometric notation label:  
*equal length sides of a shape*  
*equal angles of a shape*  
*pairs of parallel sides of a shape*
- Identify how many lines of symmetry a shape has
- Identify, with reason, whether a shape is regular or irregular
- Recognise and recall the names of common 3D objects
- Describe a shape by talking about faces, edges and vertices
- Sketch a cube, cuboid and simple prisms
- Identify 3D objects from their properties
- Multiply and divide by 10, 100, 1000 etc. to convert metric units

- Recall that response boxes should be exhaustive and non-overlapping
- Recall that timescales should be specified in the question
- Give reasons why questions and/or response boxes are wrong in a questionnaire
- Describe the features of simple bar charts
- Interpret data from simple bar charts
- Construct axes using appropriate scales and construct bar charts
- Label the sectors of a pie chart correctly
- Know simple fractions of  $360^\circ$  to interpret data
- Construct a pie chart accurately without a calculator using a multiplier
- Find the mode, mean and range from a list of numbers
- Find the median from an odd numbered data set
- Sort a list of numbers into a frequency table
- Use words to describe the likelihood of an event
- Recall that probabilities are always between 0 and 1
- Find the probability of one outcome and write it as a fraction
- Find the relative frequency of one outcome from an experiment

## Year 7 Ways of Doing- Mathematics

- Use proportion to solve recipe style questions (double and halves)
- Find halves and quarters of an amount
- Find 50%, 25% of an amount by halving or quartering
- Find 10% or 1% by dividing by 10 or 100
- Increase and decrease amounts by 1%, 10%, 25% and 50% to find 20%, 30%, 5% etc. without a calculator

- Use appropriate metric units based on the size of what you are measuring
- Convert between metric length units e.g. mm to m