

**Edgar Sewter Primary School**  
**Calculation Policy for Mathematics**  
**Updated September 2015**

The following calculation policy has been updated to meet requirements of the National Curriculum 2014 and condense the BHS pyramid's calculation policy to make it more user friendly.

The calculation policy is organised according to age stage expectations as set out in National Curriculum 2014, however, **it is vital that pupils are taught according to the stage that they are currently working at.**

It is important that any type of calculation is given a real life context or problem solving approach to help build children's understanding of the purpose of calculation, and to help them recognise when to use certain operations and methods when faced with problems.

Pupils need to be taught and encourage to decide what approach they will take to a calculation, to ensure that they select the most appropriate method for the numbers involved:

**Can I do it in my head using a mental strategy?**

**Could I use some jottings to help me?**

**Should I use a written method to work it out?**

When working out trickier calculation, pupils should

**Approximate**

**Calculate**

**Check**

# Nursery and Reception Addition

Counting with resources, games, models and images and role play; recognising numerals around home and school

Making drawings to support addition



3

and



2

make 5 altogether

Understanding simple symbols using drawings

$$2 + 3 = \square$$

At a party, I eat 2 cakes and my friend eats 3.

How many cakes did we eat altogether?



Understanding and recognition of number bonds to 10 and 20

What number can I add to 7 to make 10?

How many ways can I make the number 10 by adding 2 numbers?

What number can be added to 14 to make 20?

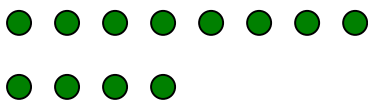
How many number bonds to 20 are there?

Understand simple symbols using jottings

$$8 + 4 = \square$$

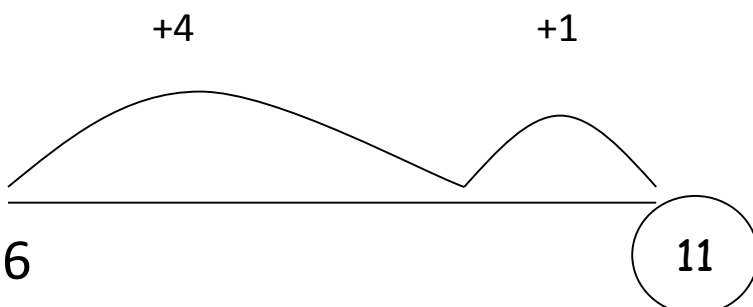
8 people are on the bus. 4 more get on at the next stop.

How many people are on the bus now?



Using a number line to add small numbers, using knowledge of number bonds to 10 to bridge 10

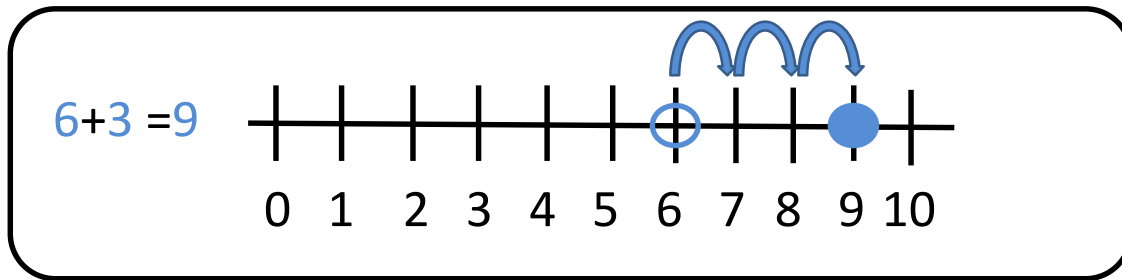
$$6 + 5 = \square$$





# Year 1 Addition

Use numbered lines to add, by counting on in ones (initially). Encourage children to start with a **larger** number and count on.



Children should:

Have access to a wide range of counting equipment, everyday objects, number tracks and number lines, hundred squares and be shown numbers in different contexts.

Represent and use number bonds and related subtraction facts within 20

Add one-digit and two-digit numbers to 20, including zero

Read, write and interpret mathematical statements involving addition (+) and equals (=) signs

Interpret addition number sentences and solve missing box problems, using concrete objects and number line addition to solve them  $5 + 3 = \bigcirc$ ,  $15 + 4 = \bigcirc$ ,  $5 + 3 + 1 = \bigcirc$ ,  $\bigcirc + \bigcirc = 6$

## Key Vocabulary

**+, addition, add, more, plus, and, make, sum, total, altogether, double, one more, two more... ten more, =, equal to, equals, sign, is the same as, count on, number line**

## Key Skills

- Count to and across 100 beginning with 0 or 1, or from any given number
- Count, read and write numbers to 100 in numerals
- Count in multiples of twos, fives and tens
- Read and write numbers from 1 to 20 in numerals and words.
- Identify one more and one less given a number,
- Identify and represent numbers using objects and pictorial representations including the number line

# Year 2 Addition

Add 2 digit numbers and tens

$$24 + 20$$

+10 +10



Use of hundred square to see patterns when adding 10

Add 2 digit numbers and ones

$$27 + 7$$

+3 +4



Add two pairs of 2-digit numbers, moving to the partitioned column method when secure adding tens and ones

Use of Diennes Base 10 to model, compare to written method, to secure understanding

STEP 1: Only provide examples that **DO NOT** cross tens boundary until secure with method itself.  
STEP 2: Once they can add a multiple of ten to a 2-digit number

$$54 + 15$$

+10 +5



STEP 1

$$62 + 27$$

$$60 + 2$$

$$\underline{20 + 7}$$

$$80 + 9$$

$$= \underline{\underline{89}}$$

STEP 2

$$55 + 37$$

$$50 + 5$$

$$\underline{30 + 7}$$

$$80 + 12$$

$$= \underline{\underline{92}}$$

STEP 3

Move to adding 2 and 3-digit numbers using partitioned column method (Year 3)

## Key Vocabulary

+, addition, add, more, plus, and, make, sum, total, altogether, double, one more, two more... ten more, ..., one hundred more, = equal to, equals, sign, is the same as, count on, number line, tens boundary

## Key Skills

- Add 2-digit number and ones
- Add 2-digit number and tens
- Add two 2-digit numbers
- Add three 1-digit numbers
- Show that addition of two numbers can be done in any order (commutative)
- Recall and use addition bonds to 20 and bonds of tens to 100 (30 + 70 etc)
- Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward
- Recognise the place value of each digit in a two-digit number (tens, ones)
- Compare and order numbers from 0 up to 100; use <, > and = signs
- Read and write numbers to at least 100 in numerals and in words
- Solve problems with addition using concrete objects and pictorial representations, including those involving numbers, quantities and measures and applying their increasing knowledge of mental and written methods

# Year 3 Addition

Add numbers with up to 3 digits

Expanded column addition

$$\begin{array}{r} 367 + 185 = 552 \\ 367 \\ + 185 \\ \hline 12 \\ 140 \\ 400 \\ \hline 552 \end{array}$$

Compact column addition

$$\begin{array}{r} 367 + 185 = 552 \\ 367 \\ + 185 \\ \hline 552 \\ 11 \end{array}$$

What's the same?  
What's different?

Remind pupils the actual value is 'six tens add eight tens',  
not 'six add eight', which equals fourteen tens.

Use **place value equipment** to support understanding

**Add ones first**, in preparation for compact method.

Children who are very secure and confident with 3-digit expanded column addition should be moved onto the compact column addition method, being introduced to "carrying" for the first time. Compare the expanded method to the compact column method to develop an understanding of the process and the reduced number of steps involved.

## Key Vocabulary

+, addition, add, more, plus, and, make, sum, total, altogether, double, one more, two more... ten more, ..., one hundred more, = equal to, equals, sign, is the same as, count on, number line, tens boundary, hundreds boundary, estimate, approximate, approximately,

## Key Skills

- Read and write numbers up to 1000 in numerals and in words
- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- Add a three-digit number and ones mentally (146 + 8)
- Add a three-digit number and tens mentally (328 + 60)
- Add a three-digit number and hundreds mentally (254 + 500)
- Add two-digit numbers mentally including exceeding 100
- Find 10 or 100 more than a given number
- Estimate the answer to a calculation and use inverse operations to check answers
- Add numbers with up to three digits, using formal written methods of columnar addition and subtraction
- Solve problems, including missing number problems, using number facts, place value, and more complex addition.
- Continue to practise a wide range of mental addition strategies, i.e. number bonds, adding nearest multiple of 10, 100, 1000 and adjusting, using near doubles, partitioning and recombining

# Year 4 Addition

Add numbers with up to 4 digits

$$4327 + 1892 = 6219$$

$$\begin{array}{r} 4327 \\ + 1892 \\ \hline 6219 \\ 11 \end{array}$$

$$4327 + 1892 + 457 = 6676$$

$$\begin{array}{r} 4327 \\ 1892 \\ + 457 \\ \hline 6676 \\ 111 \end{array}$$

Use and apply this method to money and measurement values.

Introduce the **compact column addition** method by asking children to add the two given numbers together using the method that they are familiar with (**expanded column addition**—see Y3). Teacher models the compact method with carrying, asking children to discuss similarities and differences and establish how it is carried out.

## Key Vocabulary

+, add, more, plus, and, make, sum, total, altogether, increase, inverse, double, one more, two more... ten more, ..., one hundred more, one thousand more, = equal to, equals, sign, is the same as, count on, number line, tens boundary, hundreds boundary, most, tens, ones, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, "carry", expanded, compact, thousands, hundreds, digits, inverse, estimate, approximate, approximately,

## Key Skills

- Select most appropriate method: mental, jottings or written and explain why.
- Count in multiples of 1000
- Find 1000 more or less than a given number
- Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
- Identify, represent and estimate numbers using different representations
- Round any number to the nearest 10, 100 or 1000
- Solve number and practical problems that involve all of the above and with increasingly large positive numbers
- Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- Estimate and use inverse operations to check answers to a calculation
- Solve two-step problems in contexts, deciding which operations and methods to use and why.

# Year 5 Addition

Add numbers with more than 4 digits including money, measures and decimals with different numbers of decimal places.

The diagram illustrates three examples of addition problems with callout boxes explaining key concepts:

- Example 1:** 
$$\begin{array}{r} \pounds 35.78 \\ + \pounds 27.34 \\ \hline \pounds 63.12 \\ 1\ 1\ 1 \end{array}$$
- Example 2:** 
$$\begin{array}{r} 18.04 \\ 7.67 \\ + 0.80 \\ \hline 26.51 \\ 1\ 1\ 1 \end{array}$$
- Example 3:** 
$$\begin{array}{r} 36706 \\ 8624 \\ 2452 \\ + 415 \\ \hline 48197 \\ 1\ 2\ 1 \end{array}$$

Callout boxes and their content:

- Decimal point and other place value columns should be aligned
- Pupils should be able to add more than two numbers
- Use zero as place holder
- Say 'four hundredths' and 'seven hundredths' to reinforce place value

## Key Vocabulary

+, add, more, plus, and, make, sum, total, altogether, increase, inverse, double, one more, two more... ten more, ..., one hundred more, one thousand more, = equal to, equals, sign, is the same as, count on, number line, tens boundary, hundreds boundary, ones boundary, tenths boundary, most, tens, ones, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, "carry", expanded, compact, thousands, hundreds, digits, inverse, estimate, approximate, approximately, inverse, decimal place, decimal point, tenths, hundredths, thousandths, estimate, approximate, approximately,

## Key Skills

- **Select most appropriate method: mental, jottings or written and explain why.**
- Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000
- Add whole numbers with more than 4 digits, including using formal written methods (columnar addition)
- Add numbers mentally with increasingly large numbers
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- Solve addition multi-step problems in contexts
- Solve number problems and practical problems that involve all of the above



# Year 6 Addition

Add several numbers with increasing complexity different numbers of decimal places (including money and measures)

$$\begin{array}{r} 32.743 \\ 7.030 \\ 29.870 \\ +1.600 \\ \hline 71.243 \\ \text{2 2 1} \end{array}$$

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

Zeros could be added into any empty decimal places, to show there is no value to add.

## Key Vocabulary

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

## Key Skills

- **Select most appropriate method: mental, jottings or written and explain why.**
- Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit
- Round any whole number to a required degree of accuracy
- Solve number and practical problems
- Perform mental calculations, including with mixed operations and large numbers
- Use their knowledge of the order of operations to carry out calculations involving the four operations
- Solve multi-step problems in contexts, deciding which operations and methods to use and why

# Nursery and Reception Subtraction

Counting with resources, games, models and images and role play; recognising numerals around home and school

Using counting resources to take an amount away and count how many are left; begin to look at the inverse relationship between addition and subtraction

Making drawings to support subtraction

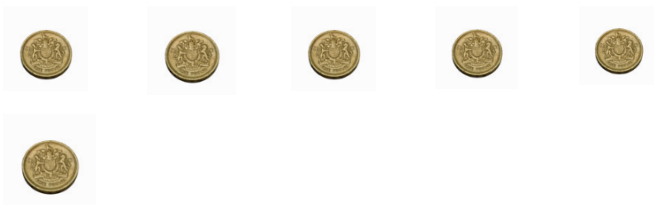


Finding the difference pictorially

A teddy bear costs £5 and a doll costs £2.

How much more does the bear cost?

Find the difference



Understanding simple symbols for subtraction

$$5 - 2 = \square$$

I had 5 balloons. 2 of them burst.

How many did I have left?

Take away



Understanding simple symbols using jottings

$$8 - 3 = \square$$

Mum baked 8 biscuits. I ate 3.

How many were left?

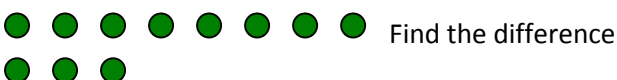
Take away



Finding the difference with jottings

Lisa has 8 felt tip pens and Tim has 3.

How many more does Lisa have?

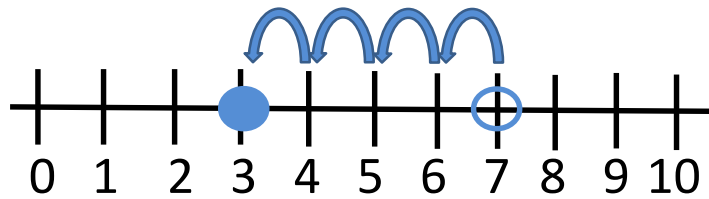


# Year 1 Subtraction

Children consolidate understanding of subtraction practically, showing subtraction on bead strings, using cubes etc. and in familiar contexts, and are introduced to more formal recording using number lines as below

Take away

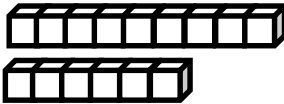
$$7 - 4 = 3$$



Count back in ones on a numbered number line to take away, with numbers up to 20.

Find the difference between

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



Nine is 3 more than six

I am 2 years older than my sister

Children should:

Have access to a wide range of counting equipment, everyday objects, number tracks, number lines and hundred squares, and be shown numbers in different contexts.

Represent and use number bonds and related subtraction facts within 20

Subtract one-digit and two-digit numbers to 20, including zero

Read, write and interpret mathematical statements involving subtraction (−) and equals (=) signs

Interpret addition number sentences and solve missing box problems, using concrete objects and number line addition to solve them  $9 - 7 = \bigcirc$ ,  $14 - 6 = \bigcirc$ ,  $9 - \bigcirc = 2$ ,  $\bigcirc - \bigcirc = 6$

## Key Vocabulary

-, subtract, take (away), minus, leave, how many are left/left over? How many have gone? One less, two less ... ten less, how many more to make...? How many more is ... than...? How many fewer is ... than ...? How much less is...? difference between, =, equals, sign, is the same as, number bonds/pairs, missing numbers

## Key Skills

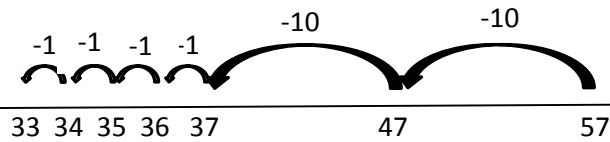
- Count backwards from any given number including across 100
- Count, read and write numbers to 100 in numerals;
- Count in multiples of twos, fives and tens
- Read and write numbers from 1 to 20 in numerals and words.
- Identify one more and one less than a given number
- Identify and represent numbers using objects and pictorial representations including the number line

# Year 2 Subtraction

## Subtracting pairs of 2-digit numbers on a number line

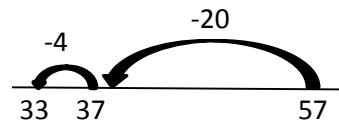
$$57 - 24 = 33$$

Partition the second number and subtract it in tens and ones, as below



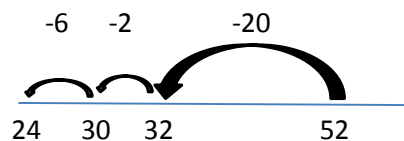
Subtract tens first, then ones

Move towards more efficient jumps back as below



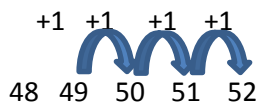
Combine with use of hundred square to reinforce understanding of number value and order

Teach children to **bridge through ten** to help them become more efficient, for example  $52 - 28$



Subtract numbers close together by **counting on**

$52 - 48$  Count on from smaller number



Children are taught to recognise that when numbers are close together, it is more efficient to **count on** the difference. They need to be clear about the relationship between addition and subtraction.

## Key Vocabulary

-, subtract, take (away), minus, leave, how many are left/left over? How many have gone? One less, two less ... ten less, one hundred less, tens boundary, how many more to make...? How many more is ... than...? How many fewer is ... than ...? How much less is...? difference between, =, equals, sign, is the same as, number bonds/pairs/facts, missing numbers,

## Key Skills

- Subtract ones from a 2-digit number (*take away/counting back*)
- Subtract tens from a 2-digit number (*take away/counting back*)
- Subtract two 2-digit numbers
- Recall and use subtraction facts to 20, and related facts up to 100 ( $100 - 70 = 30$ )
- Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward
- Recognise the place value of each digit in a two-digit number (tens, ones)
- Solve problems with subtraction using concrete objects and pictorial representations, including those involving numbers, quantities and measures and applying their increasing knowledge of mental and written methods
- Compare and order numbers from 0 up to 100; use  $<$ ,  $>$  and  $=$  signs
- Read and write numbers to at least 100 in numerals and in words

# Year 3 Subtraction

Use columnar subtraction with up to three digits

## Partitioning

$$786 - 54 = 732$$

$$\begin{array}{r}
 = \quad 700 \quad 80 \quad 6 \\
 - \quad \quad \quad 50 \quad 4 \\
 \hline
 = \quad 700 \quad 30 \quad 2
 \end{array}$$

## Decomposition in Expanded Form

$$754 - 86 = 668$$

$$\begin{array}{r}
 700 \quad 50 \quad 4 \\
 - \quad \quad \quad 80 \quad 6 \\
 \hline
 \end{array}$$

### Exchange the tens and ones

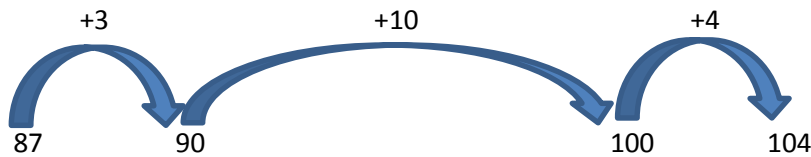
$$\begin{array}{r}
 \quad \quad 40 \\
 700 \quad \cancel{50} \quad 14 \\
 - \quad \quad \quad 80 \quad 6 \\
 \hline
 \quad \quad \quad \quad 8
 \end{array}$$

### Exchange the hundreds and tens

$$\begin{array}{r}
 \quad \quad 600 \\
 \cancel{700} \quad 140 \quad 14 \\
 - \quad \quad \quad 80 \quad 6 \\
 \hline
 = \quad 600 \quad 60 \quad 8
 \end{array}$$

Step 1: Children will be taught to partition numbers, and will deal with numbers that are not crossing the tens or hundreds boundaries.  
Step 2: Using **place value equipment** to model, children will be taught to exchange

Counting on as a mental calculation strategy, where numbers are close together e.g. 104-87 (In tens and ones first, before 'jumping to nearest ten')



## Key Vocabulary

-, subtract, take (away), minus, leave, how many are left/left over? How many have gone? One less, two less ... ten less, one hundred less, tens boundary, exchange, how many more to make...? How many more is ... than...? How many fewer is ... than ...? How much less is...? difference between, =, equals, sign, is the same as, number bonds/pairs/facts, missing numbers, estimate, round, approximate, approximately

## Key Skills

- Read and write numbers up to 1000 in numerals and in words
- Subtract ones from a three-digit number mentally
- Subtract tens from a three-digit number mentally
- Subtract hundreds from a three-digit number mentally
- 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)
- Subtract numbers with up to three digits, using formal written methods of columnar 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 subtraction.
- Continue to practise a wide range of mental addition strategies, i.e. number bonds, subtracting nearest multiple of 10, 100, 1000 and adjusting, using near halves, partitioning and recombining

# Year 4 Subtraction

Subtract with up to 4-digit numbers

Partitioned column subtraction using exchanging  
(decomposition)

$$\begin{array}{r} 3726 - 1564 = 2162 \\ 600 \\ 3000 + \cancel{700} + 120 + 6 \\ -1000 + 500 + 60 + 4 \\ \hline 2000 + 100 + 60 + 2 \end{array}$$



Compact column subtraction

$$\begin{array}{r} 3726 - 1564 = 2162 \\ 3 \overset{6}{\cancel{7}} 2 6 \\ \underline{1 5 6 4} \\ 2 1 6 2 \end{array}$$

What's the same?  
What's different?

Use **place value equipment** to reinforce understanding of exchanging.

When introducing compact method, get children to use partitioned method, show compact and ask for similarities.

Children should apply this method to money and measures.

**Always encourage children to consider the best method for the numbers involved— mental, counting on, counting back or written method.**

## Key Vocabulary

-, subtract, take (away), minus, leave, how many are left/left over? How many have gone? One less, two less ... ten less, one hundred less, tens/hundreds boundary, exchange, how many more to make...? How many more is ... than...? How many fewer is ... than ...? How much less is...? difference between, =, equals, sign, is the same as, number bonds/pairs/facts, missing numbers, estimate, round, approximate, approximately, inverse

## Key Skills

- **Select most appropriate method: mental, jottings or written and explain why.**
- Estimate and use inverse operations to check answers to a calculation
- Count in multiples of 1000
- Find 1000 less than a given number
- Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
- Identify, represent and estimate numbers using different representations
- Round any number to the nearest 10, 100 or 1000
- Solve number and practical problems that involve all of the above and with increasingly large positive numbers
- Subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction **where appropriate**
- Solve two-step problems in contexts, deciding which operations and methods to use and why.

## Year 5 Subtraction

Subtract with at least 4-digit numbers including money, measures, decimals

Children who are still not secure in number facts and place value will need to remain on the partitioned column method until ready for the compact method. (See year 4)

$$\begin{array}{r} 23^{10} 148^{10} 6 \\ -2165 \\ \hline 28341 \end{array}$$

$$\begin{array}{r} 23^{10} 158^{11} 10 \\ -1674.32 \\ \hline 2483.88 \end{array}$$

Subtract with decimal values, including mixtures of integers and decimals, aligning the decimal point. Add a "zero" in any empty decimal places to aid understanding of what to subtract in that column.

Create lots of opportunities for subtracting and finding differences with money and measures.

**Always encourage children to consider the best method for the numbers involved— mental, counting on, counting back or written method**

### Key Vocabulary

-, subtract, take (away), minus, leave, how many are left/left over? How many have gone? One less, two less ... ten less, one hundred less, hundreds/tens/ones/tenths boundary, exchange, how many more to make...? How many more is ... than...? How many fewer is ... than ...? How much less is...? difference between, =, equals, sign, is the same as, number bonds/pairs/facts, missing numbers, estimate, round, approximate, approximately, inverse

### Key Skills

- **Select most appropriate method: mental, jottings or written and explain why.**
- Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000
- Subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction)
- Subtract numbers mentally with increasingly large numbers
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- Solve subtraction multi-step problems in contexts
- Solve number problems and practical problems that involve all of the above
- Interpret negative numbers in context, count forwards and backwards with negative whole numbers, including through zero

## Year 6 Subtraction

Subtracting with increasingly large and more complex numbers and decimal values

$$\begin{array}{r} 45112156711 \\ -15742 \\ \hline 36829 \end{array}$$

$$\begin{array}{r} 1291134.167133 \text{ kg} \\ -87.840 \text{ kg} \\ \hline 116.893 \text{ kg} \end{array}$$

Pupils should be able to apply their knowledge of a range of mental strategies, mental recall skills, and informal and formal written methods when selecting the most appropriate method to work out subtraction problems.

### Key Vocabulary

-, subtract, take (away), minus, leave, how many are left/left over? How many have gone? One less, two less ... ten less, one hundred less, hundreds/tens/ones/tenths/hundredths boundary, exchange, how many more to make...? How many more is ... than...? How many fewer is ... than ...? How much less is...? difference between, =, equals, sign, is the same as, number bonds/pairs/facts, missing numbers, estimate, round, approximate, approximately, inverse

### Key Skills

- **Select most appropriate method: mental, jottings or written and explain why.**
- Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000
- Subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
- Subtract numbers mentally with increasingly large numbers
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
- solve number problems and practical problems that involve all of the above
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.



# Nursery and Reception Multiplication

**Children need to start multiplication methods as stories using visual prompts.**

i.e. Little Red Riding Hood took 2 apples to Grandma, 2 apples to her mother and 2 apples to the Wood cutter, how many apples did she deliver all together? Use apples to visualise the problem, move the apples around, make different arrays which one works for the problem, count in twos along the number line etc

**Move to written representation of sums but solve pictorially, discuss as 6 lots of 2 or 2 groups of 6, discuss as an array, count in 2's count in 6's etc**

i.e.  $6 \times 2 =$

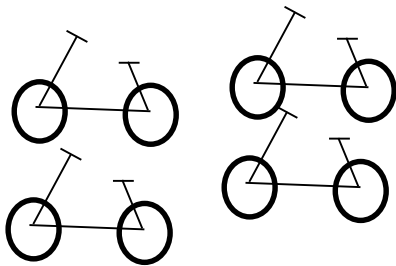


# Year 1 Multiplication

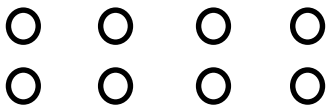
Children should:

Multiply with concrete objects, arrays (lego!) and pictorial representations.

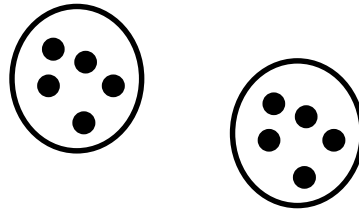
How many wheels on 4 bikes?



$$2 + 2 + 2 + 2 = 8$$



There are five sweets in one bag. How many sweets in three bags?



$$5 + 5 + 5 = 15$$

Give children experience of counting equal group of objects in 2s, 5s and 10s.

Present practical problem solving activities involving counting equal sets or groups, as above.

## Key vocabulary

groups of, grouping, doubling, lots of, times, array, altogether, multiply, multiplied by, multiple, count, double, pattern

## Key skills for multiplication at Y1:

Count in multiples of twos, fives and 10. (*Make connections link to counting coins, minutes round a clock*)

Solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Make connections between arrays, number patterns, and counting in twos, fives and tens

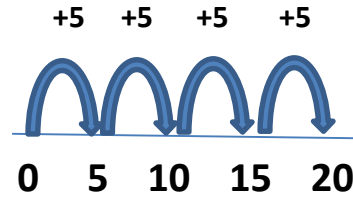
# Year 2 Multiplication

Children should:

Multiply with using arrays and repeated addition (using at least 2s, 5s and 10s)

## Use repeated addition on a number line

Starting from zero, make equal jumps up on a number line to work out multiplication facts and write multiplication statements using x and = signs



4 lots of 5

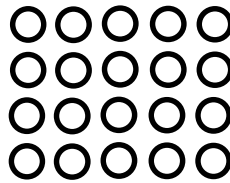
$4 \times 5 =$

$4 \times 5 = 20$

## Use arrays

Use arrays to help teach children to understand the **commutative law** of multiplication  $4 \times 5 = 5 \times 4$

Give examples such as  $4 \times \underline{\quad} = 20$ .



$$5 \times 4 = 4 + 4 + 4 + 4 + 4 = 20$$

$$4 \times 5 = 5 + 5 + 5 + 5 = 20$$

## Mental recall

Children should begin to recall multiplication facts for 2, 5 and 10 times tables through practice in counting and understanding of the operation

## Key vocabulary

X, groups of, lots of, times, array, altogether, multiplication, multiply, count, multiplied by, multiple, double, array, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times,...ten times, times as (big, long, wide... and so on) double, multiple of, count on, multiplication table, multiplication fact

## Key skills for multiplication at Y2:

Count in steps of 2, 3 and 5 from zero, and in 10s from any number.

Recall and use multiplication facts from the 2, 5 and 10 multiplication tables, including recognising odds and evens.

Write and calculate number statements using the x and = signs

Show that multiplication can be done in any order (commutative).

Solve a range of problems involving multiplication, using concrete objects, arrays, repeated addition, mental methods, and multiplication facts.

Pupils use a variety of language to discuss and describe multiplication.

# Year 3 Multiplication

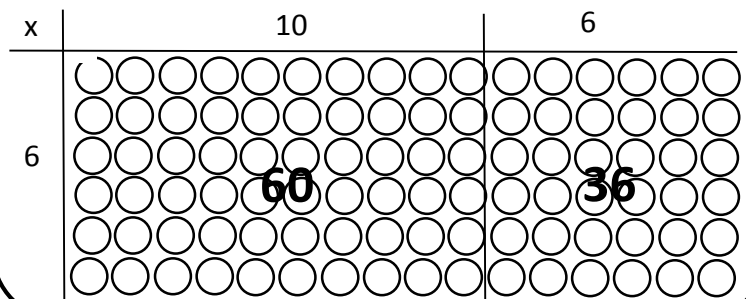
## Multiply 2-digits by a single digit number

Introduce the **grid method** for multiplying 2-digit by single-digits

x	20	3
8	160	24

$$160 + 24 = 184$$

Link the layout of the grid to an array initially



Introduce the grid method with children physically making an array to represent the calculation (e.g. make 8 lots of 23 with 10s and 1s place value counters), then translate this to grid method format.

### Children need to be able to

Partition numbers into tens and units

Multiply multiples of ten by a single digit (e.g.  $20 \times 4$ ) using their knowledge of multiplication facts and place value

Recall and work out multiplication facts in the 2, 3, 4, 5, 8 and 10 times tables.

Work out multiplication facts not known by repeated addition or other taught mental strategies (e.g. by commutative law, working out near multiples and adjusting, using doubling etc.) Strategies to support this are repeated addition using a number line, bead bars and arrays.

## Key vocabulary

X, groups of, lots of, times, array, altogether, multiplication, multiply, count, multiplied by, multiple, product, double, array, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times,...ten times, times as (big, long, wide... and so on) double, multiple of, count on, multiplication table, multiplication fact, factor

## Key skills for multiplication at Y3:

Recall and use multiplication facts for the 2, 3, 4, 5, 8 and 10 multiplication tables, and multiply by multiples of 10.

Write and calculate number statements using the multiplication tables they know, including 2-digit x single-digit, drawing upon mental methods, and progressing to reliable written methods.

Solve multiplication problems, including missing number problems.

Develop mental strategies using commutativity (e.g.  $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$ )

Solve simple problems in contexts, deciding which operations and methods to use.

Develop efficient mental methods to solve a range of problems e.g using commutativity ( $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$ ) and for missing number problems  $\_\_ \times 5 = 20$ ,  $3 \times \_\_ = 18$ ,  $\_\_ \times \_\_ = 32$

# Year 4 Multiplication

Multiply 3 and 4 digits by a single digit number using all facts up to 12 x 12

Develop the grid method

x	300	60	7
6	1800	360	42

1800  
360  
+42

Use column addition to total accurately

Move onto short multiplication (see Y5) if and when children are confident and accurate multiplying 2 and 3-digit numbers by a single digit this way, and are already confident in "carrying" for written addition

**Children need to be able to:**

**Approximate** before they calculate, and make this a regular part of their calculating, going back to the approximation to **check** the reasonableness of their answer.

e.g:  $-346 \times 9$  is approximately  $350 \times 10 = 3500$

Record an approximation to check the final answer against.

Multiply multiples of ten and one hundred by a single-digit, using their multiplication table knowledge.

Recall all times tables up to 12 x 12

## Key vocabulary

X, groups of, lots of, times, array, altogether, multiplication, multiply, count, multiplied by, multiple, product, double, array, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times,...ten times, times as (big, long, wide... and so on) double, multiple of, count on, multiplication table, multiplication fact, factor, round, approximate,

## Key skills for multiplication at Y4:

Count in multiples of 6, 7, 9, 25 and 1000

Recall multiplication facts for all multiplication tables up to 12 x 12.

Recognise place value of digits in up to 4-digit numbers

Use place value, known facts and derived facts to multiply mentally, e.g. multiply by 1, 10, 100, by 0, or to multiply 3 numbers.

Use commutativity and other strategies mentally  $3 \times 6 = 6 \times 3$ ,  $2 \times 6 \times 5 = 10 \times 6$ ,  $39 \times 7 = 30 \times 7 + 9 \times 7$ .

Solve problems with increasingly complex multiplication in a range of contexts.

Count in multiples of 6, 7, 9, 25 and 1000

Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)

# Year 5 Multiplication

Multiply up to 4-digits by 1 or 2 digits.

Introducing column multiplication

Introduce by comparing a grid method calculation to a short multiplication method, to see how the steps are related, but notice how there are less steps involved in the column method

Children need to be taught to **approximate first**, e.g. for  $62 \times 39$ , they will use rounding:  $62 \times 39$  is approximately  $60 \times 40 = 2400$ , and use the approximation to **check** the reasonableness of their answer against

Short multiplication

x	300	60	4
7	2100	420	28

What's the same?

What's different?

$$\begin{array}{r} 364 \\ \times 7 \\ \hline 28 \\ 420 \\ \hline 2100 \\ \hline 2548 \end{array}$$

$$\begin{array}{r} 364 \\ \times 7 \\ \hline 2548 \\ 42 \end{array}$$

Long multiplication – use of grid when introducing

x	300	20	7
60	18000	1200	420
3	900	60	21

What's the same?

What's different?

$$\begin{array}{r} 327 \\ \times 63 \\ \hline 420 \text{ (60 x 7)} \\ 1200 \text{ (60 x 20)} \\ 18000 \text{ (60 x 300)} \\ \hline 21 \text{ (3 x 7)} \\ 60 \text{ (3 x 20)} \\ 900 \text{ (3 x 300)} \\ \hline 20601 \end{array}$$

$$\begin{array}{r} 327 \\ \times 63 \\ \hline 19620 \\ \underline{981} \\ \hline 20601 \end{array}$$

## Key vocabulary

X, groups of, lots of, times, array, altogether, multiplication, multiply, count, multiplied by, multiple, product, double, array, repeated addition, commutative, multiple of, multiplication table, multiplication fact, factor, product, inverse, square, integer, short/long multiplication, 'carry', round, approximate

## Key skills for multiplication at Y5:

Identify multiples and factors, using knowledge of multiplication tables to  $12 \times 12$ .

Solve problems where larger numbers are decomposed into their factors

Multiply and divide integers and decimals by 10, 100 and 1000

Recognise and use square and cube numbers and their notation

Solve problems involving combinations of operations, choosing and using calculations and methods appropriately

# Year 6 Multiplication

Short and long multiplication as in Y5, and multiply decimals with up to 2d.p. by a single digit

$$\begin{array}{r} 8.19 \\ \times 7 \\ \hline 57.33 \\ \hline \end{array}$$

1 6

Line up the decimal points in the question and the answer

Children will be able to:

Use rounding and place value to make **approximations** before calculating and use these to check answers against.

Use short multiplication (see Y5) to multiply numbers with more than 4-digits by a single digit; to multiply money and measures, and to multiply decimals with up to 2d.p. by a single digit.

Use long multiplication (see Y5) to multiply numbers with at least 4 digits by a 2-digit number.

## Key vocabulary

X, groups of, lots of, times, array, altogether, multiplication, multiply, count, multiplied by, multiple, product, tenths, hundredths, decimal place, array, repeated addition, commutative, multiple of, multiplication table, multiplication fact, factor, product, inverse, square, integer, short/long multiplication, 'carry', round, approximate

## Key skills for multiplication at Y6:

Recall multiplication facts for all times tables up to 12 x 12 (as Y4 and Y5).

Multiply multi-digit numbers, up to 4-digit x 2-digit using long multiplication.

Perform mental calculations with mixed operations and large numbers.

Solve multi-step problems in a range of contexts, choosing appropriate combinations of operations and methods.

Estimate answers using round and approximation and determine levels of accuracy.

Round any integer to a required degree of accuracy.

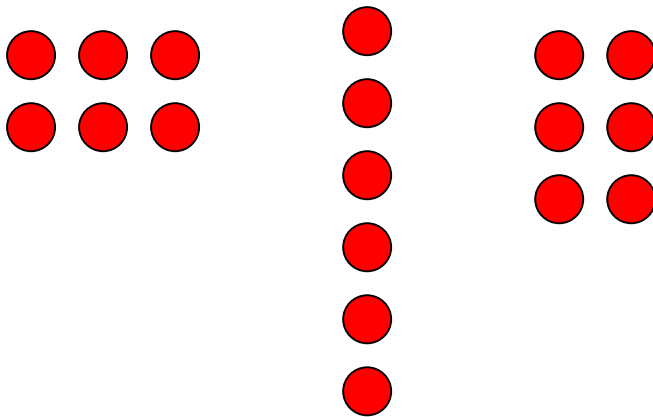
# Nursery and Reception Division

Children need to have lots of opportunities to count *and share* in groups, starting in groups of 2's, 5's and 10's. They need to count back and along in 2's, 5's, 10's etc. and they need to start from different starting points on the number line.

Mental oral starters need to include counting out loud, backwards in increments of 2, 5, 10

Play with numbers and their arrays on a regular basis, (use the word array). Encourage child to make it a habit that when they see a number they count out that many counters and play around with what it looks like in different arrangements,

i.e 6 looks like . . . .



Mental Oral Starter needs to include repeated subtraction,

i.e  $100 - 2 - 2 - 2 - 2 - 2 = \text{etc}$

Children must understand grouping and sharing and from a young age discuss 'left overs'

i.e. if Josie has 10 cakes and she shares them with 5 children including herself, how many cakes does each child receive? Use toys to role play such scenarios.

What if Josie had 11 cakes, what would happen?

(Start with the total number and share out to each child until there are no more left)

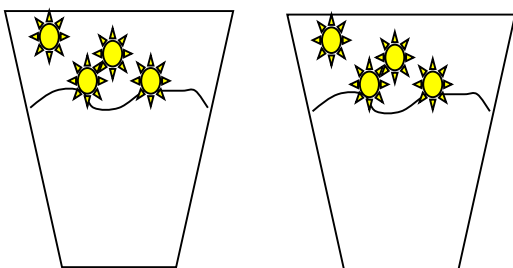
i.e. if Jason has a game to play where he needs to organise his 12 friends into groups of 3 how many groups will he have?

(Count in groups of 3 until all the people have been used)

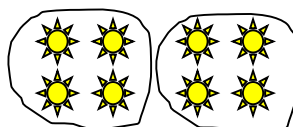
Use pictures and equipment to solve division

i.e 8 sunflowers seeds into 2 pots.  $8 \div 2 =$

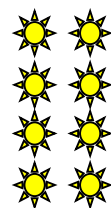
by sharing;



by grouping



OR





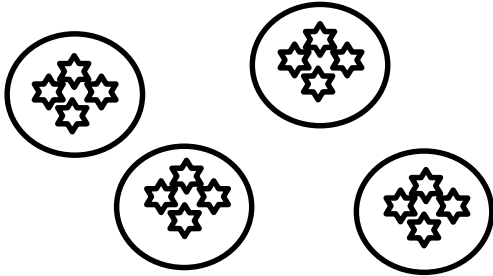
# Year 1 Division

Children should:

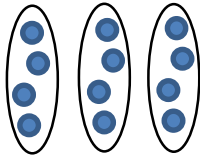
## Group and share small quantities

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

**Grouping** How many groups of 4 can be made with 12 stars? 3



**Sharing** 12 shared between 3 is 4



Example division problem in a familiar context:

There are 5 pupils on this table and there are 15 pieces of fruit to share between us. If we share them equally, how many will we each get?

Can they work it out and give a division statement... ?

“15 shared between 5 people gives you 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 number skills needed for division at Y1:

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.

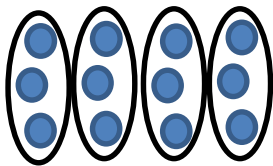
# Year 2 Division

Children should:

**Group and share, using the  $\div$  and  $=$  sign**

**Use objects, arrays, diagrams and pictorial representations, and grouping on a number line**

**Arrays:**



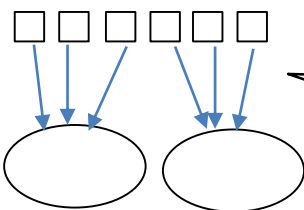
$$12 \div 3 = 4$$

How many groups of 3 are in 12?

Pupils should also show that the same array can represent  $12 \div 4 = 3$  if grouped horizontally

**Know and understand sharing and grouping**

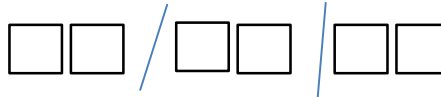
6 sweets shared between 2 people, how many do they each get?



sharing

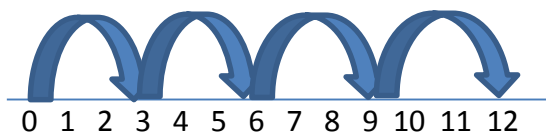
grouping

There are 6 sweets, how many people can have 2 sweets each?



**Grouping using a number line**

How many groups of 3 in 12?



## 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 number skills needed for division at Y2:

Count in steps of 2, 3, and 5 from 0

Recall and use division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.

Calculate mathematical statements for division within the multiplication tables and write them using the  $\div$  and  $=$  signs.

Show that division cannot be done in any order

Solve problems involving division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Grouping

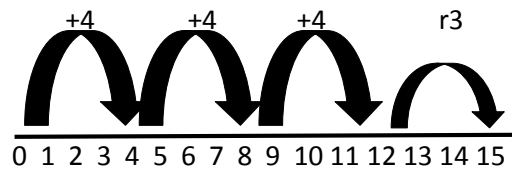
# Year 3 Division

## Divide 2-digits by a single digit number

### STEP 1: Grouping on a number line

Continue to work out unknown division facts by grouping on a number line from zero. Also now teach the concept of remainders. This is introduced practically and with arrays, alongside being shown on a number line. Children should work towards calculating basic division facts with remainders **mentally** for the 2s, 3s, 4s, 5s and 10s, ready for 'carrying' **remainders** across within the short division method

$$15 \div 4 = 3 \text{ r } 3$$



### STEP 2: Short division

Having no remainders OR carrying (each digit must be a multiple of the divisor)

$$93 \div 3$$

*Using Diennes and/or other place value equipment to support*

$$31$$

Remind children that 93 is 90+3 and pose

$$3 \overline{)93}$$

What is 9 tens divided into 3 groups? 3 tens (record above 9 tens)

What is 3 ones divided into 3 groups? 1 one (record above 3 ones)

*Consider whether children can do this mentally with jottings. i.e. knowing 90 is 3 x 30 and 3 is 3 x 1 – link to chunking.*

Having no remainders in the final answer, but remainders occurring with the tens digit

$$78 \div 3$$

**ONLY INTRODUCE ONCE CHILDREN UNDERSTAND HOW TO CALCULATE REMAINDERS AND SHORT DIVISION (ABOVE)**

*Using Diennes and/or other place value equipment to support*

$$3 \overline{)26} \text{ r } 18$$

Remind children that 93 is 90+3 and pose

What is 7 tens divided into 3 groups? 2 tens (record above 7 tens), remainder 1 ten (exchange into ten ones and carry to ones column)

What is 18 ones divided into 3 groups? 6 ones (record above 8 ones)

### 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, inverse, short division, remainder, multiple, how many ... in ....?

### Key number skills needed for division at Y3:

Recall and use division facts for the 2, 3, 4, 5, 8 and 10 multiplication tables (through doubling and halving, connect the 2, 4 and 8s).

Carry out mentally (with jottings as appropriate) division by 10, 100, 2 and 4

Write and calculate mathematical statements for division using the multiplication tables that they know, using mental and progressing to formal written methods.

Solve problems, in contexts, and including missing number problems, involving multiplication and division. Pupils develop efficient mental methods, for example, using multiplication and 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 and progressing to the formal written method of short division

# Year 4 Division

## Divide up to 3-digits by a single digit number

STEP 1: Pupils must be secure with short division for dividing 2-digit numbers by a single digit (see steps in year 3 - **continue to use place value equipment to support, can they do mentally with jottings**)

$$78 \div 3$$

$$\begin{array}{r} 26 \\ 3 \overline{)78} \end{array}$$

STEP 2: Pupils move onto dividing numbers with up to 3 digits by a single digit, where there is no remainder at this stage. Children who exceed this expectation may progress to level expected at year 5.

$$\begin{array}{r} 126 \\ 6 \overline{)71536} \end{array}$$

Using a zero to acknowledge place value when answer in 'first' column is not '1 or more'. Carry the number (7) to the next digit.

$$\begin{array}{r} 087 \\ 9 \overline{)77863} \end{array}$$

Use real-life contexts to help pupils gain a full understanding, including money and measure

Mental division with jottings

$$540 \div 4$$

Half

$$\begin{array}{c} 500 + 40 \\ \downarrow \quad \downarrow \\ 250 + 20 \end{array}$$

Half again

$$\begin{array}{c} \downarrow \quad \downarrow \\ 125 + 10 = 135 \end{array}$$

### 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, inverse, short division, "carry", remainder, multiple, divisible by, factor, place value, how many ... in ....?

### Key number skills needed for division at Y4:

Recall multiplication and division facts for all numbers up to  $12 \times 12$ .

Use place value, known and derived facts to divide mentally (with jottings where necessary) by 10 and 100 and 1, 2, 4 and 8.

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  $600 \div 3 = 200$  AND  $4 \times 3 = 12$  so  $120 \div 30 = 4$  etc.

Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers.

# Year 5 Division

Divide up to 4-digits by a single digit number, including those with remainders.

Short division, including remainder answers

$$\begin{array}{r} 0870r3 \\ 6 \overline{)5223} \end{array}$$

Division needs to have a real life problem solving context, where pupils consider the meaning of the remainder and how to express it.

The answer to  $5223 \div 6$  could be expressed as 870 remainder 3 OR 870 and three sixths =  $870 \frac{1}{2}$  OR 870.5 OR rounded as appropriate to the problem involved.

Pupils should make an **estimation**, before carrying out calculation, to use as a **check** AND/OR use **inverse**

If pupils are confident with dividing by one digit numbers they should be introduced to dividing by two digit numbers (chunking), **see year 6**

## 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, inverse, short division, "carry", remainder, multiple, divisible by, factor, inverse, place value, how many ... in ....?, quotient, prime number, prime factors, composite number, estimate

## Key number skills needed for division at Y5:

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 including by powers of ten, 2, 4, 8, 16 and 5, 20, 40 etc

**Use multiplication facts to divide near multiples mentally or jottings (link to chunking). E.g.  $312 \div 3 = 104$  (as  $3 \times 100 = 300$  and  $3 \times 4 = 12$ )**

Identify multiples and factors, including finding all factor pairs of a number, and common factors of two number.

Solve problems involving multiplication and division where larger numbers are decomposed into their factors.

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 formal written method of short division 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.  $98 \div 4 = 24 \text{ r } 2 = 24 \frac{1}{2} = 24.5 \approx 25$ ).

# Year 6 Division

Divide at least 4-digits by both single-digit and 2-digit numbers, including decimal numbers and quantities.

Short division, for dividing by a single digit

$$\begin{array}{r} 01870.33 \\ 6 \overline{) 115222.2020} \end{array}$$

**Calculating a decimal remainder:** In this example rather than expressing the remainder as r2, a decimal point is added after the units because there is still a remainder, and the remainder two is carried onto zeros after the decimal point (to show there was no decimal value in the original number). Keep dividing to an appropriate degree of accuracy for the problem being solved. (In this example some children will convert remainder to 2/6 find equivalent 1/3 and know decimal equivalent is 0.3333')

Dividing by 2 digits (chunking)

Find out 'How many 26s are in 962?' by **adding** chunks of 26, until you reach 962 exactly or can add no more 26s (then there is a remainder!)

Teach pupils to write 'Key Multiples' of divisor that will help them decide which chunks to use (2x, 4x, 10x, 5x)

When introducing, ask 'Can we use 10 lots?' As they become more confident, encourage more efficient chunks (e.g. 20x) expanding on their Key multiples

$$\begin{array}{r} 26 \overline{) 962} \\ 520 \quad (20x) \\ +260 \quad (10x) \\ \hline 780 \quad (30x) \\ +130 \quad (5x) \\ \hline 910 \quad (55x) \\ +52 \quad (2x) \\ \hline 962 \quad (57x) \\ \hline \text{Answer } 57 \end{array}$$

## 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, inverse, short division, "carry", remainder, multiple, divisible by, factor, inverse, place value, how many ... in ....?, quotient, prime number, prime factors, composite number, estimate, common factor, chunking, key multiples

Key number skills needed for division at Y6:

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.

Solve problems which require answers to be rounded to specified degrees of accuracy