Year 8 Number Skills: Journey of Knowledge

Context and Introduction to Unit

In this unit pupils will recall methods used to add, subtract, multiply and divide multi-digit numbers and relate this to problem solving. Pupils will identify properties of numbers (using key vocabulary) and incorporate these into calculations.

Prior knowledge (KS2 NC)

Multiply and divide multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication/division (interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context). Perform mental calculations, including with mixed operations and large numbers. Identify common factors, common multiples and prime numbers. Use their knowledge of the order of operations to carry out calculations involving the four operations. Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

The bigger picture:

Career links – Retail Assistant

Mathematician: Carol Vorderman

CORE KNOWLEDGE

Descriptor	Year 8 Core Knowledge	SPARX	✓
- Developing +	To add and subtract more than two numbers including decimals.	M429, M152	
	To divide number integers and use divisibility rules.	M823	
	To add, subtract, multiply and divide with negative numbers.	M106, M288	
	To know the squares, cubes and their roots.	M135	
	To confidently apply the order of operations including brackets and indices.	M521	
	To use index notation.	M135	
- Securing +	To divide decimals by integers and link divisibility rules to factors and multiples	M823	
	To apply the four rules of negatives using fractions and decimals.	M521, M835, M157, M110	
	To use the order of operations with indices, brackets and fractions.	M521	
	To write a number as a product of its prime factors.	M108	
	To find HCF and LCM from a list	M698, M227	
	To use HCF and LCM in context.	M698, M227	
- Mastering +	To derive divisibility rules.	M823	
	To derive and understand the rules for the 4 operations with negatives	M521	
	To know that it is not possible to take the square root of a negative number.	M135	
	Use prime factors to find the HCF and LCM of two numbers.	M365	
	To understand that all natural numbers can be written as a product of prime factors.	M365	
	To find different factors of a number from prime factors.	M365	

ABOVE AND BEYOND

Multiply and divide by decimals
Answer calculations involving powers and roots
Use estimation
Calculate HCF and LCM using prime factor tree's
Identify common factors, the highest common factor and the lowest common multiple
Use the priority of operations, including powers
Use index form for powers
Do mental calculations with squares and square roots

VOCABULARY

Integer
Number
Negative
Decimal
Addition
Subtraction
Multiplication
Division
Remainder
Operation
Estimate
Power
Roots
Factor
Multiple
(etymology)
Primes
Square
Cube

Assessment

Unit 1 MAP followed by Acceleration

WHERE NEXT?

BIDMAS will run throughout all maths activities.
Understanding inverse operations will be required for the algebra unit both in solving and rearranging equations.
Handling negative numbers will be required in ALL future work.

Year 8: Area, Perimeter and Volume: Journey of Knowledge

Context and Introduction to Unit
In this unit pupils will learn about how to calculate the area and perimeter of a given shapes (stating the correct units). Pupils will make links to work completed on 2-D shapes and how this relates to 3-D shapes in terms of finding the surface area and volume.

Prior knowledge (KS2 NC)
Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres. Calculate and compare the area of rectangles (including squares). Estimate volume (for example, using blocks to build cuboids (including cubes)). Recognise that shapes with the same areas can have different perimeters and vice versa. Recognise when it is possible to use formulae for area and volume of shapes. Calculate the area of parallelograms and triangles.

The bigger picture:

Career links – Builder, Architect, Interior Designer

Mathematician – Archimedes.

CORE KNOWLEDGE

Descriptor	Year 8 Core Knowledge	SPARX	✓
- Developing +	To derive and use the formula for area of a triangle and find missing lengths.	M291	
	To derive and use the formula for area of a parallelogram and find missing lengths.	M610	
	To find the volume of cubes and cuboids.	M765, M534	
	To find the surface area of cubes and cuboids.		
	Draw accurate plans and elevations from a 3D solid.	M229	
	Draw accurate 3D shapes on isometric paper from plans and elevations.	M229	
- Securing +	To derive and use the formula of a trapezium and find missing lengths.	M705	
	To find the area of compound shapes and solve problems.	M996	
	To solve problems using the volume and surface area of cubes and cuboids including compound shapes	M765, M534	
	Finding missing lengths using the volume and surface area of a cube and cuboid	M765, M534	
	Convert between metric measures in everyday contexts. Including litres to cm^3	M772, M530, M761	
	To convert between metric and imperial units.	M772, M530, M761	
- Mastering +	To use area and volume formula when lengths are given as algebraic expressions.	N/A	
	To solve area and volume problems when lengths are given in different units.	N/A	
	To be able equate volumes and surface area of cubes and surface area to solve problems.	N/A	
	To be able to convert units of area and volume.	M728, M465	

ABOVE AND BEYOND

Perimeter and area of compound shapes
Find missing side lengths from given perimeter or area
Write expressions for perimeter and area
Convert between different units for surface area and volume

VOCABULARY

Triangle
Rectangle
Area
Perimeter (etymology)
Formula
Length
Width
Prism
Compound
Measurement
Cuboid
Volume
Vertices
Edge
Face
Units
Conversion (etymology)

Assessment

Unit 2 MAP followed by Acceleration

WHERE NEXT?

The basic shape knowledge will be built on as we learn about Cones, Cylinders and Spheres
Properties of the shapes learned in Year 8 will also apply to the topic of Similar Shapes

Year 8 – Statistics, Graphs and Charts: Journey of Knowledge

Context and Introduction to Unit
In this unit pupils will learn about the different ways to present statistical data. They will start by looking at how to calculate averages and range from a list and then move on to calculating these averages from a table. They will look closely at how to present the data in a variety of ways including as a table and pie chart.

Prior knowledge (KS2 NC)
Pupils both encounter and draw graphs relating two variables, arising from their own enquiry and in other subjects. Pupils know when it is appropriate to find the mean of a data set.

The bigger picture:

Career link:
Sports coach/analyst

Mathematicians – Euclid.

CORE KNOWLEDGE

Descriptor	Year 8 Core Knowledge	SPARX	✓
- Developing +	Interpret and draw simple pie charts based on known fractions.	M574, M165	
	Understand that pie charts do not display numbers but proportion.	M574, M165	
	To use grouped frequency tables, find the modal class and estimate the range.	M945	
	Find the averages from a frequency table.	M127	
	To draw and interpret a simple stem and leaf diagrams	M648, M210	
	Interpret charts and graphs.	N/A	
- Securing +	To interpret and draw pie charts when angles need to be calculated.	M574, M165	
	To calculate the estimated mean from a grouped frequency table.	M287	
	To draw two-way tables to represent data	M899	
	To find the mode and median from a stem and leaf diagram.	M210	
	To draw and interpret a stem and leaf diagram involving decimals and larger values.	M648, M210	
	To describe correlation and the relationship between two variables.	M769, M596	
	To draw a line of best fit and use it to predict an outcome.	M769, M596	
	Compare two sets of data by using a chart or graph.	M769, M596	
- Mastering +	Use pie charts to solve problems involving ratio and percentages.	M574, M165	
	Find the mean from a steam and leaf diagram.	M648, M210	
	Extend to back to back stem and leaf diagrams.	M648, M210	
	To understand anomalies and outliers and what may cause them.	M769, M596	

ABOVE AND BEYOND

Read and interpret information from a pie chart

Calculate the mean from a grouped frequency table

VOCABULARY

Range (etymology)
Median (etymology)
Mean
Mode
Frequency
Correlation
Data
Stem and leaf
Table
Chart
Protractor

Assessment

Unit 3 MAP followed by Acceleration

WHERE NEXT?

Year 9 – Applying Stem and Leaf knowledge to Back to Back Stem and Leaf diagrams.

KS4 – Calculating the mean from a grouped frequency table and linking averages more to the context of the question that they have been given the data for.

Year 8 - Expressions, Functions and Formulae: Journey of Knowledge

Context and Introduction to Unit
In this unit pupils will learn about the differences between expressions and formulae. They will look closely at expressions and how to simplify then and then this will then lead in to the pupils being able to write an example of an expression and formula or use them to substitute in to.

Prior knowledge (KS2 NC)
Pupils should be introduced to the use of symbols and letters to represent variables and unknowns in mathematical situations that they already understand, such as: missing numbers, lengths, coordinates and angles, formulae in mathematics and science, equivalent expressions (for example, a + b = b + a).

The bigger picture:

Career link – Computer programmer

Mathematician: Leonhard Euler

CORE KNOWLEDGE

Descriptor	Year 8 Core Knowledge	SPARX	✓
- Developing +	To write in index form to be able to multiply and divide algebraic expressions.	M608	
	To expand a single bracket.	M237	
	To factorise expressions by taking out a number as a HCF	M100	
	To use function machines to solve one and two step equations.	M707, M509	
- Securing +	To multiply a bracket by an algebraic expression.	M237	
	To expand and simplify two brackets.	M792	
	To factorise an expression by taking out variables and numbers as HCFs	M100	
	To solving two step equations by balancing.	M707, M509	
	Solve problems by forming an equation and solving.	M957	
- Mastering +	To relate expanding a bracket to area	M237	
	To find missing lengths in area problems by factorising	M100	

ABOVE AND BEYOND

Expanding brackets (single and double)

Factorising expressions by finding the HCF

VOCABULARY

Expression
Formula
Substitute (etymology)
Term
Simplify
Collect
Function machine
Input
Output

Assessment

Unit 4 MAP followed by Acceleration

WHERE NEXT?

Year 9 – Rearranging and solving more complex equations will continue where this unit has begun.

KS4 – Knowing the difference between equations, formulae and expressions then forming/solving.

Real Life Graphs

Context and Introduction to Unit
In this unit pupils will learn about Real-Life Graphs. Pupils will learn the value of Real life graphs and how can relate to real life. They will learn to use conversion graphs, distance/time graphs, line graphs, real life graphs and curved graphs, giving the pupils a deep knowledge of these.

Prior knowledge (KS2)
Pupils at KS2 should learn how to draw and use a Line Graph. They should be able to interpret the graph to help with solving problems around this

The bigger picture:

Career – Traffic Control Officer

Mathematician: Sir Isaac Newton

CORE KNOWLEDGE

Descriptor	Topic	SPARX	✓
- Developing +	Plot conversion graphs from a table of values and use the graph to convert values which can be read directly from the graph.	M843, M771	
	To interpret a simple distance-time graph.	M581	
	Plot a simple distance-time graph from descriptive text.	M551	
	Draw and interpret line graphs and identify trends.	M771	
- Securing +	Use conversion graphs to convert values which can not be read directly from the graph and solve problems.	M771	
	Understand why some real life graphs go through (0,0) and some do not.	N/A	
	To draw and use distance-time graphs to solve problems including finding speed	M581, M551, M247, M221	
	Draw and interpret curved graphs from a range of sources.	M771	
- Mastering +	Be able to describe what the gradient of a real life graph means.	M205	
	To work with different units on a distance time graph	M247	
	Understand average speed	U151	
	Understand why a curve graph may reflect the data better.	U896	
	Understand the difference between interpolation and extrapolation.	M596	
	Understand seasonal variation and rate of change to predict trends.	M183	

ABOVE AND BEYOND

Pupils to create own real life graph based on journey to school

VOCABULARY

Real – Life
Conversion
Distance
Line Graph
Curved graph
Axis

Unit 5 MAP followed by Acceleration

WHERE NEXT?

Y8 Unit 9 – Straight line graphs.
Understanding how to substitute into an equation of a line.
Recognising Y = Mx + C.

KS4 - Real Life Graphs for speed distance and time.
Using conversion graphs for metric to imperial measures and for currencies.

Next Unit: Decimal and Ratio

Decimals and Ratio: Journey of Knowledge

Context and Introduction to Unit
Students learn about writing ratios in their simplest form using the highest common factor. As learning progresses students work with ratios involving time, metric units and currency notation and develop their proportional reasoning and link to fractions. Students learn how to divide a quantity into two or more parts when given a ratio.
Prior knowledge Work interchangeably with terminating decimals and their corresponding fractions.
Define percentage as 'number of parts per hundred', interpret percentages and percentage changes as a fraction or a decimal
Interpret fractions and percentages as operators

The bigger picture:

Career links – Chef

Gordon Ramsey

CORE KNOWLEDGE

Descriptor	Topic	SPARX	✓
- Developing +	Order decimals of any size including positive and negative decimals	M522	
	Round to a given number of decimal places	M264	
	Add and subtract with decimals.	M429, M152	
- Securing +	Round to a given number of significant figures	M994, M131	
	Multiply and divide by 0.1 and 0.01.	M803, M262	
	Multiply and divide by decimals	M803, M262	
	Solve problems involving decimals using all four operations	M803, M262	
	Solve ratio and proportion questions involving decimals.	M525, M801	
- Mastering +	Round to an appropriate degree of accuracy when given a question and understand the impact rounding has on accuracy	N/A	
	Deepen concepts of ratio and proportion using real life contexts and previous multiplicative concepts	M525, M801	
	Use unit ratio's to make comparisons.	M543	

ABOVE AND BEYOND
Understand the multiplicative nature of ratio

VOCABULARY
Decimal
Fraction
Percentage (etymology)
Rounding
Decimal place
Ordering
Terminating
Convert
Equivalent

Ratio
Part
Simplify
Equivalent
Convert
Scale
Proportion
Exchange rate

Assessment

Unit6 MAP followed by Acceleration

WHERE NEXT?

KS4 – Similar shapes looking at the ratio between area and volume and the scale factors that link them.

Comparing ratios in terms of algebra.

Lines and Angles: Journey of Knowledge

Context and Introduction to Unit

students work with protractors and rulers and are introduced to a range of angle properties including angles on a straight line, in a triangle and a quadrilateral. They will apply these facts to solve problems.

Prior knowledge know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles
identify: angles at a point and one whole turn total 360°
angles at a point on a straight line total 180°
other multiples of 90°
recognise angles where they meet at a point, are on a straight line, or are vertically opposite

The bigger picture:

Career links – Architect

Mathematician: Tony DeRose

CORE KNOWLEDGE

Topic	SPARX	✓
Know angle facts for special triangles and quadrilaterals	M351, M679	
To use triangle to find the angle sum of any regular polygon	M653	
Identify alternate and corresponding angles.	M606	
To find the interior and exterior angle of any regular polygon	M653	
To solve multi-step problems involving angles on parallel lines.	M319	
Use all angle facts, including parallel line and regular polygons to solve geometric problems.	M319	
Solve complex algebraic problems using angle facts to construct equations.	N/A	
Extend knowledge of regular polygons to find the number of sides.	M653	
Solve missing angle problems involving more than one polygon	N/A	

ABOVE AND BEYOND

Explore the relationship between exterior and interior angles

VOCABULARY

Quadrilateral
Polygon
Regular Polygon
Irregular Polygon
Isosceles
Scalene
Equilateral
Vertically opposite

Assessment

Unit 7 MAP followed by Acceleration

WHERE NEXT?

Angles and shape

Make accurate constructions of angle bisectors, perpendicular bisectors using drawing equipment
Construct accurate triangles
Construct accurate nets of solids involving triangles

Identify and problem solve Angles on Parallel Lines

Year 8 – Calculating with Fractions: Journey of Knowledge

Context and Introduction to Unit
In working with fractions students learn how to compare fractions and mixed numbers with different denominators using equivalences. They progress on from this by adding and subtracting fractions using visual and written methods. Students learn how to use place value and equivalent fractions to convert between fractions, decimals and percentage using calculator and non-calculator methods and perform operations on them.

Prior knowledge (KS2 NC)
Pupils should be introduced to the use of appropriate visual models to represent fractions as a proportion of a whole, to have an understanding of the link between fractions, decimals and percentages.

The bigger picture:

Career link – Nursing

Mathematician: Katherine Johnson

CORE KNOWLEDGE

Topic	SPARX	✓
To add and subtract fractions with the same denominator	M835	
To multiply fractions	M157	
To use equivalent fractions to compare and order fractions	M335	
To convert between improper fractions and mixed numbers	M601	
To add, subtract, multiply and divide fractions with different denominators	M835, M157, M110	
To solve BIDMAS problems involving fractions	M521	
To use the four operations with mixed numbers.	M931, M197,M265	
To solve BIDMAS problems involving negative fractions	M521	
To use a variety of strategies to work with mixed numbers efficiently	M931, M197,M265	

ABOVE AND BEYOND

Working with fractions and percentages that are >1

Choose appropriate strategies to solve multistep problems involving FDP

VOCABULARY

Fraction
Integer
Simplify
Ascending Order
Descending Order
Equivalent
Mixed number
Improper fraction

Assessment

Unit 8 MAP followed by Acceleration

WHERE NEXT?

Multiplying and dividing fractions with algebra

KS 4:
Algebraic fractions
Ratio as fractions