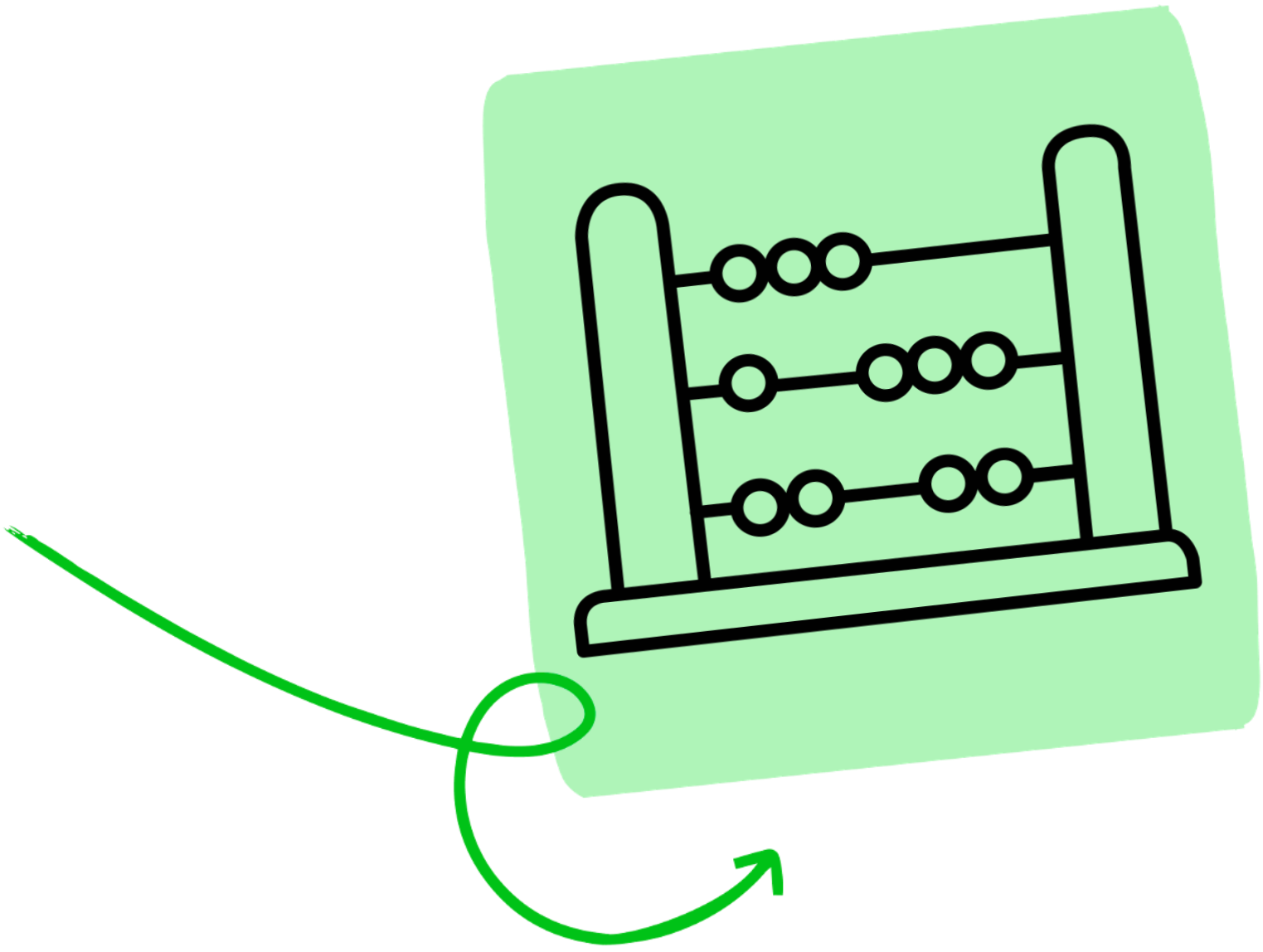
Oak National Academy

# KS1 Maths curriculum plan



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# Our curriculum

All of our curricula share the same set of principles that guide our curriculum design to ensure our curricula are high-quality. They are:

## Knowledge and vocabulary rich

Lessons and units are knowledge and vocabulary rich. Pupils will build on what they already know to develop deep knowledge and apply this knowledge in the form of skills.

## Sequenced and coherent

Careful sequencing and attention to building coherence via vertical threads so that pupils build on prior knowledge and make meaningful connections.

## Flexible

Our flexible curriculum enables schools to tailor our content to their curriculum and context.

## Accessible

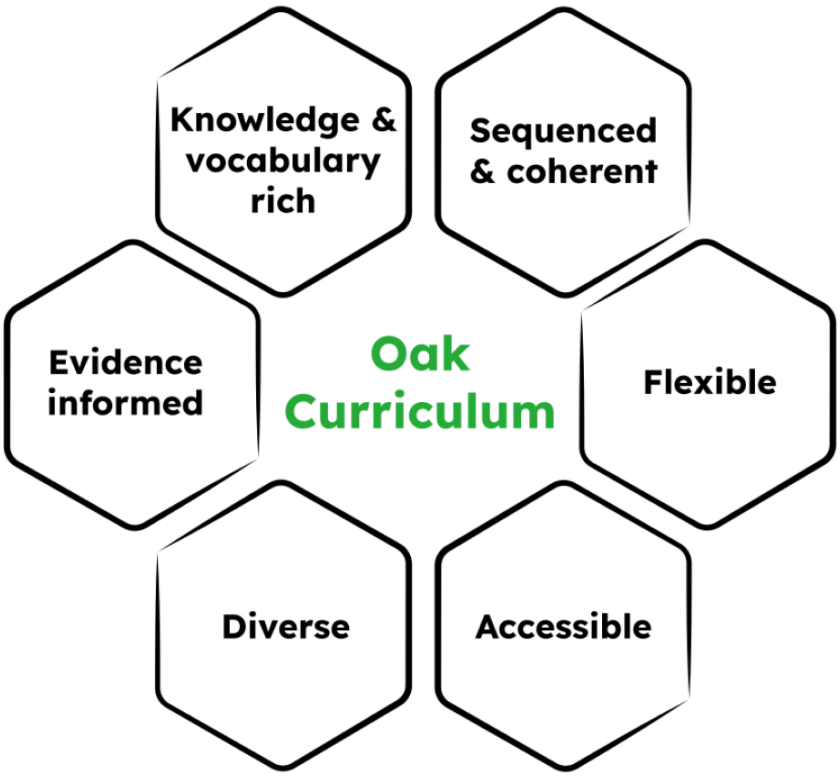
Creating an accessible curriculum that addresses the needs of all pupils and meets accessibility guidelines and requirements.

## Diverse

We prioritise creating a diverse curriculum by committing to diversity in teaching and teachers, and the language, texts and media we use, so all pupils feel positively represented.

## Evidence-informed

We take an evidence-informed approach applying the science of learning and subject-specific research.



# Threads

## What are threads?

We use threads to signpost groups of units that link to one another, that together build a common body of knowledge over time. We use the term thread, rather than vertical concepts, themes or big ideas, because it helps us bring to mind the visual concept of a thread weaving through the curriculum.

## How to use threads

1. Familiarise yourself with all of the threads relating to the subject
2. Identify the unit you will be delivering
3. Review the threads associated with the unit
4. Audit where pupils have and will learn about these threads in your existing curriculum sequence.
5. Ensure you understand how the thread relating to your new unit has been framed in prior and future units
6. Review how the thread works within the unit you will be delivering
7. Teach and iterate your framing of the thread within the unit and across your curriculum sequence

## Threads in subject

- Geometry and Measure
- Number
- Number: Addition and Subtraction
- Number: Fractions
- Number: Multiplication and division
- Number: Place value
- Statistics

# Maths curriculum explainer

## Aims and purpose

### What are the aims and purpose of our curriculum?

This curriculum develops pupils' understanding of mathematics over time so that they become competent and confident in identifying and performing the mathematics they need both at school and in their daily lives. We prepare pupils to become self-assured and resilient mathematicians by developing their ability to select the most suitable tools to solve problems across a range of topics and real-world scenarios.

## Oak curriculum principles

### What overarching curriculum principles inform the design of our curriculum?

#### Knowledge and vocabulary rich

This principle recognises the important role that knowledge, and vocabulary as a particularly important type of knowledge, plays in learning. We identify and map vocabulary across the curriculum, both in terms of the introduction of new vocabulary and the necessary repetition of vocabulary that has gone before. New vocabulary, called keywords, are signalled in bold in our lesson materials to indicate their importance. Our curriculum develops pupils' knowledge and understanding of mathematical concepts over time. For example, understanding of concepts such as 'factor' and 'equation' evolves with increasing complexity as pupils move through the key stages.

#### Sequenced and coherent

A careful and purposeful sequencing of our curriculum content underpins its design, ensuring that pupils are able to build on and make links with existing knowledge. At its simplest this means ensuring, for example, that pupils learn about the square and square root functions before meeting Pythagoras' Theorem. Attention is paid to vertical coherence in the curriculum through the strategic mapping of mathematical concepts across the curriculum, allowing for their incremental development over time. Curriculum content is intentionally revisited, for example, a lesson on right-angled trigonometry may retrieve construction or circle theorem content, or a lesson on ratios will use familiar models and tools to explicitly link to prior learning.

#### Evidence-informed

Our evidence-informed approach enables the rigorous application of research outcomes, science of learning and impactful best practice both in education in general and at a subject specific level. For example, the design of our resources reflects findings from Sweller's cognitive load theory and Mayer's principles of multimedia learning whilst our lesson design draws on Rosenshine's principles of instruction. We also draw on findings from research organisations such as the Education Endowment Foundation (EEF). At the subject level, our primary mathematics curriculum is inspired by the NCETM Curriculum Prioritisation materials to develop mastery of core concepts at an early age.

#### Flexible

Our flexible approach enables schools to use our resources in a way that fits their context and meets the varying needs of teachers and their pupils. Our curriculum can be used in its entirety or units can be selected to complement existing curricula. Our resources are adaptable so that, for example, teachers can change the mathematical model used to teach a

concept to align with their agreed department or school approach or adapt practice tasks to better reflect the prior knowledge of their pupils. At key stage 4 our curriculum aligns with all exam board specifications for GCSE Mathematics.

### Diverse

Our commitment to breadth and diversity in content, language, texts and media can be seen in our choices of real world contexts, mathematics history and application of mathematics plus the use of a group of diverse school age characters. For example, we use real data sets when analysing charts to make discussions and conjectures meaningful and grounded in recognisable places, situations and events.

### Accessible

Our curriculum is intentionally designed to facilitate high-quality teaching as a powerful lever to support pupils with SEND. Aligned with EEF guidance, our resources have a focus on clear explanations, modelling and frequent checks for understanding, with guided and independent practice. Lessons are chunked into learning cycles and redundant images and information are minimised to manage cognitive load. We have removed reference to year groups in our resources so that they can be used when pupils are ready, regardless of their age. Our resources are purposefully created to be accessible, for example by using accessible fonts, colours with good contrast, and captions in our videos. We have used Equatio's equation editor to create digital, accessible written mathematics in our resources.

# Oak subject principles

## What subject specific principles inform the design of our curriculum?

### Pairing procedural knowledge with conceptual understanding.

We introduce concepts and prompts to make pupils think hard about making sense of ideas, while also focusing on efficient procedural methods to ensure calculations can be completed easily and systematically. We often provide visual models to support understanding, then we remove scaffolding as ideas progress and foundation knowledge becomes secure, in order to aid development of mathematical fluency.

### Aligning with the Concrete Pictorial Abstract approach to mathematics teaching and learning.

We incorporate consistent visual models to explain mathematical ideas, and draw upon existing knowledge directly through the models and tools used where underpinning concepts are the same as those taught previously. We make use of pictorial representations of familiar concrete manipulatives such as Dienes blocks, algebra tiles and double sided counters.

### Use an agreed set of models and representations which bridge mathematical concepts.

We have identified and used the smallest set of models and representations that underpin and support the understanding of the greatest number of mathematical concepts. When pupils meet familiar tools and approaches this signals explicit links between implicitly connected elements of mathematics. For example, ratio tables are used to calculate the dimensions of similar shapes, percentage changes, plotting coordinates and equivalent fractions which signposts the links between them. For maximum impact, these models and representations are shared by both our primary and secondary curricula.

**Use of variation theory in practice tasks and modelling.**

Modelling and practice makes use of variation to minimise the risk of pupils drawing incorrect inferences which can cause misconceptions to develop. For example, varying the orientation of shapes in geometry to ensure pupils understand that a horizontal base is not a ‘feature’ of a particular type of shape, or that the ‘base’ of a triangle when calculating the area is not confined to being a horizontal side. We also use minimally different examples in some tasks to draw attention to singular changes and how they affect mathematical models and calculations.

# National curriculum

## How does our curriculum reflect the aims & purpose of the national curriculum?

There are three main aims of the national curriculum for mathematics: fluency, reasoning and problem solving. Our curriculum ensures that all pupils become fluent in the fundamentals of mathematics. For example, small steps when teaching the knowledge and understanding of counting, helps build fluency in simple addition and subtraction. Pupils are supported and encouraged to reason mathematically by justifying decisions when choosing whether something is true or false, providing the answer to a calculation or conjecturing when identifying patterns. Lastly, our curriculum ensures pupils can solve problems through lessons at the end of each unit that apply the knowledge they have learnt to new and sometimes unfamiliar contexts.

# Curriculum delivery

## What teaching time does our curriculum require?

Our curricula for key stages 1-3 are designed for 36 weeks of curriculum time across the school year, leaving time for other activities both within and beyond the curriculum such as assessments or school trips. At key stage 4, year 10 also has approximately 36 weeks of curriculum time, but year 11 has only 24 weeks (around 2 terms) to recognise that schools will not be teaching new content in the run up to the GCSE exams.

Our maths curriculum provides roughly a lesson a day for all key stages and year groups. Our key stage 1 lessons are designed to be taught in approximately 40 minutes, and 50 minutes to an hour in key stages 2, 3 and 4. We understand that exact time dedicated to mathematics can vary greatly between schools due to differences in curriculum planning, resource allocation and school-specific priorities. Therefore we fully expect and encourage teachers to adapt our curriculum and resources to best suit their needs and available curriculum time. This is particularly important where year groups may be streamed either through sets, or in key stage 4 where pupils may be working both between and within the foundation and higher exam routes. For example, a year 10 unit will typically include a few lessons revisiting knowledge taught previously, and end with challenging problem solving activities. A teacher may decide that the unit could be compressed to spend less time on earlier content, or more time developing it.

# Curriculum coherence

## What are 'threads'?

We use threads to signpost groups of units that link to one another, building a common body of knowledge over time. We use the term thread, rather than vertical concepts,

themes, or big ideas, because it helps to bring to mind the visual concept of a thread weaving through the curriculum.

**Primary mathematics threads**

- Number
  - addition and subtraction
  - fractions
  - multiplication and division
  - place value
- Algebra
- Statistics
- Probability
- Ratio and proportion
- Geometry and measure

**Secondary mathematics threads**

- Number
- Algebra
- Statistics
- Probability
- Ratio and proportion
- Geometry and measure

These threads are the distinct domains that appear in the national curriculum programme of study. These domains have been used as threads because in each domain knowledge is built over time, teachers of mathematics are very familiar with them and they are used by examination boards. In primary, much of the curriculum is focussed on developing knowledge and understanding of ‘number’. Therefore this thread has been further broken down into ‘addition and subtraction’, ‘fractions’, ‘multiplication and division’, and ‘place value’. Common threads across our primary and secondary curricula can enable more effective transition, helping pupils to bridge their knowledge and understanding from primary to secondary.

# Recommendations from subject specific reports

## How does our curriculum address and enact recommendations from subject specific reports (e.g. EEF guidance reports & Ofsted Research Review)?

Our curriculum addresses the EEF recommendations from 2018, which found a strong evidence base for the use of manipulatives and visual models to support mathematical ideas. Our slides typically draw upon visual representations of common manipulatives such as the Rekenrek, multilink cubes, and counters, and we promote the use of physical versions of such tools in our teacher tips. We focus on development of both procedural and conceptual mathematics by making sense of concepts whilst developing efficacy through the use of algorithms and practice.

# Subject-specific needs

## How does our curriculum deal with elements that arise from the specific needs of the subject?

**Does the Oak curriculum embrace a mastery approach?**

Our subject principles align to those of a mastery approach. The concrete-pictorial-abstract approach is evident throughout, particularly as concepts are first introduced. Towards key stage 4, abstraction and efficacy are more frequently relied upon, however this is always with the support of strong visual diagrams, tools and small steps to help pupils make sense of the mathematics being used. We carefully build mathematical ideas using real-world situations and recognisable narrative structures. We offer opportunities for pupils to think hard and discuss concepts and problems together or with the teacher. We design activities for younger pupils to explore ideas using manipulatives while also

ensuring they recognise familiar tools used consistently when learning topics underpinned by the same mathematical concept.

**How are calculators introduced and used in the mathematics curriculum?**

We have embedded calculator use throughout the secondary curriculum. It is introduced after the understanding of what is happening is taught, and highlights that the calculator is a useful tool for speeding up lengthy or repeated calculations. We make use of calculator functions such as storing answers and displaying them in different formats to create unique activities that can only be enabled by digital technology.

# Year 1 units

View interactive sequence online

**1**
Counting, recognising and comparing numbers 0 - 10

**2**
Counting to and from 20

**3**
Counting in tens - decade numbers

**4**
Pattern in counting from 20 to 100

**5**
Comparing quantities - part part whole relationships

**6**
Composition of numbers 0 to 5

**7**
Recognise, compose, decompose and manipulate 2D and 3D shapes

**8**
Composition of numbers 6 to 10

**9**
Additive structures: addition

**10**
Additive structures: addition and subtraction

**11**
Addition and subtraction facts within 10

**12**
Composition of numbers 11 to 19

**13**
Numbers 0 to 20 in different contexts

**14**
Unitising and coin recognition - counting in 2s, 5s and 10s

**15**
Unitising and coin recognition - value of a set of coins

| 16 | 17 | 18 |
| --- | --- | --- |
| Solving problems in a range of contexts | Position and direction including fractions of turns | Time - sequencing events and telling the time to the hour and half hour |

# Year 2 units

View interactive sequence online

**1**
Composition of multiples of 10

**2**
Counting and representing the numbers 20 to 99

**3**
Comparing, ordering and partitioning 2-digit numbers

**4**
Secure fluency of addition and subtraction facts within 10

**5**
Calculating within 20

**6**
Adding and subtracting ones and tens to and from 2-digit numbers

**7**
Grouping objects in different ways and relating to multiplication

**8**
Representing counting in 2s, 5s and 10s as the 2, 5 and 10 times tables

**9**
Representing counting in 5s as the 5 times table and link to the 10 times tables

**10**
Multiplying by 2, doubling and halving (factors and products)

**11**
Introduction to division structures

**12**
Shape: discuss and compare 2D and 3D shapes

**13**
Addition and subtraction of two 2-digit numbers

**14**
Money: recognise coins and use £ and p symbols

**15**
Fractions: identify equal parts and be familiar with halves, thirds and quarters

**16**
**Time: write and tell the time to five minutes**

**17**
**Position and direction**

**18**
**Doubling, halving, quotative and partitive division**

**19**
**Sense of measure - capacity, volume and mass**

# Threads in maths

See how to use threads ↑

- Geometry and Measure
- Number
- Number: Addition and Subtraction
- Number: Fractions
- Number: Multiplication and division
- Number: Place value
- Statistics

## Thread, **'Geometry and Measure'**

***Year 1***

- **Unit 5,** 'Comparing quantities - part part whole relationships'
- **Unit 7,** 'Recognise, compose, decompose and manipulate 2D and 3D shapes'
- **Unit 13,** 'Numbers 0 to 20 in different contexts'
- **Unit 14,** 'Unitising and coin recognition - counting in 2s, 5s and 10s'
- **Unit 15,** 'Unitising and coin recognition - value of a set of coins'
- **Unit 16,** 'Solving problems in a range of contexts'
- **Unit 17,** 'Position and direction including fractions of turns'
- **Unit 18,** 'Time - sequencing events and telling the time to the hour and half hour'

***Year 2***

- **Unit 2,** 'Counting and representing the numbers 20 to 99'
- **Unit 12,** 'Shape: discuss and compare 2D and 3D shapes'
- **Unit 14,** 'Money: recognise coins and use £ and p symbols'
- **Unit 15,** 'Fractions: identify equal parts and be familiar with halves, thirds and quarters'
- **Unit 16,** 'Time: write and tell the time to five minutes'
- **Unit 17,** 'Position and direction'
- **Unit 19,** 'Sense of measure - capacity, volume and mass'

## Thread, **'Number'**

***Year 1***

- **Unit 1,** 'Counting, recognising and comparing numbers 0 - 10'
- **Unit 2,** 'Counting to and from 20'
- **Unit 3,** 'Counting in tens - decade numbers'
- **Unit 4,** 'Pattern in counting from 20 to 100'
- **Unit 5,** 'Comparing quantities - part part whole relationships'
- **Unit 6,** 'Composition of numbers 0 to 5'
- **Unit 8,** 'Composition of numbers 6 to 10'
- **Unit 9,** 'Additive structures: addition'
- **Unit 10,** 'Additive structures: addition and subtraction'
- **Unit 11,** 'Addition and subtraction facts within 10'
- **Unit 12,** 'Composition of numbers 11 to 19'
- **Unit 13,** 'Numbers 0 to 20 in different contexts'
- **Unit 14,** 'Unitising and coin recognition - counting in 2s, 5s and 10s'
- **Unit 15,** 'Unitising and coin recognition - value of a set of coins'
- **Unit 16,** 'Solving problems in a range of contexts'

### *Year 2*

- **Unit 1,** 'Composition of  multiples of 10'
- **Unit 2,** 'Counting and representing the numbers 20 to 99'
- **Unit 3,** 'Comparing, ordering and partitioning 2-digit numbers'
- **Unit 4,** 'Secure fluency of addition and subtraction facts within 10'
- **Unit 5,** 'Calculating within 20'
- **Unit 6,** 'Adding and subtracting ones and tens to and from 2-digit numbers'
- **Unit 7,** 'Grouping objects in different ways and relating to multiplication'
- **Unit 8,** 'Representing counting in 2s, 5s and 10s as the 2, 5 and 10 times tables'
- **Unit 9,** 'Representing counting in 5s as the 5 times table and link to the 10 times tables'
- **Unit 10,** 'Multiplying by 2, doubling and halving (factors and products)'
- **Unit 11,** 'Introduction to division structures'
- **Unit 13,** 'Addition and subtraction of two 2-digit numbers'
- **Unit 15,** 'Fractions: identify equal parts and be familiar with halves, thirds and quarters'
- **Unit 18,** 'Doubling, halving, quotative and partitive division'

## Thread, **'Number: Addition and Subtraction'**

### *Year 1*

- **Unit 6,** 'Composition of numbers 0 to 5'
- **Unit 8,** 'Composition of numbers 6 to 10'
- **Unit 9,** 'Additive structures: addition'
- **Unit 10,** 'Additive structures: addition and subtraction'
- **Unit 11,** 'Addition and subtraction facts within 10'
- **Unit 13,** 'Numbers 0 to 20 in different contexts'
- **Unit 15,** 'Unitising and coin recognition - value of a set of coins'
- **Unit 16,** 'Solving problems in a range of contexts'

### *Year 2*

- **Unit 4,** 'Secure fluency of addition and subtraction facts within 10'
- **Unit 5,** 'Calculating within 20'
- **Unit 6,** 'Adding and subtracting ones and tens to and from 2-digit numbers'
- **Unit 13,** 'Addition and subtraction of two 2-digit numbers'
- **Unit 14,** 'Money: recognise coins and use £ and p symbols'
- **Unit 19,** 'Sense of measure - capacity, volume and mass'

## Thread, **'Number: Fractions'**

***Year 1***

- **Unit 16,** 'Solving problems in a range of contexts'
- **Unit 17,** 'Position and direction including fractions of turns'

***Year 2***

- **Unit 10,** 'Multiplying by 2, doubling and halving (factors and products)'
- **Unit 15,** 'Fractions: identify equal parts and be familiar with halves, thirds and quarters'
- **Unit 16,** 'Time: write and tell the time to five minutes'
- **Unit 18,** 'Doubling, halving, quotative and partitive division'

## Thread, **'Number: Multiplication and division'**

***Year 1***

- **Unit 14,** 'Unitising and coin recognition - counting in 2s, 5s and 10s'
- **Unit 16,** 'Solving problems in a range of contexts'

***Year 2***

- **Unit 7,** 'Grouping objects in different ways and relating to multiplication'
- **Unit 8,** 'Representing counting in 2s, 5s and 10s as the 2, 5 and 10 times tables'
- **Unit 9,** 'Representing counting in 5s as the 5 times table and link to the 10 times tables'
- **Unit 11,** 'Introduction to division structures'
- **Unit 18,** 'Doubling, halving, quotative and partitive division'

## Thread, **'Number: Place value'**

***Year 1***

- **Unit 1,** 'Counting, recognising and comparing numbers 0 - 10'
- **Unit 2,** 'Counting to and from 20'
- **Unit 3,** 'Counting in tens - decade numbers'
- **Unit 4,** 'Pattern in counting from 20 to 100'
- **Unit 12,** 'Composition of numbers 11 to 19'

***Year 2***

- **Unit 1,** 'Composition of  multiples of 10'
- **Unit 2,** 'Counting and representing the numbers 20 to 99'
- **Unit 3,** 'Comparing, ordering and partitioning 2-digit numbers'
- **Unit 13,** 'Addition and subtraction of two 2-digit numbers'
- **Unit 14,** 'Money: recognise coins and use £ and p symbols'

# Thread, **'Statistics'**

### *Year 2*

- **Unit 5,** 'Calculating within 20'
- **Unit 8,** 'Representing counting in 2s, 5s and 10s as the 2, 5 and 10 times tables'
- **Unit 9,** 'Representing counting in 5s as the 5 times table and link to the 10 times tables'
- **Unit 13,** 'Addition and subtraction of two 2-digit numbers'