Year 7 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: Rachel Riley – countdown.

CORE KNOWLEDGE

Descriptor	Topic	SPARX	✓
- Emerging +	Recall and use multiplication tables to 12 x 12 and associated division facts	M462	
	Understand negative numbers in context	N/A	
	Order postitive and negative numbers	M704, M527	
	Round whole numbers to the nearest 10, 100 and 1000	M111	
	Multiply and divide by 10, 100 and 1000	M113	
	Use a written method to multiply 4 digit by 1 or 2 digit numbers	M187	
	Use a written method to divide up to 4 digit by 1 or 2 digits	M354	
	Solve problems using the four operations	M928, M374, M187, M354	
	Find multiples and factors of numbers	M823	
- Developing +	Find common factors and multiples	M698, M227	
	Recognise prime numbers up to 20	M322	
	Recognise square numbers up to 100 and use a calculator to find squares and square roots	M135	
	Multiple and divide by multiples of 10, 100 and 1000	M113	
	Use the priority of operations	M521	
	Use inverse operations and estimation to check calculations	N/A	
	Solve problems involving money	M429, M152	
	Round money to the nearest pound or penny	M431	
	Solve problems involving time	N/A	
	Interpret a calculator display for time and money	N/A	
	Add and subtract negative numbers	M106	
- Securing +	Recognise prime numbers up to 100	M322	
	Recognise square numbers and roots up to 225	M135	
	Write numbers in index form	M135	
	Use priority of operations using indices	M521	
	Understand what a remainder means in division	M354	
	Find the LCM and HCF of any two numbers	M288	
	Multiply and divide negative numbers	M698, M227	
	Use negative numbers in relation to money and bank statements	M106	

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

Assessment
UNIT 2 MAP and acceleration

WHERE NEXT?

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

Transformations: Journey of Knowledge

Context and Introduction to Unit
In this unit pupils will learn what transformation means in a variety of different contexts. The main focus will be on reflection, rotation and translation.

Prior knowledge (KS2 NC)
Pupils draw and label a pair of axes in all four quadrants with equal scaling. This extends their knowledge of one quadrant to all four quadrants, including the use of negative numbers. Pupils draw and label rectangles (including squares), parallelograms and rhombuses, specified by coordinates in the four quadrants, predicting missing coordinates using the properties of shapes.

The bigger picture:

Career link – Graphic designer

Mathematician: Chip Kidd

CORE KNOWLEDGE

Descriptor	Topic	SPARX	✓
- Emerging +	Identify congruent shapes.	M124	
	Recognise line symmetry in 2D shapes.	M523	
	Recognise and carry out reflections in a mirror line.	M290	
	Translate 2D shapes.	M139	
- Developing +	Enlarge shapes using given scale factors. Work out the scale factor given an object and its image.	M178	
	Recognise rotational symmetry in 2D shapes.	M523	
	Identify reflection symmetry in 3D shapes.	M290	
	Understand the relationship between rotational and line symmetry in regular polygons.	M523	
	Reflect a shape on a coordinate grid.	M290	
	Find the mirror line for a reflection on a coordinate grid.	M290	
	Describe and carry out rotations on a coordinate grid.	M910	
	Transform 2D shapes by combinations of rotations, reflections and translations.	M139, M290, M910, M178	
- Securing +	Understand how ratio and enlargement relate to each other (including side lengths and perimeter and area).	M178	
	Know that in enlargements, angles in shapes remain unchanged.	M178	
	Understand the symmetries of 3D solids and the shapes of their planes of symmetry.	M523	
	Describe a reflection on a coordinate grid using correct equations.	M139, M290, M910, M178	
	Know that in translation, rotation, reflection the image is congruent to the object.	M124	
	Understand that combined transformations can be equivalent to a single transformation.	M178	
	Identify patterns/rules in coordinates of vertices when a shape is reflected in different straight lines on a coordinate grid	N/A	
	Identify patterns/rules in coordinates of vertices when a shape is rotated by different angles and in different directions on a coordinate grid.	N/A	

ABOVE AND BEYOND

Enlarging a shape using a scale factor.
Enlarging a shape using a fractional or negative scale factor.

VOCABULARY
Vector (etymology)
Transformation
Translation
Rotation/Rotate
Reflection/Reflect
Mirror line
Centre
Angle
Direction
Coordinate (etymology)
Describe

Assessment

Unit 10 MAP followed by Acceleration

WHERE NEXT?

KS4 – Transformations focusing more on combining transformations and enlargement.

Year 7 – Analysing and displaying data: 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 complete a frequency table and tally chart and then move on to calculating averages from a set of data. They will look closely at how to calculate each average and what each one represents.
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

Mathematician: Florence Nightingale – Pie Charts

CORE KNOWLEDGE

Descriptor	Topic	SPARX	✓
Emerging +	Read and draw bar charts	M460, M738	
	Read and draw pictograms	M644	
	Read and draw a line graph	M140, M183	
	Read and interpret information from tables	M899	
	Find the mode and range from a set of data	M841, M328	
Developing	Draw and read dual bar charts	M460, M738	
	Draw and read compound bar charts	M460, M738	
	Find the range and mode from tables, charts and graphs	M127	
	Construct a grouped frequency table	M945	
	Find the mode, mean, median and range from a list of data	M934, M940	
Securing +	Find the range and mode from tables, charts and graphs	M127	
	Find the mode, mean, median and range from a list of data including decimals and negatives	M841, M940,	
	Compare data using the range and an average		
	Choose the most appropriate average	M440	
	Find the mean from a discrete frequency table	M127	

ABOVE AND BEYOND

Calculate averages from a frequency table

Choose the best way to represent given data

Understand what the different averages represent and which is most appropriate for a context

VOCABULARY

Range
Median
Mean
Mode
Frequency
Data
Table
Chart
Average
Tally

Assessment

Unit 1 MAP followed by Acceleration

WHERE NEXT?

KS3 – Calculating averages from a frequency table.

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 7 - Expressions, Functions and Formulae:
Journey of Knowledge

The bigger picture:

Career link – Computer programmer
Mathematician – Ada Lovelace (programmer) crypto currency.

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).

CORE KNOWLEDGE

Topic	SPARX	✓
Write a simple formula in words	M813, M830	
Substitute positive numbers into simple formula written in words	M979	
Find the output of a simple function machine written in symbols and words	N/A	
Use letters to represent unknowns	M813	
Write expressions to describe simple functions	M813, M830	
Write expressions from word problems using all four rules	M813, M830	
Use the priority of operations	N/A	
Substitute positive numbers into simple expressions	M208	
Simplify expressions by collecting like terms	M795, M531	
Multiply and divide terms	M813, M568	
Substitute positive and negative numbers into more complex expressions	M208, M979	
Find the input given the output of a function machine using inverse operations	N/A	
Understand the terminology variable and function	M830	
Expand a single bracket	M237	
Factorise a single bracket	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 3 MAP

WHERE NEXT?

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

Year 7 – Decimals and Measures– Journey of Knowledge

Context and Introduction to Unit
In this unit pupils will learn about decimals. They will be able to line up decimals to be able to add and subtract correctly. Pupils will be able to round to various decimals places. Being able to multiply and divide with decimals

Prior knowledge (KS2)
Read, write and order decimals, Rounding numbers up to 3 decimal places, finding equivalences between fraction, decimals and percentages. Multiply one digit by numbers with 1 or 2 decimals places. Being able to write answers up to 2 decimal places.

The bigger picture:

Career – Bank Manager

Mathematician – Gabriel Mouton (modern version of SI units)

CORE KNOWLEDGE

Descriptor	Topic	SPARX	✓
- Emerging +	Work out the perimeter of squares, rectangles, regular polygons and shapes made from rectangles.	M920, M635, M690	
	Find area of regular shapes by counting squares.	M900	
	Find areas of irregular shapes by counting squares.	M900	
	To be able to tell the time from an analogue clock	N/A	
	Understand 12 and 24 hour time	M515, M627	
	Multiply and divide whole numbers and decimals by 10, 100 and 1000	M113	
	Choose suitable units to estimate length.	M487	
	Measure and draw lines to the nearest mm	N/A	
- Developing +	Find the area of squares, rectangles and shapes made up of rectangles.	M390, M269	
	Write decimals in order of size.	M522	
	Round decimals to the nearest whole number.	M431	
	Round decimals to 1dp. Use rounding to estimate calculations.	M431	
	Add and subtract decimals.	M429, M152	
	Multiply and divide whole numbers and decimals by 10, 100 and 1000.	M113	
	Convert between adjacent metric units of length, mass and capacity.	M772, M530, M761	
	Compare measurements by converting into the same unit. Solve problems involving metric units.	M772	
	Read scales and use scale diagrams.	M112	
- Securing +	Understand that all metric measures are multiples and divisors of a base unit. Investigate the relationships between non-adjacent units.	M772, M530, M761	
	Understand how to make choices about which unit to convert measures	M772, M530,	
	Understand how different scales enable different levels of accuracy.	M772, M530, M761	
	Understand where to position a decimal point by considering equivalent calculations.	M911	
	Understand which numbers to round when estimating a calculation and what effect it will have on the answer.	M878	
	Use metric and imperial units.	M772	
	Multiply and divide decimals by a single digit whole number.	M803, M262	
	Check an answer by considering the order of magnitude.	N/A	

ABOVE AND BEYOND
Working with percentages
Multiply decimals mentally
Check a result by considering whether it is of the right order of magnitude
Understand where to position the decimal point by considering equivalent calculations

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

Assessment tasks

Unit 4 MAP

WHERE NEXT?

Next unit - Fractions

Year 7 - 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 (Film - Hidden Figures)

CORE KNOWLEDGE

Descriptor	Topic	SPARX	✓
- Emerging +	Use fraction notation to describe parts of a shape.	M158	
	Compare simple fractions with the same denominator or numerator	M335	
	Write one value as a fraction of another.	M939	
	Add and subtract fractions with the same denominator.	M835	
	Find simple fractions of an amount.	M695, M684	
	Use a diagram to compare two fractions.	M335	
	Work with simple equivalent fractions	M410	
- Developing +	Use equivalent fractions to compare and order fractions.	M335	
	Simplify fractions using a common factor.	M671	
	Add and subtract fractions with different denominators	M835	
	Find fractions of an amount.	M695, M684	
	Work with simple equivalent fractions and decimals.	M958	
	Understand percentage as 'parts per 100'.	M476	
	Convert a percentage to a fraction or decimal.	M264	
	Calculate simple percentages of amounts.	M437	
- Securing +	Calculate more difficult percentages of amounts.	M437, M905	
	Calculate one value as percentage of another.	M264	
	Work with equivalent fractions, decimals and percentages.	M264	
	Working with fractions and percentages that are >1	N/A	
	Understand when it is easier to compare proportions when using fractions, decimals or percentages	M264	
	Use inverse operations with fractions.	U881	
	Understand that all 1, 2 and 3 place decimals are also fractions.	M958	

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 5 MAP

WHERE NEXT?

Year 7 - In the following probability unit. Fractions are used to express the likelihood of an outcome.
Yr 8 – multiplying and dividing fractions.
Calculating with percentages.

Probability: Journey of Knowledge

Context and Introduction to Unit
In this unit pupils will learn about the term probability and why it is used. Students learn how to write a probability as a simplified fraction. As learning progresses they use equivalent fractions to compare probabilities and predict outcomes by finding a fraction of an amount.
Prior knowledge (KS2 NC) Pupils do not study probability at KS2 however they do study calculating fractions and decimals which is needed to calculate probabilities.
Compare and order fractions, including fractions > 1
Use common factors to simplify fractions; use common multiples to express fractions in the same denomination
Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions

The bigger picture:

Career links – Computer Game Designer
Mathematicians – Gerolamo Cardano
(Italian – probability of gaming)

CORE KNOWLEDGE

Descriptor	Topic	SPARX	✓
- Emerging +	Use the language of probability and use the probability scales with words	M655	
- Developing +	Understand that the probability scale is 0 – 1	M655	
	Calculate simple probabilities	M941	
	Understand that any probability is a measure of what may happen not what will happen.	M755	
	Record data and calculate experimental probability.	M332	
- Securing +	Calculate the probability of an event not happening	M755	
	Apply experimental probability in simple situations and make conclusions based on the result.	M332	
	Understand that experimental probability is and estimation and that the more trials you complete the better the estimation.	M332	
	Calculate the number of expected outcomes given the probability.	M206	

ABOVE AND BEYOND

VOCABULARY
Probability
Outcome
Impossible
Certain
Even chance
Expectation
frequency
Experimental data
Estimate
Theoretical
Expected Outcomes

Assessment
Unit 6 MAP

WHERE NEXT?
Year 8 – Statistics, Graphs and Charts
Representations of data will potentially require an understanding of the vocabulary and the use of probability information.

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

Mathematician: Malala Yousafzai (Nobel peace prize winner)

CORE KNOWLEDGE

Descriptor	Topic	SPARX	✓
- Emerging +	Use fractions to describe proportions	M267, M801	
	Use ratio notation	M885	
- Developing +	Reduce a two-part ratio to its simplest form	M885	
	Find equivalent ratio.	M885	
	Divide a quantity into two parts in a given ratio	M525	
	Use percentages to describe and compare simple proportions.	M267	
	Use and solve simple problems involving direct proportion using scaling.	M267	
	Understand and use the relationship between fractions, ratio and proportion.	M478	
- Securing +	Reduce a three-part ratio into its simplest form.	M885	
	Solve word problems involving ratio.	M801	
	Use ratio with measures.	M112	
	Use the unitary method to solve simple problems in direct proportion.	M478	
	Understand when it is most efficient to use scaling or the unitary method.	M885, M267, M478	
	Understand direct proportion as a rate of change in simple terms.	M885, M267	

ABOVE AND BEYOND
Understand the multiplicative nature of ratio

VOCABULARY
Ratio
Part
Simplify
Equivalent
Convert
Scale
Proportion
Exchange rate

Assessment
Unit 7 MAP

WHERE NEXT?
Year 8 – Decimals and ratio
Exploring more possibilities with ratio notation and calculations.

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: Maryam Mirzakhani – Fields medal winner

CORE KNOWLEDGE

Descriptor	Topic	SPARX	✓
- Emerging +	Name and label lines, angles and triangles.	M502, M814, M276	
	Accurately draw lines	M814	
	Recognise acute, obtuse and reflex angles.	M502	
	Estimate the size of angles	M541	
	Use a protractor to measure and draw acute angles.	M780, M331	
- Developing +	Use a protractor to measure and draw any angle.	M780, M331	
	Use the rules for angles on a straight line, angles around a point and vertically opposite angles.	M818, M163	
	Classify triangles	M276	
	Work out the size of unknown angles in triangles.	M351	
	Identify and name types of quadrilaterals.	M276	
	Solve angle problems involving quadrilaterals.	M679	
	Use a ruler and protractor to draw triangles.	M565	
- Securing +	Calculate interior and exterior angles.	M818, M351	
	Use angles in triangles to solve problems involving other shapes made up of triangles.	M351	
	Use angles in quadrilaterals to solve problems involving other shapes made up of quadrilaterals.	M679	
	Understand that you can draw more than one triangle with the same angles and different side lengths	M565	
	Given one side and two angles, understand that you can only draw one triangle	M565	
	Classify triangles more accurately using more than one name eg. right angled isosceles.	M276	

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 8 MAP

WHERE NEXT?
Year 8 – lines and angles
More properties using angles will be explored. Reliance on key knowledge from this Year 7 Unit to find missing angles in more complex geometry.

Sequences and Graphs

Context and Introduction to Unit
In this unit pupils will learn about Sequences and Graphs. How to work with sequences patterns and pupils will learn how to generate and continue a sequences, using and find the nth term.
Pupils will also learn about straight line graphs and how to draw a graph from a given set of coordinates.

Prior knowledge (KS2)
Generate and Describe linear sequences
Find missing coordinates
Talk about number patterns

The bigger picture:

Career – Animator

Mathematicians – Leonardo Bonacci (Pisa) - Fibonacci Sequence

CORE KNOWLEDGE

Descriptor	Topic	SPARX	✓
- Emerging •	Recognise an arithmetic sequence.	M241	
	Use the term-to-term rule to work out terms in an arithmetic	M381	
	Describe how a pattern sequence grows.	M241	
	Read and plot coordinates in the first quadrant	M618	
- Developing •	Recognise a geometric sequence.	N/A	
	Generate terms of a sequence using a position-to-term rule.	M991	
	Write and use number sequences to model real-life problems.	N/A	
	Continue and describe special sequences.	M981	
	Read and plot coordinates in all 4 quadrants.	M618	
	Find the midpoint of a line segment.	M622	
	Recognise, name and plot straight line graphs parallel to the x- or y-	M797	
	Recognise, name and plot the graph of y = x and y = −x.	N/A	
	Plot straight line graphs using a table of values.	M932	
- Securing •	Understand that the first pattern gives the first term, and what is added each time is the term to term rule	N/A	
	Understand that when you plot an arithmetic sequence, it will always give a straight line.	N/A	
	Write and use number sequences to model real-life problems.	N/A	
	Generate and plot coordinates from a rule.	M932	
	Know and understand that the midpoint is (mean of x coordinates, mean of y coordinates), just as midpoint of two numbers is the mean of the two numbers.	M622	
	Understand that the equation of a straight line is a function that generates a y value for every x value, and when you input x = 1, 2, 3, (consecutive terms) into the function, the y values form an arithmetic sequence.	M932	

ABOVE AND BEYOND
Geometric Sequences

Midpoint of a line segment, using coordinates of these points

Graphs of y=x and y=-x

Y=mx+c

VOCABULARY
Generate
Nth term
Sequence (etymology)
Linear
Straight line
Position to term
Term to term
Coordinates
Pattern
Segments
Horizontal
Vertical

Assessment tasks
Unit 9 MAP

WHERE NEXT?
Leads onto Transformations

Translation - links co-ordinate information with vector information to find a new location for a shape.
Rotation – A centre of rotation is given as a co-ordinate (x,y).
Enlargement – A centre of enlargement is given as a co-ordinate (x, y).
Reflection – A mirror line is given as an equation of a line.