

## 3.1 NUMBER SENSE

3-week sequence

### Success criteria

Pupils can explain and show how and when their counting is useful for adding and subtracting. They can make appropriate decisions about when to use their understanding of place value for solving problems, including adding and subtracting.

*I can explain and represent how I know that 771 is greater than 717. I can explain why it is easy to subtract 70 from 771 and suggest other numbers that would be easy to subtract using my understanding of place value.*

### Learning objectives

Pupils should be taught to:

*Number and place value*

- count from 0 in multiples of 100; find 10 or 100 more or less than a given number
- recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- compare and order numbers up to 1000
- identify, represent and estimate numbers using different representations
- read and write numbers up to 1000 in numerals and in words
- solve number problems and practical problems involving these ideas.

### Guidance

Pupils use larger numbers to at least 1000, applying partitioning related to place value using varied and increasingly complex problems, building on work in Year 2 (for example,  $146 = 100 + 40$  and  $6, 146 = 130 + 16$ ).

Using a variety of representations, including those related to measure, pupils continue to count in ones, tens and hundreds, so that they become fluent in the order and place value of numbers to 1000.

## 3.2 ADDITIVE REASONING

3-week sequence

### Success criteria

Pupils can solve addition and subtraction problems in different contexts, appropriately choosing and using number facts, understanding of place value and counting. They explain their decision making and justify their solutions.

*I can explain and represent different efficient ways of solving  $£177 + £49$  and  $£172 - £28$ .*

### Learning objectives

Pupils should be taught to:

*Addition and subtraction*

- add and subtract numbers mentally, including:
  - a three-digit number and ones
  - a three-digit number and tens
  - a three-digit number and hundreds
- add and subtract numbers with up to three digits
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

*Measurement*

- measure, compare, add and subtract: lengths (m / cm / mm); mass (kg / g); volume / capacity (l / ml)
- add and subtract amounts of money to give change, using both £ and p in practical contexts

*Statistics*

- interpret and present data using bar charts, pictograms and tables

- solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables.

### Guidance

Pupils continue to become fluent in recognising the value of coins, by adding and subtracting amounts including mixed units and giving change using manageable amounts. They record £ and p separately. The decimal recording of money is introduced formally in Year 4.

Pupils continue to measure using the appropriate tools and units, progressing to using a wider range of measures, including comparing and using mixed units (for example, 1 kg and 200 g) and simple equivalents of mixed units (for example, 5 m = 500 cm)

Pupils understand and use simple scales (for example, 2, 5, 10 units per cm) in pictograms and bar charts with increasing accuracy.

For additional guidance see appendix.

## 3.3 MULTIPLICATIVE REASONING

3-week sequence

### Success criteria

Pupils can explain and represent multiplication as both repeated addition and scaling and division as both sharing and grouping. They use this understanding to derive facts and solve problems.

*I can explain and represent different efficient ways of solving  $12 m \times 4$  and show that it is the same length as  $4 m \times 12$  and explain why. I can explain and represent  $40 \div 4 = 10$  as sharing between four and putting into groups of four, suggest contexts for these and explain what the ten represents in each case.*

### Learning objectives

Pupils should be taught to:

*Number and place value*

- count from 0 in multiples of 4, 8, 50 and 100

*Multiplication and division*

- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- write and calculate mathematical statements for multiplication and division using the multiplication tables that they know
- solve problems, including missing number problems, involving multiplication and division including positive integer scaling problems and correspondence problems in which  $n$  objects are connected to  $m$  objects.

### Guidance

Pupils now use multiples of 2, 3, 4, 5, 8, 10, 50 and 100.

Pupils continue to practise their mental recall of multiplication tables when they are calculating mathematical

statements in order to improve fluency. Through doubling, they connect the 2, 4 and 8 multiplication tables.

Pupils develop efficient mental methods, for example, using commutativity and associativity (for example,  $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$ ) and multiplication and division facts (for example, using  $3 \times 2 = 6$ ,  $6 \div 3 = 2$  and  $2 = 6 \div 3$ ) to derive related facts (for example,  $30 \times 2 = 60$ ,  $60 \div 3 = 20$  and  $20 = 60 \div 3$ ).

Pupils solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts, (for example, four times as high, eight times as long etc.) and correspondence problems in which  $m$  objects are connected to  $n$  objects (for example, 3 hats and 4 coats, how many different outfits?; 12 sweets shared equally between 4 children; 4 cakes shared equally between 8 children).

The comparison of measures includes simple scaling by integers (for example, a given quantity or measure is twice as long, or five times as high) and this connects to multiplication.

## 3.4 GEOMETRIC REASONING

2-week sequence

### Success criteria

Pupils can explain and show angle as a measure of turn and can draw, make and identify shapes with right-angles.

*I can draw a 2-D shape which has two right angles and explain how I know whether the other angles are greater than or less than a right angle. I can construct a 3-D shape which has right angles and explain how I know they are right angles.*

### Learning objectives

Pupils should be taught to:

*Geometry: properties of shapes*

- draw 2-D shapes, and make 3-D shapes using modeling materials; 3-D shapes in different orientations and describe them
- recognise that angles are a property of shape or a description of a turn
- identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle.

### Guidance

Pupils' knowledge of the properties of shapes is extended at this stage to symmetrical and non-symmetrical polygons and polyhedra. They should be able to describe the properties of 2-D and 3-D shapes using accurate language, including lengths of lines and acute and obtuse for angles greater or lesser than a right angle.

For further guidance see appendix.

## 3.5 NUMBER SENSE

2-week sequence

### Success criteria

Pupils can explain and show how and when their counting is useful for adding and subtracting and make appropriate decisions about when to use their understanding of place value for solving problems including adding and subtracting.

*I can explain and represent how I know that 780 ml is more than 708 ml and suggest numbers that would be easy to subtract from each of these, using my understanding of place value. I can count in tenths from 7.5 and explain and represent what happens when I reach 7.9.*

### Learning objectives

Pupils should be taught to:

#### Number and place value

- count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number
- recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- compare and order numbers up to 1000
- identify, represent and estimate numbers using different representations
- read and write numbers up to 1000 in numerals and in words
- solve number problems and practical problems involving these ideas

#### Measurement

- tell and write the time from an analogue clock, including using Roman numerals from I to XII and 12-hour and 24-hour clocks
- measure, compare, add and subtract: lengths (m / cm / mm); mass (kg / g); volume / capacity (l / ml)

#### Fractions

- count up and down in tenths, recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10.

### Guidance

Pupils connect tenths to place value and decimal measures, and to division by 10.

For further guidance see 3.1.

## 3.6 ADDITIVE REASONING

3-week sequence

### Success criteria

Pupils can solve addition and subtraction problems in different contexts (including extracting the necessary information from graphs, charts and tables), appropriately choosing and using number facts, understanding of place value and counting. They can explain their decision making and justify their solutions.

*I can explain and efficiently solve questions related to a bar chart for a school of 400 children such as 'How many fewer children cycle to school than walk?' and 'How many more children travel on a school bus than cycle?'*

### Learning objectives

Pupils should be taught to:

#### Addition and subtraction

- add and subtract numbers mentally, including:
  - a three-digit number and ones
  - a three-digit number and tens
  - a three-digit number and hundreds
- add and subtract numbers with up to three digits
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

#### Measurement

- measure, compare, add and subtract: lengths (m / cm / mm); mass (kg / g); volume / capacity (l / ml)

- add and subtract amounts of money to give change, using both £ and p in practical contexts

#### Statistics

- interpret and present data using bar charts, pictograms and tables
- solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables.

### Guidance

For guidance see 3.2 and appendix.

## 3.7 NUMBER SENSE

3-week sequence

### Success criteria

Pupils can represent fractions as numbers and explain and show how they know that for unit fractions, as the denominator increases, the size of the number decreases.

*I can represent and explain how I know  $\frac{1}{10}$  is smaller than  $\frac{1}{9}$  and why  $\frac{2}{7} + \frac{3}{7} = \frac{5}{7}$ .*

### Learning objectives

Pupils should be taught to:

*Number and place value*

- identify, represent and estimate numbers using different representations

*Fractions*

- count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10
- recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators
- add and subtract fractions with the same denominator within one whole [for example,  $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$ ]

- compare and order unit fractions and fractions with the same denominator
- solve problems that involve all of the above.

### Guidance

Pupils begin to understand unit and non-unit fractions as numbers on the number line, and deduce relations between them, such as size and equivalence. They should go beyond the [0, 1] interval, including relating this to measure.

They understand the relation between unit fractions as operators (fractions of) and division by integers.

For further guidance see appendix.

## 3.8 MULTIPLICATIVE REASONING

3-week sequence

### Success criteria

Pupils can explain and represent multiplication as both repeated addition and scaling; and division as both sharing (including finding fractions), and grouping. They use this understanding to derive facts and solve problems.

*I can explain and represent how to share seven bars of chocolate between ten friends and justify the solution.  
I can explain and represent how to find a third of 18 kg and record a matching number sentence.*

### Learning objectives

Pupils should be taught to:

*Number and place value*

- count from 0 in multiples of 4, 8, 50 and 100

*Multiplication and division*

- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers
- solve problems, including missing number problems, involving multiplication and division including positive integer scaling problems and correspondence problems in which n objects are connected to m objects

*Fractions*

- count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10
- recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
- solve problems that involve all of the above.

### Guidance

Pupils continue to practise their mental recall of multiplication tables when they are calculating mathematical statements in order to improve fluency. Through doubling, they connect the 2, 4 and 8 multiplication tables.

Pupils develop efficient mental methods, for example, using commutativity and associativity (for example,  $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$ ) and multiplication and division facts (for example, using  $3 \times 2 = 6$ ,  $6 \div 3 = 2$  and  $2 = 6 \div 3$ ) to derive related facts (for example,  $30 \times 2 = 60$ ,  $60 \div 3 = 20$  and  $20 = 60 \div 3$ ).

Pupils solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts, (for example, four times as high, eight times as long etc.) and correspondence problems in which m objects are connected to n objects (for example, 3 hats and 4 coats, how many different outfits?; 12 sweets shared equally between 4 children; 4 cakes shared equally between 8 children).

The comparison of measures includes simple scaling by integers (for example, a given quantity or measure is twice as long, or five times as high) and this connects to multiplication.

Pupils continue to recognise fractions in the context of parts of a whole, numbers, measurements, a shape, and unit fractions as a division of a quantity.

## 3.9 GEOMETRIC REASONING

2-week sequence

### Success criteria

Pupils can recognise and identify horizontal and vertical lines and pairs of perpendicular and parallel lines and justify their thinking. They can identify acute, obtuse and right angles in the context of a 2-D shape and justify their thinking.

*I can follow instructions to draw a particular right-angled trapezium. I can find four examples of pairs of perpendicular lines and parallel lines in the school and explain what is the same and what is different about them.*

### Learning objectives

Pupils should be taught to:

*Geometry: properties of shapes*

- draw 2-D shapes, and make 3-D shapes using modeling materials; recognise 3-D shapes in different orientations and describe them
- recognise that angles are a property of shape or a description of a turn
- identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle
- identify horizontal and vertical lines and pairs of perpendicular and parallel lines.

### Guidance

Pupils' knowledge of the properties of shapes is extended at this stage to symmetrical and non-symmetrical polygons and polyhedra. They should be able to describe the properties of 2-D and 3-D shapes using accurate language, including lengths of lines and acute and obtuse for angles greater or lesser than a right angle.

For further guidance see appendix.

## 3.10 NUMBER SENSE

2-week sequence

### Success criteria

Pupils can explain and show how and when their counting is useful for adding and subtracting. They can explain and show how to tell the time and use knowledge of different units of time to solve problems.

*I can explain and show how the start times of television programmes change when a sports programme over runs by ten minutes. I can read the time on different clocks and say what the time will be in half an hour and in 45 minutes.*

### Learning objectives

Pupils should be taught to:

*Number and place value*

- count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number
- recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- compare and order numbers up to 1000
- identify, represent and estimate numbers using different representations
- read and write numbers up to 1000 in numerals and in words
- solve number problems and practical problems involving these ideas

*Measurement*

- tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks
- estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, a.m. / p.m., morning, afternoon, noon and midnight
- know the number of seconds in a minute and the number of days in each month, year and leap year

- compare durations of events, [for example, to calculate the time taken by particular events or tasks]

*Statistics*

- interpret and present data using bar charts, pictograms and tables.

### Guidance

Pupils use larger numbers to at least 1000, applying partitioning related to place value using varied and increasingly complex problems, building on work in Year 2 (for example,  $146 = 100 + 40$  and  $6$ ,  $146 = 130$  and  $16$ ).

Using a variety of representations, including those related to measure, pupils continue to count in ones, tens and hundreds, so that they become fluent in the order and place value of numbers to 1000.

Pupils use both analogue and digital 12-hour clocks and record their times. In this way they become fluent in, and prepared for, using digital 24-hour clocks in Year 4.

## 3.11 ADDITIVE REASONING

3-week sequence

### Success criteria

Pupils can solve addition and subtraction problems in different contexts, appropriately choosing and using number facts, understanding of place value and counting, and mental and written methods. They can explain their decision making and justify their solution.

*I can explain and represent different ways of solving  $324\text{ m} + 299\text{ m}$  and  $605\text{ kg} - 587\text{ kg}$  and give reasons for which would be the most efficient.*

### Learning objectives

Pupils should be taught to:

#### Addition and subtraction

- add and subtract numbers mentally, including:
  - a three-digit number and ones
  - a three-digit number and tens
  - a three-digit number and hundreds
- add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

#### Measurement

- measure, compare, add and subtract: lengths (m / cm / mm); mass (kg / g); volume / capacity (l / ml)
- add and subtract amounts of money to give change, using both £ and p in practical contexts
- record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, a.m. / p.m., morning, afternoon, noon and midnight
- know the number of seconds in a minute and the number of days in each month, year and leap year
- compare durations of events, [for example, to calculate the time taken by particular events or tasks]

#### Statistics

- interpret and present data using bar charts, pictograms and tables
- solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables.

### Guidance

Pupils use their understanding of place value and partitioning, and practise using columnar addition and subtraction with increasingly large numbers up to three digits to become fluent.

Pupils continue to become fluent in recognising the value of coins, by adding and subtracting amounts including mixed units and giving change using manageable amounts. They record £ and p separately. The decimal recording of money is introduced formally in Year 4.

Pupils continue to measure using the appropriate tools and units, progressing to using a wider range of measures, including comparing and using mixed units (for example, 1 kg and 200 g) and simple equivalents of mixed units (for example, 5 m = 500 cm)

Pupils understand and use simple scales (for example, 2, 5, 10 units per cm) in pictograms and bar charts with increasing accuracy.

For additional guidance see appendix.

## 3.12 NUMBER SENSE

2-week sequence

### Success criteria

Pupils can represent fractions as numbers and explain and show how they know one fraction is bigger than or equivalent to another.

*I can represent and explain how I know how to order the following numbers and place them on a number line:  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ ,  $\frac{4}{4}$ , 1,  $1\frac{1}{2}$ ,  $\frac{2}{4}$  and  $\frac{2}{2}$ .*

### Learning objectives

Pupils should be taught to:

#### Number and place value

- identify, represent and estimate numbers using different representations

#### Fractions

- count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and dividing one-digit numbers or quantities by 10
- recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators
- recognise and show, using diagrams, equivalent fractions with small denominators
- add and subtract fractions with the same denominator within one whole [for example,  $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$ ]

- compare and order unit fractions and fractions with the same denominator.
- solve problems that involve all of the above.

### Guidance

Pupils begin to understand unit and non-unit fractions as numbers on the number line, and deduce relations between them, such as size and equivalence. They should go beyond the [0, 1] interval, including relating this to measure.

They understand the relation between unit fractions as operators (fractions of) and division by integers.

For further guidance see appendix.

## 3.13 MULTIPLICATIVE REASONING

3-week sequence

### Success criteria

Pupils can explain and represent multiplication as both repeated addition and scaling, and division as both sharing, (including finding fractions), and grouping. They use this understanding to derive facts and solve problems including two-digit by one-digit multiplications.

*I can explain and represent different efficient ways of solving  $£28 \times 8$  and  $£75 \div 3$  using my known facts and understanding, and suggest different contexts where these calculations might arise.*

### Learning objectives

Pupils should be taught to:

*Number and place value*

- count from 0 in multiples of 4, 8, 50 and 100

*Multiplication and division*

- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- solve problems, including missing number problems, involving multiplication and division; solve positive integer scaling problems and correspondence problems in which  $n$  objects are connected to  $m$  objects.

*Fractions*

- count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10
- recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
- solve problems that involve all of the above.

*Measurement*

- know the number of seconds in a minute and the number of days in each month, year and leap year.

### Guidance

Pupils develop efficient mental methods, for example, using commutativity and associativity (for example,  $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$ ) and multiplication and division facts (for example, using  $3 \times 2 = 6$ ,  $6 \div 3 = 2$  and  $2 = 6 \div 3$ ) to derive related facts (for example,  $30 \times 2 = 60$ ,  $60 \div 3 = 20$  and  $20 = 60 \div 3$ ).

Pupils develop reliable written methods for multiplication and division, starting with calculations of two-digit numbers by one-digit numbers and progressing to the formal written methods of short multiplication and division.

Pupils solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts, (for example, four times as high, eight times as long etc.) and correspondence problems in which  $m$  objects are connected to  $n$  objects (for example, 3 hats and 4 coats, how many different outfits?; 12 sweets shared equally between 4 children; 4 cakes shared equally between 8 children).

Pupils continue to recognise fractions in the context of parts of a whole, numbers, measurements, a shape, and unit fractions as a division of a quantity.

## 3.14 GEOMETRIC REASONING

2-week sequence

### Success criteria

Pupils can measure the perimeter of simple 2-D shapes and describe properties of the shapes related to the angles.

*I can draw several shapes with a perimeter of 30 cm and identify horizontal and vertical lines and pairs of perpendicular and parallel lines. I can also identify acute, obtuse and right angles in the shapes I have drawn.*

### Learning objectives

Pupils should be taught to:

*Geometry: properties of shape*

- recognise that angles are a property of shape or a description of a turn
- identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle
- identify horizontal and vertical lines and pairs of perpendicular and parallel lines
- measure the perimeter of simple 2-D shapes.

### Guidance

Pupils' knowledge of the properties of shapes is extended at this stage to symmetrical and non-symmetrical polygons and polyhedra. They should be able to describe the properties of 2-D and 3-D shapes using accurate language, including lengths of lines and acute and obtuse for angles greater or lesser than a right angle.

For further guidance see appendix.