



*West Road*  
PRIMARY SCHOOL

**Calculation Policy**  
**Updated April 2018**

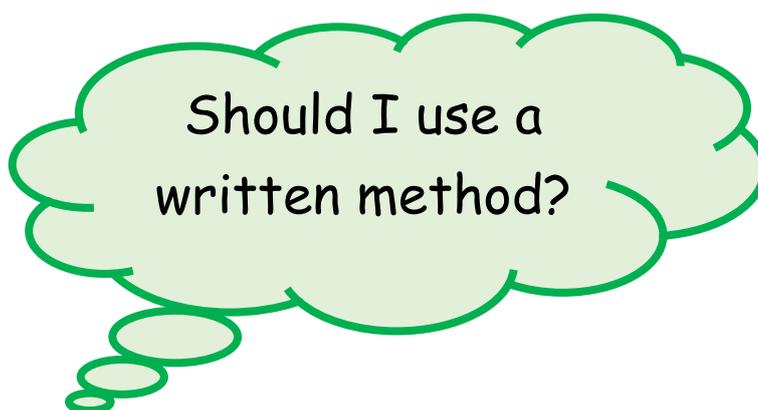
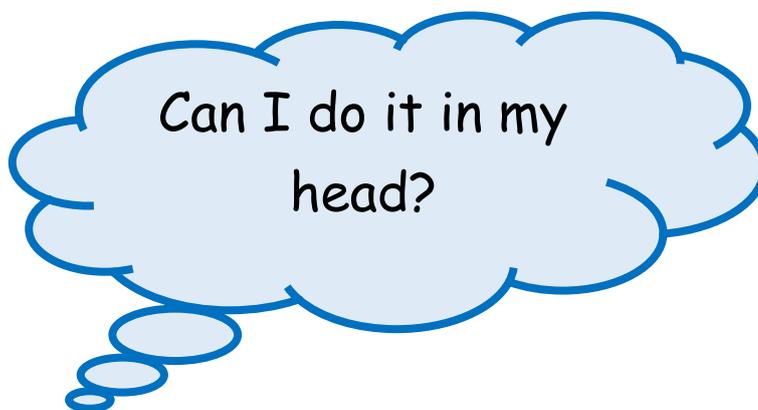
This policy has been written to ensure consistency in the mathematical written methods and approaches to calculation across years 1-6 and EYFS through Early Learning Goals.

The 2014 national curriculum for mathematics aims to ensure that all pupils are to become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.

Times Tables Recall:

West Road has subscribed to Times Tables Rockstars as a resource tool to support and challenge our pupils with the recall of their times tables. By the end of Year 4, pupils should be able to recall multiplication facts up to  $12 \times 12$  at speed.

As part of a child's learning in calculation, they need to be taught how to select the best method according to the numbers. The hierarchy of thinking should be:



## Rationale for KS1

Children in Years 1 and 2 will be given a really solid foundation in the basic building blocks of mental and written arithmetic. Through being taught **place value**, they will develop an understanding of how numbers work, so that they are confident in 2-digit numbers and beginning to read and say numbers above 100. A focus on **number bonds**, first via practical hands-on experiences and subsequently using memorisation techniques, enables a good grounding in these crucial facts, and ensures that all children leave Y2 knowing the pairs of numbers which make all the numbers up to 10 at least. They will also have experienced and been taught pairs to 20. Their knowledge of number facts enables them to **add several single-digit numbers**, and to **add/subtract a single digit number to/from a 2-digit number**. Another important conceptual tool is their ability to **add/subtract 1 or 10**, and to **understand which digit changes and why**. This understanding is extended to enable children to **add and subtract multiples of ten** to and from any 2-digit number. The most important application of this knowledge is their ability to **add or subtract any pair of 2-digit numbers using column addition/subtraction**. Children will be taught to **count in 2s, 3s, 5s and 10s**, and will have related this skill to repeated addition. They will have met and begun to learn the associated **2x, 3x, 5x and 10x tables**. Engaging in a practical way with the concept of repeated addition and the **use of arrays** enables children to develop a preliminary understanding of multiplication, and asking them to consider how many groups of a given number make a total will introduce them to the idea of division. They will also be taught to **double and halve numbers**, and will thus experience scaling up or down as a further aspect of multiplication and division. Fractions will be introduced; **halves, quarters and thirds**.

## Rationale for Lower KS2

In lower key stage 2, children build on the concrete and conceptual understandings they have gained in key stage 1 to develop a real mathematical understanding of the four operations, in particular developing **arithmetical competence in relation to larger numbers**. In addition and subtraction, they are taught to use place value and number facts to add and subtract numbers mentally and will develop a range of strategies. In particular, they will learn to add and subtract multiples and near multiples of 10, 100 and 1000, and will become fluent in **complementary addition** as an accurate means of achieving fast and accurate answers to 3-digit subtractions. Standard written methods for adding larger numbers are taught, learned and consolidated. This key stage is also the period during which **all the multiplication and division facts** are thoroughly memorised, including all facts up to the 12 x 12 table. Efficient written methods for multiplying or dividing a 2-digit or 3-digit number by a single-digit number are taught, as are mental strategies for multiplication or division with large but friendly numbers, e.g. when dividing by 5 or multiplying by 20. Children will develop their understanding of fractions, learning to **reduce a fraction to its simplest form** as well as **finding non-unit fractions of amounts** and quantities. The concept of a decimal number is introduced and children consolidate a firm understanding of **one-place decimals, multiplying and dividing whole numbers by 10 and 100**.

## Rationale for UKS2

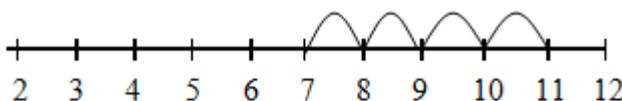
Children move on from dealing mainly with whole numbers to performing arithmetic operations with both **decimals and fractions**. They will consolidate their use of written procedures in adding and subtracting whole numbers with **up to 6 digits** and also decimal numbers with **up to two decimal places**. Mental strategies for adding and subtracting increasingly large numbers will also be taught. These will draw upon children's robust understanding of place value and knowledge of number facts. Efficient and flexible strategies for mental multiplication and division are taught and practised, so that children can perform appropriate calculations even when the numbers are large, such as  $40,000 \times 6$  or  $40,000 \div 8$ . **Fractions and decimals are also added, subtracted, divided and multiplied**, within the bounds of children's understanding of these more complicated numbers, and they will also calculate simple **percentages and ratios**. **Negative numbers** will be added and subtracted.

# ADDITION +

## Year 1 Add with numbers up to 20

Use numbered number lines and number squares to add, by counting on in ones, encouraging children to begin with the larger number and count on.

$$7 + 4 = 11$$



$$5 + 3 = 8$$



Children should:

- Have access to a range of equipment e.g. Number lines, counting apparatus, Numicon, 100 squares, bead strings etc.
- Be shown numbers in range of contexts
- Read and write maths stories using the = and + signs
- Interpret maths stories including missing number problems e.g.  $3 + \_ = 8$

**Key Vocabulary** add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line.

### Key skills for addition at year 1

- Read and write numbers to 100 in numerals (1-20 in words)
- Count to and across 100
- Recall bonds to 10 and 20, and addition facts within 20 ('story of' 5, 6, 7, 8, 9 and 10)
- Count on in ones from a given 2-digit number.
- Add two single-digit numbers by counting on.
- Add three single-digit numbers spotting doubles or number bonds.
- Count on in tens from any given 2-digit number.
- Add 10 to any given 2-digit number.
- Use number facts to add single-digit numbers to two-digit numbers, e.g. use  $4 + 3$  to work out  $24 + 3$ ,  $34 + 3$
- Add by putting the larger number first.
- Recognise doubles to double 6.

# ADDITION +

## Year 2 Add with 2-digit numbers develop mental

fluency with place value and addition using 2-digit numbers, then move to formal methods.

Add 2-digit numbers and tens, 2-digits and units, two 2-digit numbers, first practically using equipment (100 squares, Dienes base 10)

$$23 + 47 =$$



This needs to be modelled using apparatus first then move onto formal recording.

$$\begin{array}{r} 23 \\ + 12 \\ \hline 35 \end{array}$$

$$\begin{array}{r} 48 \\ + 27 \\ \hline 75 \\ \hline \end{array}$$

**Key Vocabulary** add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, **sum, tens, units, partition, addition, column, tens.**

### Key skills for addition at year 2

- Locate any 2-digit number on a landmarked line and use this to compare numbers; record comparisons < and >, e.g.  $56 > 39$ .
- Identify any number on the 1-100 number grid; understand that each number is a multiple of ten and some ones, e.g. 54 is 50 and 4 more.
- Add two single digit numbers ( $8 + 7$ ) by counting up; add two 2-digit numbers which total less than 100 by counting on in tens and ones, e.g.  $54 + 37$  as  $54 + 30 + 7$ .
- Know securely number pairs for all the numbers up to and including 12
- Count in steps of 2, 5, 10 and 3 from 0.
- Know different unit patterns when not crossing a ten, e.g.  $4 + 3 = 7$ ,  $14 + 3 = 17$ ,  $24 + 3 = 27$
- Begin to recognise unit patterns when crossing a ten, e.g.  $5 + 6 = 11$
- Know pairs with a total of 20 and multiples of 10 to 100
- Count on in ones and tens from any given 2-digit number
- Add two or three single-digit numbers
- Add a single-digit number to any 2-digit number using number facts, including bridging multiples of 10. Add 10 and small multiples of 10 to any given 2-digit number
- Add any pair of 2-digit numbers
- Know that adding can be done in any order
- Solve problems with addition using concrete objects, pictorial representations, involving numbers, quantities and measures, applying written and mental methods

# ADDITION +

## Year 3 Add numbers up to 3 digits.

Use column addition method to add 3-digit numbers or three 2-digit numbers.

$$\begin{array}{r} 236 \\ + 73 \\ \hline 309 \\ \hline 1 \end{array}$$

Add the units/ones first, carry numbers underneath the bottom line, remind the children of the actual value e.g. 3 tens add 7 tens.

When do we know children are ready for this method?

- Do they know addition and subtraction facts to 20?
- Do they understand place value?
- Can they explain their mental strategies orally and record them using informal jottings?

**Key Vocabulary** add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, addition, column, tens, **increase, vertical, 'carry', expanded, compact.**

### **Key skills for addition at year 3**

- Know pairs with each total to 20
  - Know pairs of multiples of 10 with a total of 100
  - Add any two 2-digit numbers by counting on in 10s and 1s or by using partitioning
  - Add multiples and near multiples of 10 and 100
  - Add 1, 10, 100 to 3-digit numbers
  - Understand place value in 3-digit numbers
  - Perform place value additions without a struggle. (E.g.  $300 + 8 + 50 = 358$ )
  - Use place value and number facts to add a 1-digit or 2-digit number to a 3-digit number number.
  - Add pairs of 'friendly' 3-digit numbers mentally, e.g.  $320 + 450$
  - Begin to add amounts of money using addition method.
- Solve problems with addition using number facts, place value, missing numbers.

# ADDITION +

## Year 4 Add with up to 4 digits

Continue to use the column method, adding units first and carrying underneath the calculation. Also include money and measures contexts.

	3	5	1	7
+	3	9	6	
<hr/>				
	3	9	1	3
		1	1	

Add the units first

Carry numbers underneath

Remind pupils of actual value eg, 1 ten add 9 tens.

Children use and apply this method to money and measures.

**Key vocabulary** add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, sum, tens, units, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact, **thousands**, **hundreds**, **digits**, **inverse**.

### Key Skills for addition at Year 4

- Select appropriate method, mental, jottings, written—and explain why
- Add any two 2-digit numbers
- Know by heart/quickly derive number bonds to 100 (eg  $32 + 68$ ) and to £1 ( $64p + 36p$ )
- Add to the next hundred, pound and whole number. (E.g.  $234 + 66 = 300$ ,  $3.4 + 0.6 = 4$ )
- Perform place value additions without a struggle. (E.g.  $300 + 8 + 50 + 4000 = 4358$ )
- Add multiples and near multiples of 10, 100 and 1000.
- Add £1, 10p, 1p to amounts of money
- Use place value and number facts to add 1-, 2-, 3- and 4-digit numbers where a mental calculation is appropriate'. (E.g.  $4004 + 156$  by knowing that  $6+4=10$  and that  $4004+150=4154$  so total is 4160)
- Perform inverse operations to check
- Solve 2-step problems in context
- Continue to practise a wide range of mental addition strategies eg. Round and adjust, near doubles, numbers bonds, partitioning and recombining

# ADDITION +

## Year 5 Add numbers with more than 4 digits

including money, measure and decimals with different numbers of decimal places.

$$\begin{array}{r} 23,481 \\ + 1,362 \\ \hline 24,843 \end{array}$$

Use column addition to add two or three whole numbers

$$\begin{array}{r} \text{£} 23.59 \\ + \text{£} 7.55 \\ \hline \text{£} 31.14 \end{array}$$

Use column addition to add any pair of two-place decimal numbers including amounts of money.

Say 6 tenths and 7 tenths to reinforce place value

$$\begin{array}{r} 19.01 \\ 3.65 \\ + 0.70 \\ \hline 23.36 \end{array}$$

Empty decimal places can be filled to with zero to show the place value of each column

### Children should:

Understand the place value of tenths and hundredths and use this to align numbers with differing numbers of decimal place.

**Key vocabulary** add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact, thousands, hundreds, digits, inverse, **decimal places**, **decimal point**, **tenths**, **hundredths**, **thousandths**.

### Key Skills for addition at Year 5

- Locate 5 and 6 digit numbers on a landmarked line; use this to compare/order numbers.
- Round to ten, a hundred, a thousand or ten thousand.
- Use rounding to check accuracy
- Understand a one-place decimal number as a number of tenths and a two-place decimal number as a number of hundredths.
- Add or subtract 0.1 or 0.01 to/from any decimal number with confidence, e.g.  $5.83 + 0.01$  or  $4.83 - 0.1$
- Add and subtract mentally with confidence - where the numbers are less than 100 or the calculation relies upon simple addition and place value.
- Confidently add numbers with more than 4-digits using a secure written method, including adding 'piles' of numbers
  - Use inverse to check calculations

# ADDITION +

## Year 6 Add several numbers of increasing complexity

including money, measure and decimals with different numbers of decimal places.

$$\begin{array}{r} 23.361 \\ 9.080 \\ 59.770 \\ + 1.300 \\ \hline 93.511 \\ \small 2 \quad 1 \quad 2 \end{array}$$

Tenths, hundredths and thousandths should be correctly aligned, with the decimal point aligned vertically, including in the answer.

Empty decimal places can be filled with zero to show the place value of each column.

Use column method to add in context of money, measures, including decimals with different numbers of decimal places.

Pupils should apply their knowledge of a range of mental strategies, mental recall skills, informal and formal written methods when selecting the **appropriate method** to work out addition problems. Opportunities to discuss the appropriateness of methods need to be planned for.

$$\begin{array}{r} 81,059 \\ 3,668 \\ 15,301 \\ + 20,551 \\ \hline 120,579 \\ \small 1 \quad 1 \quad 1 \quad 1 \end{array}$$

**Key vocabulary** add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact, thousands, hundreds, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths.

### **Key Skills for addition at Year 6**

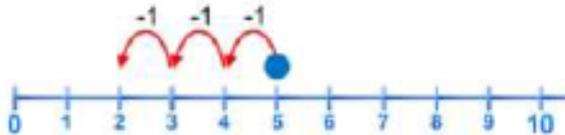
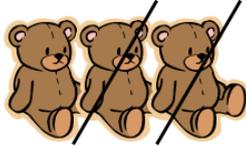
- Add mentally with confidence using larger numbers and calculations of increasing complexity
- Add several large numbers using written addition
- Add several large or decimal numbers using written addition
- Perform mental calculations, including with mixed operations and large numbers, using a range of strategies
- Solve multi-step problems
- Use estimation and inverse to check the validity of an answer

# SUBTRACTION -

## Year 1 Subtract from numbers up to 20

Children consolidate understanding of subtraction practically using bead strings, cubes etc and in real life contexts. They are introduced to more formal recording using number lines, numbers squares and then using empty numbers lines.

$$3 - 2 =$$

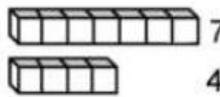


$$5 - 3 = 2$$

Model subtraction practically and using number tracks, number lines and 100 squares and practically.

Find the difference between - this is to be done practically using the language 'find the distance between' and 'how many more than?'

This will be introduced practically with the language 'find the distance between' and 'how many more?' in a range of familiar contexts.



'Seven is 3 more than four'

'I am 2 years older than my sister'

**Key vocabulary** equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is...

## **Key Skills for subtraction at Year 1**

- Give a number, say one less
- Count back in ones to from 100 and from any single-digit or 2-digit number.
- Count back in tens from any 2-digit number
- Locate any number on a 1-100 grid or a beaded line 0-100.
- Know number bonds to 10, also know what is left if objects are taken from 10, e.g. 10 fingers, fold down 4, leaves 6 standing.
- Solve one-step problems involving subtraction, using concrete objects (bead strings, objects, cubes) and pictures, and missing number problems
  - Recognise the - and = signs, and use these to read and write simple subtractions.

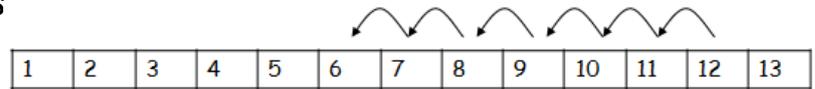
# SUBTRACTION -

## Year 2 Subtract with 2-digit numbers

Use practical equipment such as Dienes and number squares first.

Subtract first on a on a numbered number line, then on an empty number line, by counting back, aiming to develop mental subtraction skills

$$12 - 6 =$$



Once children have secure place value knowledge they move onto column subtraction.

$$\begin{array}{r} 86 \\ - 45 \\ \hline 41 \end{array}$$

Subtract the units (ones) first then the tens.

$$\begin{array}{r} 74^16 \\ - 17 \\ \hline 29 \end{array}$$

When secure, children will subtract using 'funny' counting (borrowing)

**Key vocabulary** equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is..., **difference, count on, strategy, partition, tens units**

### Key Skills for subtraction at Year 2

- Recognise that addition and subtraction are inverse operations and understand that  $10 - 4 = 6$  as well as  $6 + 4 = 10$ .
- Count back in ones or tens to take away, e.g.  $27 - 3 =$  or  $54 - 20 =$ .
- Begin to count up to find a difference between two numbers with a small gap (42 - 38). Know when to count on and when to count back
- Recall and use subtraction facts to 20 fluently
- And derive and use related fact to 100
- Subtract using concrete objects, pictorial representations, 100 squares, Dienes and mentally, including a 2-digit number and ones, a 2-digit numbers and tens, and two 2-digit numbers
- Use inverse to check calculations.

# SUBTRACTION -

## Year 3 Subtract with 2 and 3-digit numbers

Children should understand when to count back where appropriate, using place value or number facts. This skill should be reinforced through mental work.

Begin to use column subtraction method, first using 'friendly numbers'.

$$\begin{array}{r} 643 \\ - 214 \\ \hline 439 \end{array}$$

Move to formal subtraction using 'borrowing'.

**Key vocabulary** equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is..., difference, strategy, borrow, digit, value, hundreds.

### Key Skills for subtraction at Year 3

- Understand place value in 3-digit numbers; add and subtract 1s, 10s or 100s without difficulty; use this to add and subtract multiples of 1, 10, 100 to/from 3-digit numbers.
- Mentally subtract any pair of 2 digit numbers, e.g. 75 - 58
- Recognise that there are two ways of completing subtractions, either by counting up or by counting back.

# SUBTRACTION -

## Year 4 Subtract with up to 4-digit numbers

Subtract using column subtraction, using borrowing where appropriate.

$$\begin{array}{r} 2\overset{6}{7}54 \\ - 1\overset{1}{5}62 \\ \hline 1192 \end{array}$$

**Key vocabulary** equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is..., difference, count on, strategy, borrow, digit, value, hundreds, **inverse**.

### **Key Skills for subtraction at Year 4**

- Mentally subtract any pair of two digit numbers.
- Subtract 3 digit numbers from 3 digit numbers
- Practise mental subtraction strategies, eg. Round and adjust (37−9), using place value
- Count backwards through zero, using negative numbers

# SUBTRACTION -

**Year 5** Subtract with at least 4-digit numbers including money, measures and decimals.

Use column subtraction to subtract numbers with up to 5 digits.

$$\begin{array}{r} \cancel{3}^2 \cancel{0}^1 \cancel{0}^0 \cancel{8}^1 \cancel{6}^0 \\ - \quad \quad 2128 \\ \hline 28928 \end{array}$$

Subtract with decimal values, including mixtures of integers and decimals and aligning the decimal point.

$$\begin{array}{r} \cancel{7}^1 \cancel{6}^0 \cancel{9}^8 \cdot \cancel{0}^0 \\ - \quad \quad 372 \cdot 5 \\ \hline 6796 \cdot 5 \end{array}$$

Add a zero in any decimal place to aid understanding of what to subtract.

**Key vocabulary** equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is..., difference, strategy, digit, value, hundreds, inverse, tenths, hundredths, decimal point, decimal

## Key Skills for subtraction at Year 5

- Count backwards through zero, using negative numbers
- Add or subtract 0.1 or 0.01 to/from any decimal number with confidence, e.g.  $5.83 + 0.01$  or  $4.83 - 0.1$
- Children need to utilise and consider a range of subtraction strategies, jottings and written methods before choosing how to calculate
- Subtract larger numbers using column subtraction or by counting up
- Begin to subtract decimal numbers using counting up:  $6.2 - 3.5$
- Decide which mental methods to use and explain why

# SUBTRACTION -

**Year 6** Subtracting with increasingly large and more complex numbers and decimal values.

$$\begin{array}{r} \cancel{7} \cancel{8} \cancel{0}, 699 \\ - \quad 89,949 \\ \hline 60,750 \end{array}$$

Including money, measure and decimals with different numbers of decimal places

Use the column method to subtract more complex integers

$$\begin{array}{r} \cancel{7} \cancel{0} 5 \cdot \cancel{4} 19 \text{ kg} \\ - \quad 36 \cdot 08 \text{ kg} \\ \hline 69 \cdot 339 \text{ kg} \end{array}$$

Use column method to subtract in context of money, measures, including decimals with different numbers of decimal places.

Empty decimal places can be filled with zero to show the place value of each column.

Pupils should apply their knowledge of a range of mental strategies, mental recall skills, informal and formal written methods when working out subtraction problems.

**Key vocabulary** equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least, how many left, how much less is..., difference, count on, strategy, partition, tens units, borrow, digit, value, hundreds, inverse, tenths, hundredths, decimal point, decimal.

## Key Skills for subtraction at Year 6

- Subtract mentally with confidence - where the numbers are less than 100 or the calculation relies upon simple subtraction and place value. Examples include:  $6,723 - 400$ ,  $72 - 46$ ,  $100 - 64$
- Subtract large numbers using column subtraction, e.g.  $1323 - 758$
- Subtract decimal numbers.
- Use negative numbers in context and calculate intervals across zero.
- Children need to utilise mental subtraction strategies, jottings and written methods how to calculate subtractions.
- Decide which methods to use and explain why.

# MULTIPLICATION X

Year 1 Multiply with concrete objects, arrays and pictorial representations

How many legs will 3 teddies have?



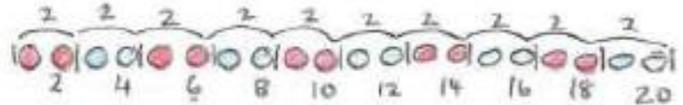
$$2 + 2 + 2 = 6$$

Using repeated addition

$$3 \times 5 = \begin{array}{c} \text{○} \\ \text{●} \text{ ●} \\ \text{●} \end{array} + \begin{array}{c} \text{○} \\ \text{●} \text{ ●} \\ \text{●} \end{array} + \begin{array}{c} \text{○} \\ \text{●} \text{ ●} \\ \text{●} \end{array}$$

5 + 5 + 5

Count in 2s, 5s, 10s



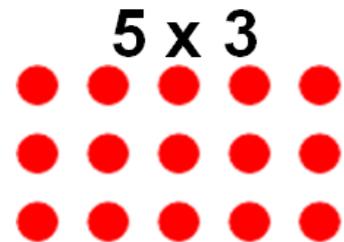
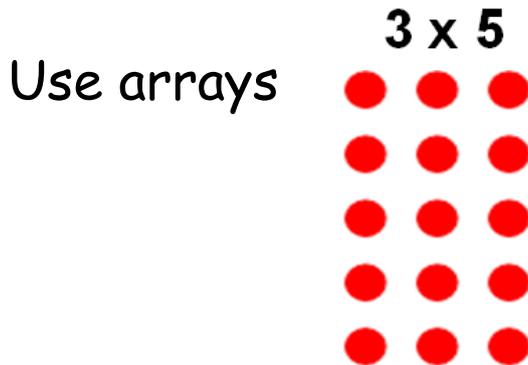
Key vocabulary groups of, lots of, times, array, altogether, multiply, count

## Key Skills for multiplication at Year 1

- Count in multiples of 2, 5 and 10
- Recognise doubles to double 6
- Solve simple one-step problems involving multiplication and division, calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

# MULTIPLICATION X

**Year 2** Multiplication using arrays and repeated addition. (using at least 2s, 5s and 10s)



Repeated addition:

$$4 \times 5 =$$

$$5 + 5 + 5 + 5 =$$

Learn doubles to double 20

Begin to double multiples of 5 to 100

Begin to double two-digit numbers less than 50 with 1s digits of 1, 2, 3 4 or 5

**Key vocabulary** groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, sets of, equal groups, times as big as, once, twice, three times...

## Key Skills for addition at Year 2

- Count in steps of 2, 3 and 5 from zero and in 10s from any number
- Know the 2X, 5X and 10X tables and begin to say how many 10s are in 40 or how many 5s are in 30; recognise odd and even answers
- Write and calculate number statements using x and = signs
- Show that multiplication can be done in any order
- Solve a range of problems involving multiplication, using concrete objects, arrays, repeated addition, Numicon, mental methods and multiplication facts

# MULTIPLICATION X

Year 3 multiply 2-digit numbers by a single digit number.

Introduce the children to column multiplication.

$$\begin{array}{r} \times 13 \\ \hline 65 \\ \hline \end{array}$$

Children should be able to:

- Multiply multiples of ten by a single digit (Smile multiplication) using their knowledge of multiplication facts and times tables.
- Recall and work out multiplication facts in the 2,3,4,5,8 and 10 times tables

*Smile Multiplication* 😊

$$\underline{30} \times \underline{80} = \underline{2400}$$

24

Do the tables bit,  
Then make it 10, 100  
or 1000 times bigger!

Key vocabulary groups of, lots of, times, altogether, multiply, count, multiplied by, repeated addition, column, row, times as big as, once, twice, three times..., **multiple, product, tens, units, value**

## Key Skills for multiplication at Year 3

- Understand that multiplication is commutative, e.g.  $4 \times 8$  is the same as  $8 \times 4$ .
- Know the 4x, 6x and 8x times tables. All tables need to be learned to 12th multiple.
- Multiply any 2-digit number by 10 or a single-digit number by 100;
- Understand the effect of multiplying whole numbers by 10 and 100.
- Multiply a 2 digit number by a 1 digit number starting to use the formal written method.
  - Solve multiplication problems involving missing numbers

# MULTIPLICATION X

## Year 4 multiply 2 and 3 digits by a single digit using all multiplication tables up to $12 \times 12$

Use the column multiplication method to multiply 2 and 3 digit numbers by a single digit.

$$\begin{array}{r} 38 \\ \times 7 \\ \hline 266 \\ \hline 5 \end{array}$$

Children should be able to:

- Approximate before they calculate and make this a regular part of their calculating, going back to their approximation to consider the reasonableness of their answer
- Record an approximation to check their answer against
- Multiply multiples of 10 and 100 by a single digit, using smile multiplication
- Recall all times tables up to  $12 \times 12$

*Smile Multiplication* 😊

$30 \times 80 = 2400$

24

Do the tables bit,  
Then make it 10, 100  
or 1000 times bigger!

Key vocabulary groups of, lots of, times, altogether, multiply, count, multiplied by, repeated addition, column, row, times as big as, once, twice, three times..., multiple, product, tens, units, value, **inverse**

### Key Skills for multiplication at Year 4

- Multiply 1 and 2 digit numbers by 10, 100 and 1000; to understand place value in decimal numbers with one place.
- Know and recite 3x, 4x, 6x, 7x, 8x, 9x times tables up to 12th multiple; include multiplying by 0 (e.g.  $5 \times 0 = 0$ ,  $7 \times 0 = 0$ ) or by 1 (e.g.  $5 \times 1 = 5$ ,  $\frac{1}{2} \times 1 = \frac{1}{2}$ ).
- Multiply 1- digit numbers by 2-digit or friendly 3-digit numbers using grid method.
- Use doubling as strategy for multiplying by 2, 4, 8
- Count in multiples of 6, 7, 9, 25 and 1000

**Pupils should be able to recall all times tables up to  $12 \times 12$  at speed!**

# MULTIPLICATION X

Year 5 Multiply up to 4 digits by 1 or 2 digits. Use column multiplication.

$$\begin{array}{r} 327 \\ \times \quad 4 \\ \hline 1308 \\ \small 1 \quad 2 \end{array}$$

Introduce long multiplication for multiplying by 2 digits.

$$\begin{array}{r} 18 \\ \times 13 \\ \hline 54 \\ 180 \\ \hline 234 \end{array}$$

$18 \times 3$  on the first row ( $8 \times 3 = 24$ , carrying the 2 for 20, then  $1 \times 3$ )  $18 \times 10$  on the 2nd row. Show multiplying by 10 by putting zero in units first.

Move towards more complex numbers.

$$\begin{array}{r} 1234 \\ \times \quad 16 \\ \hline 7404 \quad (1234 \times 6) \\ 12340 \quad (1234 \times 10) \\ \hline 19744 \end{array}$$

$$\begin{array}{r} 3652 \\ \times \quad 8 \\ \hline 29216 \\ \small 5 \quad 4 \quad 1 \end{array}$$

Children should approximate first.

**Key vocabulary** groups of, lots of, times, altogether, multiply, count, multiplied by, repeated addition, column, row, sets of, equal groups, times as big as, once, twice, three times..., multiple, product, tens, units, value, inverse, square, factor, integer, decimal, short/long multiplication, 'carry'

## Key Skills for multiplication at Year 5

- Know and recite all times tables including division facts.
- Multiply 2- and 3-digit numbers by numbers  $\leq 12$ ; multiply 2-digit by 2-digit numbers.
- Identify multiples and factors, using knowledge of multiplication tables up to  $12 \times 12$ .
- Multiply integers and decimals by 10, 100, 1000
- Recognise and use squared, cubes and their notations

# MULTIPLICATION X

**Year 6** Short and long multiplication, as in year 5, and multiply decimals with up to 2 decimal places by a single digit.

Remind children that the single digit belongs in the units column

$$\begin{array}{r} 3.19 \\ \times 8 \\ \hline 25.52 \\ \hline \end{array}$$

Line up the decimal points in the question and the answer

**Use this method for money and measures.**

**Children should:**

- Use rounding and place value to make approximations before calculating and use these to check validity of answers.
- Use **short multiplication** to (see Y5) to multiply numbers with more than 4 digits by a single digit; to multiply money and measures; and to multiply decimals up to 2 decimal places by a single digit
- Use **long multiplication** (see Y5) to multiply numbers with at least 4 digits by a 2-digit number

**Key vocabulary** groups of, lots of, times, altogether, multiply, count, multiplied by, repeated addition, column, row, sets of, equal groups, times as big as, once, twice, three times..., multiple, product, tens, units, value, inverse, **square**, **factor**, **integer**, **decimal**, **short/long multiplication**, 'carry', **tenths**, **hundredths**, **decimal**

## Key Skills for multiplication at Year 6

- Recall multiplication facts up to  $12 \times 12$
- Use short multiplication to multiply a 1-digit number by a number with up to 4 digits
- Use long multiplication to multiply a 2-digit by a number with up to 4 digits
- Use short multiplication to multiply a 1-digit number by a number with one or two decimal places, including amounts of money.
- Multiply fractions and mixed numbers by whole numbers.
- Multiply fractions by proper fractions.
- Use percentages for comparison and calculate simple percentages.
- Estimate answers using rounding and approximation

# DIVISION ÷

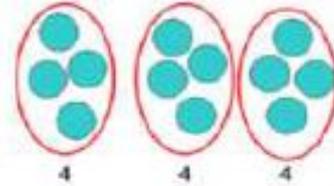
## Year 1 Group and share small quantities

Using both objects diagrams and pictorial representations, to solve problems involving both **grouping** and **sharing**.

Grouping:



Sharing:



Children should solve a division problem within a context.

E.g. 5 children share 15 sweets. How many does each child get?

Can they solve this and write a division statement eg. 15 sweets shared between 5 children gives 3 each.

**Pupils should :**

- use lots of practical apparatus, arrays and picture representations
- Be taught to understand the difference between „grouping“ objects (How many groups of 2 can you make?) and „sharing“ (Share these sweets between 2 people)
- Be able to count in multiples of 2s, 5s and 10s.
- Find half of a group of objects by sharing into 2 equal groups.

### Key vocabulary

share, share equally, one each, two each..., group, groups of, lots of, array

### **Key Skills for division at Year 1**

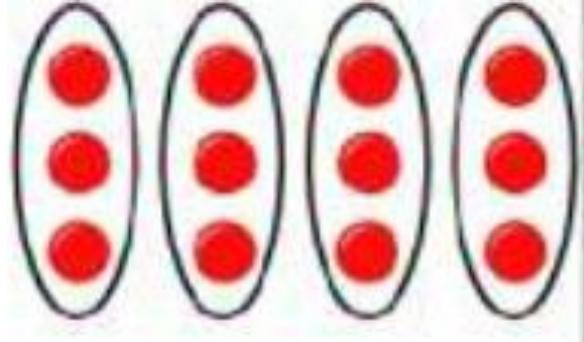
- Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations arrays with the support of the teacher
- Through grouping and sharing small quantities, pupils begin to understand, division, and finding simple fractions of objects, numbers and quantities.
- They make connections between arrays, number patterns, and counting in twos, fives and tens.

# DIVISION ÷

**Year 2** Group and share using the ÷ and = signs.

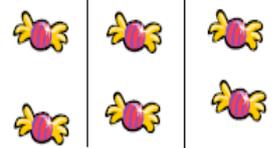
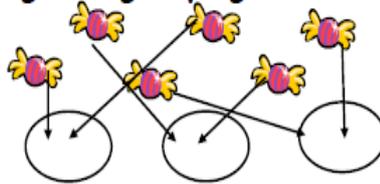
Use objects, arrays, pictorial representations and grouping.

$$12 \div 3 = 4$$



**Know and understand sharing and grouping**

6 sweets shared between 3 people, how many do each get?



Children will use sharing when finding a fraction of a number.

Some children will move onto  $15 \div 3 =$

How many 3s are there in 15?

**Key vocabulary** share, share equally, one each, two each..., group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over

## Key Skills for division at Year 2

- Count in steps of 2, 3, and 5 from 0
- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.
- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the  $\times$ ,  $\div$  and  $=$  signs.
- Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

# DIVISION ÷

**Year 3** Divide 2 digit numbers by a single digit.

Remind children of correct place value, that 96 is equal to 90 and 6.

$$\begin{array}{r} 32 \\ 3 \overline{) 96} \end{array}$$

Move to short division with remainders.

$$\begin{array}{r} 47 \text{ r } 2 \\ 6 \overline{) 284} \end{array}$$

**Key vocabulary** share, share equally, one each, two each..., group, equal groups of, lots of, divide, divided by, divided into, division, grouping, left, left over, **inverse, short division, 'carry', remainder, multiple**

## Key Skills for division at Year 3

- Recall and use division facts for the 2, 3, 4, 5, 8 and 10 multiplication tables
- Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers divided by one digit
- Solve problems, in contexts, and including missing number problems, involving division.
- Pupils develop efficient mental methods, for example, using division facts (e.g. using  $3 \times 2 = 6$ ,  $6 \div 3 = 2$  and  $2 = 6 \div 3$ ) to derive related facts ( $30 \times 2 = 60$ , so  $60 \div 3 = 20$  and  $20 = 60 \div 3$ ).
- Pupils develop reliable written methods for division, starting with calculations of 2- digit numbers by 1-digit numbers using short division.
- Halve even numbers up to 50 and multiples of ten to 100
- Perform divisions within the tables including those with remainders, e.g.  $38 \div 5$ .

# DIVISION ÷

**Year 4** Divide up to 3 digit numbers by a single digit.

Short division: Limit numbers to NO remainders in the answer (each digit must be a multiple of the divisor).

Remind children of correct place value, that 96 is equal to 90 and 6.

$$\begin{array}{r} 32 \\ 3 \overline{) 96} \end{array}$$

Move to short division with remainders.

$$\begin{array}{r} 47r2 \\ 6 \overline{) 284} \end{array}$$

**Key vocabulary** share, share equally, one each, two each..., group, equal groups of, lots of, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, 'carry', remainder, multiple, **divisible by**, **factor**

## Key Skills for division at Year 4

- Use short division to divide a 2-digit or a 3-digit number by a single-digit number.
- Give remainders as whole numbers.
- Recall multiplication and division facts for all numbers up to  $12 \times 12$ .
- Use place value, known and derived facts to multiply and divide mentally, including: multiplying and dividing by 10 and 100 and 1.
- Pupils practise to become fluent in the formal written method of short division with exact answers when dividing by a one-digit number
- Pupils practise mental methods and extend this to three-digit numbers to derive facts, for example  $200 \times 3 = 600$  so  $600 \div 3 = 200$
- Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers.

# DIVISION ÷

**Year 5** Divide up to 4 digits by a single digit  $<$  or  $=$  to 12, including answers with remainders.

Short division including remainder answers.

$$\begin{array}{r} 0663 \text{ r } 5 \\ 8 \overline{) 5309} \end{array}$$

The answer could be expressed as 663 remainder 5 or  $663 \frac{5}{8}$  or as a decimal.

$$\begin{array}{r} 47 \text{ r } 2 \\ 6 \overline{) 284} \end{array}$$

Division should be given in a real life context, including using money and measures, so that pupils know to round the answer up or down. Answers could also be given as remainders, decimals or fractions.

**Key vocabulary** share, share equally, one each, two each..., group, equal groups of, lots of, divide, divided by, divided into, division, grouping, left, left over, inverse, short division, 'carry', remainder, multiple, divisible by, factor **quotient, prime number, prime factors, composite number (non-prime)**

## Key Skills for division at Year 5

- Recall multiplication and division facts for all numbers up to  $12 \times 12$  (as in Y4).
- Multiply and divide numbers mentally, drawing upon known facts.
- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two number.
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.
- Use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.
- Work out whether a number up to 100 is prime, and recall prime numbers to 19
- Divide numbers up to 4 digits by a one-digit number using the short division method and interpret remainders appropriately for the context
- Use multiplication and division as inverses. Interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (e.g.  $98 \div 4 = 24 \text{ r } 2 = 24\frac{1}{2} = 24.5 \approx 25$ ).

# DIVISION ÷

**Year 6** Divide at least 4 digit numbers by single and 2 digit numbers (including decimals).

Short division (for dividing by a single digit)

$$\begin{array}{r} 0812.125 \\ 8 \overline{)6497.000} \end{array}$$

Children should continue to use short division with remainders. They need to learn how to express an answer as a remainder, a fraction or as a decimal as in in this example. It is important for children to start from real life problem solving contexts and for them to consider how.

Introduce long division for dividing by 2 digits.

$$\begin{array}{r} 081 \\ 12 \overline{)9972} \end{array}$$

Teachers must consult division progression methods for previous years in order to determine valid starting points for children in year 6.

**Key vocabulary** As previously, & **common factor**

## Key Skills for division at Year 6

- Recall and use multiplication and division facts for all numbers to 12 x 12 for more complex calculations
- Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context. Use short division where appropriate.
- Perform mental calculations, including with mixed operations and large numbers.
- Identify common factors, common multiples and prime numbers.
- Solve problems involving all 4 operations.
- Use estimation to check answers to calculations and determine accuracy, in the context of a problem.
- Use written division methods in cases where the answer has up to two decimal places.
- Solve problems which require answers to be rounded to specified degrees of accuracy.

