# St Cuthbert's Catholic Primary School

# Calculation Policy

At St Cuthbert's we live and learn in faith and love,
through Jesus' teachings.

Our school is a place where we can grow as a family,
helping each other to lead full and happy lives

| | | |
|---|---|---|
| Consultation that has taken place | | |
| Date formally approved by Governors | 23.06.2026 | |
| Date policy became effective | 24.06.2026 | |
| Review Date | June 2028 | |
| Person responsible for implementation and monitoring | HT ✓ | Govs |

This policy was approved by the Local Governing Committee on 23.06.2026

Signed ..... ..... Chair of Governors

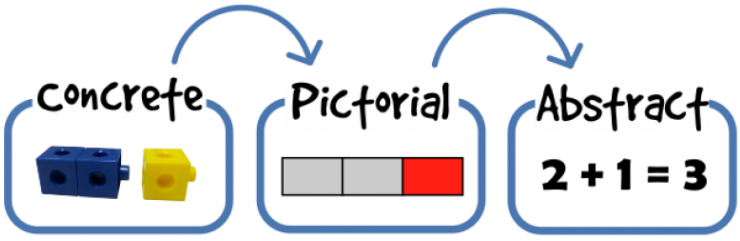
# Mathematics Calculation Policy

This policy has been devised to meet the requirements of the 2014 National Curriculum. Progression within each area of calculation is in line with the programme of study in the 2014 National Curriculum. This policy should be used to support pupils to develop a deep understanding of number and calculation. This policy has been designed to teach pupils through the use of concrete, pictorial and abstract representations.

**Concrete representations** – Pupils are first introduced to an idea or skill through the use of real objects. This is a 'hands on' component using real objects and is a foundation for conceptual understanding.

**Pictorial representations** – Once pupils have sufficiently understood the 'hands on' experiences performed they can now relate them to pictorial representations. These representations can then be used to reason and solve problems.

**Abstract representations** – Pupils are now capable of representing problems by using mathematical notations.

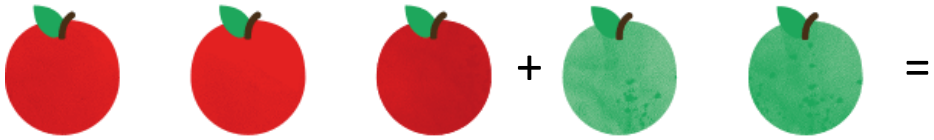



It is important that conceptual understanding that is supported by the use of representations is secure for all procedures. Reinforcement is achieved by going back and forth between these representations.

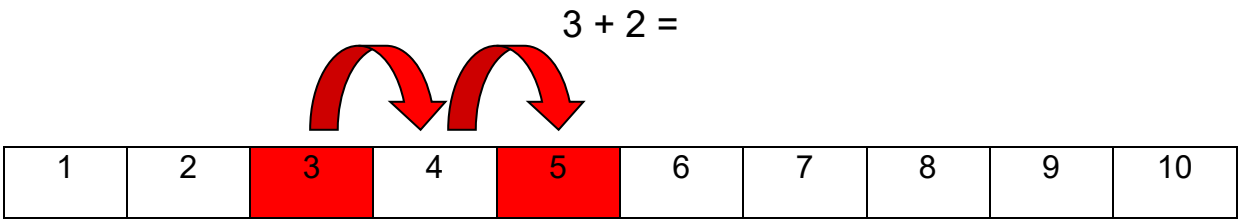
# Addition

## *Reception: Adding items in two groups together*

Use pictorial representations and real-life objects to find the total number of items in two groups, encouraging children to count accurately.



Use numbered number tracks to add, by counting on in ones, using a finger or counter, ensuring that the counting movement goes along the line.




Pupils should:

- Have access to a range of counters, number lines, number cards, tens frames
- Be shown numbers in a range of contexts
- Be able to recognise the + and = symbols
- Begin to count on from the larger number
- Begin to record own number sentences

**Key Vocabulary:** add, plus, more, make, and, total, altogether, addition, number sentence, one more than, count on, equals

**Key skills for addition in Reception**

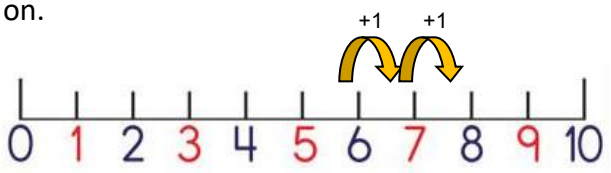
- Read and order numbers 1 – 20
- Count to 20 and above
- Say one more than a given number
- Count on in ones from a given number

# Addition

## *Year 1: Adding with numbers up to 20*

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

4 + 2 = 6




Pupils should be encouraged to begin with the number 4 and to count on 2.

Pupils should:

- Have access to a range of counting equipment, everyday objects, number tracks and number lines
- Be shown numbers in different contexts
- Be able to read and write number sentences using the + and = symbols
- Interpret number sentences including missing number problems, e.g. 3 + ? = 8

**Key Vocabulary:** add, **addend**, more, make, and, total, altogether, addition, number sentence, one more than, count on, equals, plus**, most, equal to, doubles**

**Key skills for addition in Year 1**

- Read and write numbers to 100 in numerals (1 – 20 in words)
- Count to and across 100
- Recall number bonds to 10 and 20 and addition facts within 20
- Count in multiples of 1, 2, 5 and 10
- Solve simple 1 step problems involving addition, using objects, number lines and pictorial representations

# Addition

## *Year 2: Add with 2-digit numbers*

*Developing mental fluency with addition and place value involving 2-digit numbers, then establish more formal methods.*

Add 2-digit numbers and multiples of ten, 2-digit numbers and ones, two 2-digit numbers first using practical equipment, e.g. base ten, 100 squares, place value charts, before beginning to use more formal written models.

Children move on more formal recording using partitioning method.

25 + 47 =

20 + 5  40 + 7

20 + 40 = 60

5 + 7 = 12

60 + 12 = 72

Once secure with partitioning method begin to use the formal written method of compact column addition to add numbers with up to three digits.

**Expanded column addition method**

In order to carry out this method, pupils need to recognise the value of tens and ones without recording the partitioning. Pupils need to be able to add in columns.

**Not crossing tens boundary**

$$\begin{array}{r} 22 \\ +\ 14 \\ \hline 6 \\ 30 \\ \hline 36 \end{array}$$

**Crossing tens boundary**

$$\begin{array}{r} 29 \\ +\ 14 \\ \hline 13 \\ 30 \\ \hline 43 \end{array}$$

Add the ones first, in preparation for the compact method

**Key Vocabulary:** add, addend, more, plus, and, make, altogether, total, equal to, equals, doubles, most, count on, **number line, sum, tens, ones, addition, columns, tens boundary**

**Key skills for addition in Year 2**

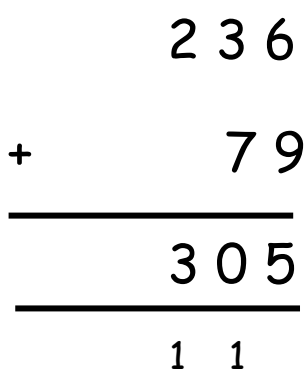
- Add a 2-digit number and ones
- Add a 2-digit number and tens
- Add pairs of 2-digit numbers
- Add three single digit numbers
- Show that adding can be done in any order
- Recall bonds to 20 and 100
- Count in steps of 2, 3, 5 and count in 10s from any given number
- Understand the place value of 2 digit numbers (tens and ones)
- Compare and order numbers to 100 using > < and =
- Read and write numbers to at least 100 in words and numerals

# Addition

## *Year 3: Add numbers with up to 3 digits*

Use expanded column addition method (see Year 2) and once pupils are very secure and confident adding 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.

Pupils to **add the ones first** and **'carry' numbers underneath** the bottom line. Pupils to be reminded that the actual value is **3 tens add 7 tens**.




**Key Vocabulary:** add, addend, more, plus, and, make, altogether, total, equal to, equals, doubles, most, count on, number line, sum, tens, ones, addition, columns, tens boundary**, hundreds boundary, increase, vertical, carry, expanded, compact**

**Key skills for addition in Year 3**

- Read and write numbers to 1000 in numerals and words
- Add 2-digit numbers mentally including those exceeding 100
- Add a 3-digit number and ones mentally
- Add a 3-digit number and hundreds mentally
- Estimate answers to calculations using inverse to check answers
- Solve problems including missing number problems, using number facts, place value and more complex addition

# Addition

## *Year 4: Add numbers with up to 4 digits*

Move from the expanded column addition method to the compact column addition method, adding the ones first and 'carrying' numbers underneath the calculation.

Introduce the **compact column addition method** by asking children to add the two given numbers together using the method that they were familiar with (expanded column method- Year 3). Teacher models the compact method with carrying, asking the children to discuss similarities and differences and establish how it is carried out.

**3517 + 396 = 3913**

```
  3 5 1 7
+   3 9 6
-------
  3 9 1 3
    1 1
```

**Remember the Steps**

- Add **Ones** First
- **'Carry'** the numbers **underneath** the line.
- Reinforce the idea of the correct place value by reminding children that we are adding **5 hundreds** and **3 hundreds**, not 5 + 3.

**Key Vocabulary:** add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones, partition, addition, column, tens, boundary, hundreds boundary, increase, vertical, carry, exp

**Key**

**Key Vocabulary:** add, addend, more, plus, and, make, altogether, total, equal to, equals, doubles, most, count on, number line, sum, tens, ones, addition, columns, tens boundary**,** hundreds boundary, increase, vertical, carry, expanded, compact, **thousands, hundreds, digits, inverse**

**Key skills for addition in Year 4**

- Select the most appropriate method: mental, jottings or written and explain why.
- Recognise the place value of each digit in a four-digit number.

)0 and

- Continue to practise a wide range of mental addition strategies, i.e., number bonds, add the nearest multiple of 10, 100, 1000 and adjust, near doubles, partitioning and recombining.
- Add numbers with up to 4 digits using the formal written method of column addition
- Solve 2 step problems in contexts, deciding which operations and methods to use and why.
- Estimate and use inverse operations to check answers to a calculation

# Addition

### *Year 5: Add numbers with more than 4 digits.*

*Including money, measures and decimals with different numbers of decimal places.*

Pupils should use the column addition method to add whole numbers. Numbers should exceed 4 digits.

```
  23481
+  1362
-------
  24843
-------
    1
```

Pupils should use the column addition method to add any pair of two-place decimals, including amounts of money. The decimal point should be aligned in the same way as the other place value columns, and must be in the same column as the answer.

```
  £23.59
+ £ 7.55
--------
  £31.14
--------
   1 1  1
```

Pupils should be able to add more than two values, carefully aligning place value columns. Pupils should understand the place value of tenths and hundredths and use this to align the numbers with different numbers of decimal places.

```
  19.01
   3.65
+  0.70
-------
  23.36
-------
  1 1
```

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

Say ‘6 tenths add 7 tenths’ to reinforce place value.

**Key Vocabulary:** add, addend, more, plus, and, make, altogether, total, equal to, equals, doubles, most, count on, number line, sum, tens, ones, addition, columns, tens boundary**,** hundreds boundary, increase, vertical, carry, expanded, compact, thousands, hundreds, digits, inverse, **decimal places, decimal point, hundredths, thousandths**

**Key skills for addition in Year 5**

- Add numbers mentally with increasingly large numbers, using and practising a range of mental strategies, ie. add the nearest multiple of 10, 100, 1000 and
- Use rounding to check answers and accuracy.
- Solve multi-step problems in contexts, deciding which operations and methods to use and why.
- Read, Write, Order and compare numbers to at least 1 million and determine the value of each digit.
- Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000.
- Add numbers with more than 4 digits using formal written method of columnar addition.

# Addition

## *Year 6: Add several numbers of increasing complexity*

Pupils will add several numbers with different numbers of decimal places (including money and measures). Tenths, hundredths and thousandths should be correctly aligned with the decimal point lined up vertically including the answer row. Zeros could be added into any empty decimal places, to show there is no value to add.

```
  23.361
   9.080
  59.770
+  1.300
  93.511
 ------
   2 1 2
```

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

Pupils will add several numbers with more than 4 digits.

```
  81059
   3668
  15301
+ 20551
 120579
 ------
  1 1 1 1
```

**Key Vocabulary:** add, addend, more, plus, and, make, altogether, total, equal to, equals, doubles, most, count on, number line, sum, tens, ones, addition, columns, tens boundary, hundreds boundary, increase, vertical, carry, expanded, compact, thousands, hundreds, digits, inverse, decimal places, decimal point, hundredths, thousandths

**Key skills for addition in Year 6**

# Subtraction

## *Reception: Subtract one-digit numbers*

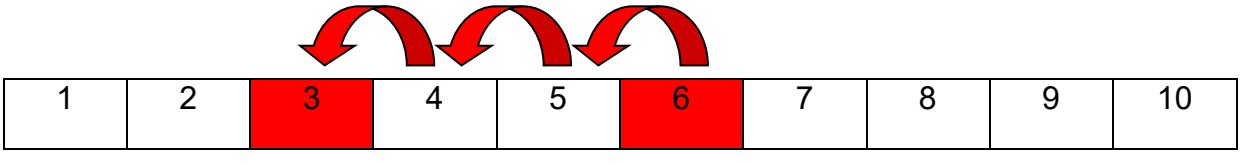
Pupils taught subtraction as taking away using objects and crossing out pictures to represent what has been taken away.

3 – 1 = 2



Use numbered number tracks to subtract, by counting back in ones, using a finger or a counter.

6 – 3 = 3




Pupils should:

Have access to a range of counters, number lines and number cards

Be shown numbers in a range of contexts

To recognise the – and = symbols

Begin to count back from the larger number

To begin to record their own number sentences

**Key Vocabulary:** equal to, take away, how many left

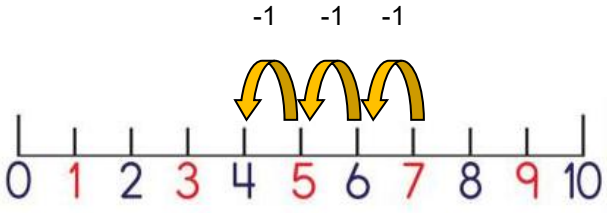
**Key skills for subtraction in Reception**

- Say one less than a given number
- Count back in ones from 10 then 20
- Solve one step problems involving subtraction, using concrete objects and pictures
- Recognise the – and = symbols and use these to read and write simple number sentences

## *Year 1: Subtract numbers from up to 20*

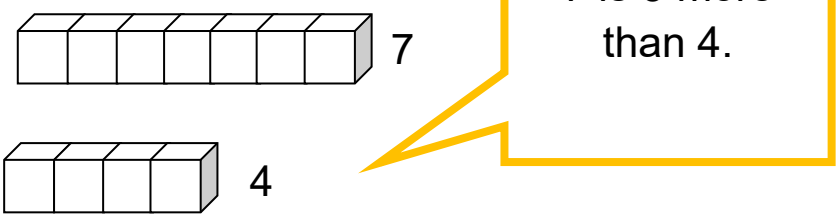
Pupils to consolidate their understanding of subtraction practically, showing subtraction on bead strings, using cubes etc. and in familiar contexts. They are introduced to more formal recording using number lines then using empty number lines.

$$7 - 3 = 4$$




Model subtraction practically and using number tracks, number lines and 100 squares. Find the difference between – this can be done practically using the language 'find the distance between' and 'how many more than?'.

$$7 - 4 = 3$$



Pupils should be recalling subtraction facts up to and within 10 and 20, and should be able to subtract zero.

**Key Vocabulary:** equal to, take away, how many left, **take, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least, count back, how much less is _?**

**Key skills for subtraction in Year 1**

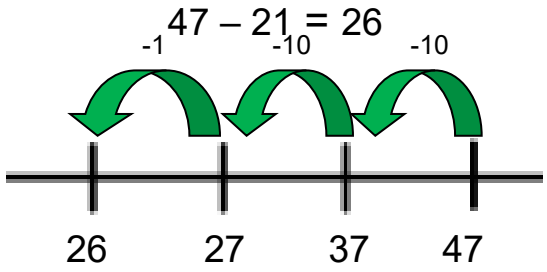
- Given a number, say one more and one less
- Count to and over 100, forward and back from any number
- Represent and use subtraction facts to and within 20.
- Subtract with one digit and two digit numbers to 20, including zero
- Solve one step problems that involve addition and subtraction, using concrete objects (bead strings etc.). and pictures and missing number problems.
- Read and write numbers from 0-20 in numerals and words

## Su

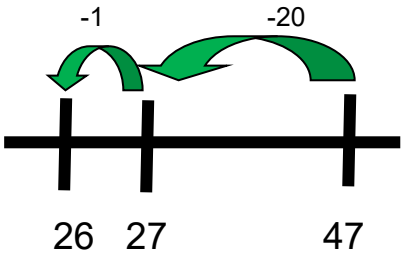
***Ye***

Use practical equipment such as base ten to model subtraction. Subtract first on a numbered **number line** by counting back aiming to develop mental subtraction skills. This strategy will be used when subtracting ones from 2-digit numbers (e.g. 35 – 7, by taking away/counting back, when subtracting tens from 2-digit numbers (e.g. 35 – 14, by taking away/counting back and when subtracting pairs of 2-digit numbers.

Partition the second number and subtract it in tens and ones.




Once pupils are confident move towards more efficient jumps back.

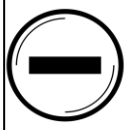


Many mental strategies are taught in Year 2. Pupils are taught that when numbers are close together, it is more efficient to count on the difference. They need to be clear about the relationship between subtraction and addition.

**Key Vocabulary:** equal to, take away, how many left, take, less, minus, subtract, **subtrahend,** leaves, distance between, how many more, how many fewer/less than, most, least, count back, how much less is _?, **difference, count on, strategy, partition, tens, ones**

**Key skills for subtraction in Year 2**

- Recognise the place value of each digit in a 2-digit number
- Recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100.
- Subtract using concrete objects, pictorial representations, 100 squares and mentally: including a 2-digit number and ones, a 2-digit number and tens, and two 2-digit numbers.
- Show that subtraction is of one number from another and cannot be done in any order.
- Recognise and use inverse relationship between addition and subtraction and use this to check answers
- Solve simple addition and subtraction problems involving measures, applying their increasing knowledge.
- Read and write numbers to at least 100 in numerals and words



Step 1: introduce the method with examples where **no exchanging** is required.

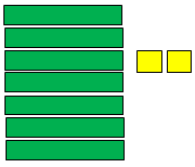
89 – 35 = 54

80 + 9

\- 30 + 5

50 + 4

Step 2: introduce 'exchanging' through practical subtraction.



72 – 47 = 25

60 1

~~7~~0 + 2

\- 40 + 7

20 + 5 = 25

Before subtracting '7' from the 72 blocks, pupils will need to exchange a row of 10 for 10 ones. Then subtract 4 tens and 7 ones.

Step 3: Once pupils are secure with the understanding of 'exchanging', they can use the partitioned column method to subtract any 2 and/or 3-digit numbers.

$$238 - 146 = 92$$

$$\begin{array}{rl} & {}^{100}\not{2}\not{0}\,{}^{1}0 + 30 + 8 \\ - & 100 + 40 + 6 \\ \hline & 0 + 90 + 2 \end{array}$$

When subtracting money remember to partition into pounds and pence, e.g. £1 + 30p + 8p

Continue to reinforce counting on as a strategy for numbers close together, e.g. 121 – 118, and also for numbers that are near multiples of 10 and 100 or £s, which make it easier to count on, or calculating change from £1.

**Key Vocabulary:** equal to, take away, how many left, take, less, minus, subtract, subtrahend, **minuend,** leaves, distance between, how many more, how many fewer/less than, most, least, count back, how much less is _?, difference, count on, strategy, partition, tens, ones, **exchange, decrease, hundreds, value, digit**.

**Key skills for subtraction in Year 3**

- Subtract mentally a 3-digit number and ones, 3-digit number and tens, 3-digit number and hundreds
- Estimate answers and use inverse operations to check
- Solve problems including missing number problems
- Find 10 or 100 more or less than a given number
- Recognise the place value of each digit in a 3 – digit number
- Counting up differences as a mental strategy when numbers are close together or near multiples of 10.
- Read and write numbers up to 1000 in numerals and words.
- Practice mental subtraction strategies, such as subtracting near multiples of 10 and adjusting and select the most appropriate methods to subtract, explaining why.

# Subtraction

## *Year 4: Subtract with up to 4 digits*

Partitioned column subtraction with exchanging (decomposition)

As introduced in Year 3, but moving onto more complex numbers and values. Use place value counters to reinforce exchanging.

$$2754 - 1562 = 1192$$

$$\begin{array}{rl} & 2000 + {}^{6}\cancel{7}00 + {}^{1}50 + 4 \\ - & 1000 + 500 + 60 + 2 \\ \hline & 1000 + 100 + 90 + 2 \end{array}$$

Once children are secure with partition column subtraction move on to **compact column subtraction**. To introduce the compact method, ask pupils to complete a subtraction calculation with the familiar partitioned column subtraction, then display the compact version for the calculation they have done. Ask pupils to consider how it relates to the method they know, what is similar and what is different to develop an understanding of it.

$$2754 - 1562 = 1192$$

$$\begin{array}{rl} & {}^{6}\cancel{2}\,{}^{1}\cancel{7}54 \\ - & 1562 \\ \hline & 1192 \end{array}$$

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

Give plenty of opportunities to apply compact column subtraction to money and measures.

Continue to reinforce counting on as a strategy for numbers close together.

**Key Vocabulary:** equal to, take away, how many left, take, less, minus, subtract, subtrahend, minuend, leaves, distance between, how many more, how many

- Estimate answers and use inverse operations to check answers
- Solve addition and subtraction 2-step problems, choosing which operations and methods to use and why
- Solve simple measures and money problems involving fractions and decimals to two decimal places
- Find 1000 more or less than a given number
- Count backwards through zero, including negative numbers
- Recognise place value of each digit in a 4-digit number.
- Round any number to the nearest 10, 100 or 1000.
- Solve number and practical problems that involve the above, with increasingly large positive numbers.

# Subtraction

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

Compact column subtraction with exchanging. Subtracting with larger integers.

$$\begin{array}{r} {}^{2}\not{3}\,{}^{1}\not{0}\,{}^{1}4\,{}^{1}\not{1} \\ 31056 \\ -\quad 2128 \\ \hline 28928 \end{array}$$

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

$$\begin{array}{r} {}^{6}\not{7}\,{}^{10}\not{1}\,{}^{1}8\,{}^{1}\not{0}.{}^{1}0 \\ -\quad 372.5 \\ \hline 6796.5 \end{array}$$

Add a 'zero' in any empty decimal place to aid understanding of what to subtract in that column.

Pupils who are still not secure with number facts and place value will need to remain on the partitioned column method (Y3/Y4) until ready for the compact column method.

**Key Vocabulary:** equal to, take away, how many left, take, less, minus, subtract, subtrahend, minuend, leaves, distance between, how many more, how many fewer/less than, most, least, count back, how much less is _?, difference, count on, strategy, partition, tens, ones, exchange, decrease, hundreds, value, digit, inverse, **tenths, hundredths, decimal point, decimal**

**Key skills for subtraction in Year 5**

- Subtract numbers mentally with increasingly large numbers
- Use rounding and estimation to check answers to calculations and determine, in a range of contexts, levels of accuracy
- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.
- Read, write, order and compare numbers to at least 1 million and determine the value of

# Subtraction

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

Using the compact column method to subract more complex integers.

$$\begin{array}{r} {}^{0}\cancel{1}\,{}^{14}\cancel{5}\,{}^{9}\cancel{0}\,.\,{}^{1}6\;9\;9 \\ -\quad 8\;9\,,\;9\;4\;9 \\ \hline 6\;0\,,\;7\;5\;0 \end{array}$$

Using the compact column method to subtract money and measures, including decimals with different numbers of decimal places.

$$\begin{array}{r} {}^{0}\cancel{1}\,{}^{9}\cancel{0}\,{}^{1}5\;.\;{}^{3}\cancel{4}\,{}^{1}1\;9\;\text{kg} \\ -\quad 3\;6\;.\;0\;8\;0\;\text{kg} \\ \hline 6\;9\;.\;3\;3\;9\;\text{kg} \end{array}$$

Empty decimal places should be filled with a zero.

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.

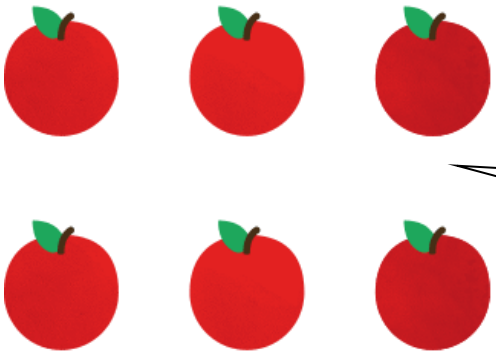
**Key Vocabulary:** equal to, take away, how many left, take, less, minus, subtract, subtrahend, minuend, leaves, distance between, how many more, how many fewer/less than, most, least, count back, how much less is _?, difference, count on, strategy, partition, tens, ones, exchange, decrease, hundreds, value, digit, inverse, tenths, hundredths, decimal point, decimal

**Key skills for subtraction in Year 6**

- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.
- Read, write, order and compare numbers to 10 million and determine the value of each digit.

# Multiplication

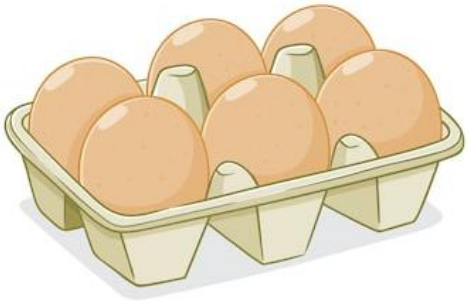
***Reception: Multiply through doubling*** using concrete objects and pictorial representations



I have three apples; can you double the number of apples?

There are six apples in total.

Pupils can investigate putting items into resources such as egg boxes, ice cube trays and cake tins thus creating arrays.





**Key Vocabulary:** doubling, groups, lots of, altogether, count

**Key skills for multiplication in Reception**

- Count in 2s and 5s
- Understand the concept of doubling is adding together two groups of the same number
- Begin to solve one step problems involving multiplication and division, calculating the answer using concrete objects, pictorial representations and arrays with the support of an adult

# Multiplication

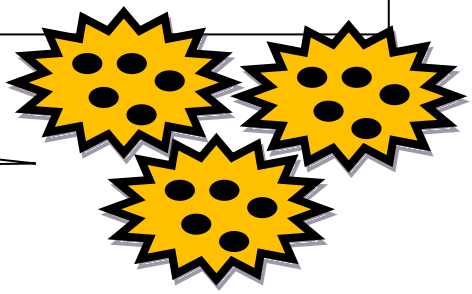
## *Year 1: Multiply with concrete objects, arrays and pictorial representations*

Pupils should be given experience of counting equal groups of objects in 2s, 5s and 10s.
Pupils should be presented with practical problem activities counting equal sets or groups.



How many legs are there altogether?

2 + 2 + 2 = 6



There are 5 sweets in one bag. How many sweets are in 3 bags?

5 + 5 + 5 = 15

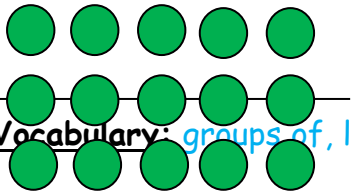
**Key Vocabulary:** doubling, groups, lots of, altogether, count, **times, multiply, array**

**Key skills for multiplication in Year 1**

- Count in 2s, 5s and 10s
- Solve one step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of a teacher.
- Make connections between arrays, number patterns and counting in 2s, 5s, 10s.
- Begin to understand doubling using concrete objects and pictorial representations.

# Multiplication

***Year 2: Multiply using arrays*** using at least 2s, 5s and 10s



5 x 3 = 15

3 x 5 = 15

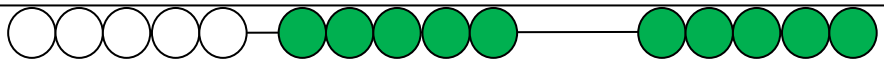
5 x 3 = 3 + 3 + 3 + 3 + 3 = 15

3 x 5 = 5 + 5 + 5 = 15

**Key Vocabulary:** groups of, l … ay, altogethe…

**…n at Year 1**

- Count in multiples of 2, 5, 10.
- Solve one step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of a teacher.
- Make connections between arrays, number patterns and counting in 2s, 5s, 10s.
- Begin to understand doubling using concrete objects and pictorial representations.



Pupils will begin to use mentally recall multiplication facts for 2, 5, 10 times tables through practice in counting and understanding of the operation.

**Key Vocabulary:** doubling, groups, lots of, altogether, count, times, multiply, array, **factor, product, multiplied by, repeated, addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times...**

**Key skills for multiplication in Year 2**

- Count in steps of 2,5,10 from zero and in 10s from any number
- Recall and use multiplication facts from the 2, 5, 10 times 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

# Multiplication

## *Year 3: Multiply 2 digits by a single digit number*

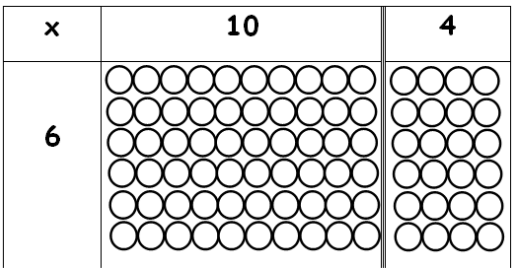
Introduce the grid method for multiplying 2-digit numbers by single digit numbers. When pupils are introduced to the grid method they should physically make the array to represent the calculation then translate this to the grid method.

14 x 6 = 84

| X | 10 | 4 |
|---|---|---|
| 6 | 60 | 24 |

60 + 24 = 84

Link the layout of the grid to an array initially.




To do this, pupils need to be able to:

- Partition numbers into tens and ones
- Multiply multiples of 10 by a single digit (e.g. 20 x 4) using their knowledge of multiplication facts and place value
- Recall and work out multiplication facts in the 2, 3, 4, 5, 6, 7, 8 and 10 times tables
- Work out multiplication facts not known by repeated addition or other taught mental strategies. Strategies to support this are repeated addition using a number line, bead strings or arrays.

**Key Vocabulary:** doubling, groups, lots of, altogether, count, times, multiply, array, factor, product, multiplied by, repeated, addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times..., **partition, grid method, multiple, product, tens, ones, value**

**Key skills for multiplication in Year 3**

- Recall and use multiplication facts from the 2, 3, 4, 5, 8 and 10 times tables, and multiply 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

# Multiplication

## *Year 4: Multiply 2 and 3 digits by a single digit using all multiplication tables up to 12 x 12*

Developing the grid method

136 x 5

| X | 100 | 30 | 6 |
|---|---|---|---|
| 5 | 500 | 150 | 24 |

500
150
+ 30
680

Encourage adding accurately.

Move onto short multiplication (Year 5) if and when the children are confident and accurate multiplying 2 and 3 digit numbers by a single digit this way **AND** are already confident on 'carrying' for written addition.

Pupils should 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. **349 x 9 is approximately 350 x 10 = 3500**
- Record an approximation to check the final answer against
- Multiply multiples of 10 and 100 by a single digit using their multiplication table knowledge
- Recall all their multiplication tables up to **12 x 12**

**Key Vocabulary:** doubling, groups, lots of, altogether, count, times, multiply, array, factor, product, multiplied by, repeated, addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times..., partition, grid method, multiple, product, tens, ones, value, **sets of, inverse**

**Key skills for multiplication in Year 4**

- Count in multiples of 6, 7, 9, 25 and 100.
- Recall all multiplication facts up to 12 x 12

# Multiplication

## *Year 5: 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 to notice that there are less steps in the column method
- Pupils need to be taught to approximate first, e.g. for 72 x 38, they will use rounding, approximately this is 70 x 40 = 2800, and use the approximation to check the reasonableness of their answer against.

**Short multiplication for multiply by a single digit**

| x | 300 | 20 | 7 |
|---|---|---|---|
| 4 | 1200 | 80 | 28 |

1200 + 80 + 28 = 1308

```
  3 2 7
x     4
-------
1 3 0 8
  1 2
```

Pupils could be asked to work out a given calculation using the grid and then compare it to the column method, what are the similarities and differences?

**Introduce long multiplication for multiplying by 2 digits**

| | 10 | 8 |
|---|---|---|
| 10 | 100 | 80 |
| 3 | 30 | 24 |

```
   1 8
x  1 3
-------
   5 4
 1 8 0
-------
 2 3 4
```

18 x 3 on the first row

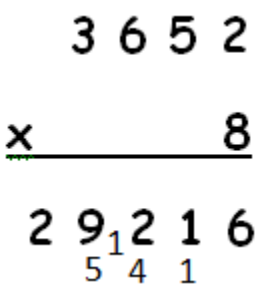
(8 x 3 = 24 carrying the 2 for twenty, then '1' x 3)

18 x 10 on the second row. Put the 0 in ones first, then say 8 x 1 and 1 x 1.

**Moving towards more complex numbers**

```
  1 2 3 4
x     1 6
---------
  7 4 0 4
  1 2 2
```

(1234 x 6)




The grid could be used to introduce long multiplication, as the relationships can be seen

**Key Vocabulary:** doubling, groups, lots of, altogether, count, times, multiply, array, factor, product, multiplied by, repeated, addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times..., partition, grid method, multiple, product, tens, ones, value, sets of, inverse, **square, factor, integer, decimal, short multiplication, long multiplication, carry**

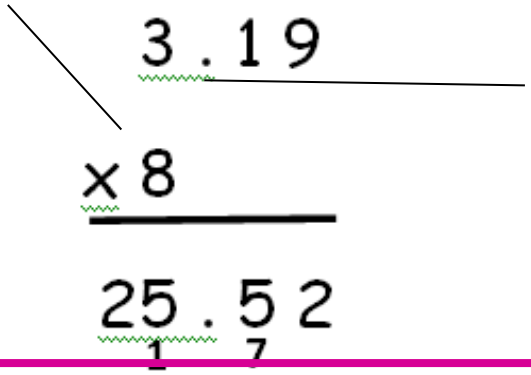
**Key skills for multiplication in Year 5**

- Identify multiples and factors, using knowledge of times tables to 12 x 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

# Multiplication

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

Remind pupils that the single digit belongs to the ones column.




Line up the decimal points in the question and the answer.

This works well for multiplying money (£, p) and other measures

Pupils 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 Year 5) to multiply numbers with more than 4 digits by a single digit; to multiply money and measures, and to multiply decimals with up to 2 decimal places by a single digit
- Use long multiplication (see Year 5) to multiply numbers with at least 4 digits by a 2 digit number

**Key Vocabulary:** doubling, groups, lots of, altogether, count, times, multiply, array, factor, product, multiplied by, repeated, addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times..., partition, grid method, multiple, product, tens, ones, value, sets of, inverse, square, factor, integer, decimal, short multiplication, long multiplication, carry, **tenths, hundredths, decimal**

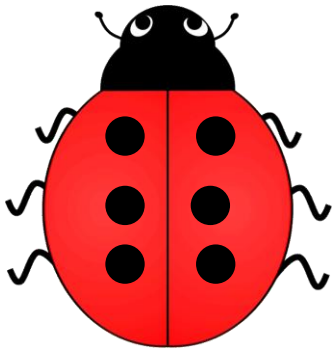
**Key skills for multiplication in Year 6**

- Recall all multiplication facts up to 12 x 12
- Multiply multi digit numbers, up to 4 digit x 2 digit using long multiplication

# Division

## *Reception: Half and share small numbers of groups*

Pupils to half a number and share equally between 2. Pupils to share objects into equal groups and count how many items there are in each group, e.g. count 6 counters and pretending they are sports, share them equally between the ladybird wings.



Making use of everyday situations, e.g. sharing fruit out at fruit time.

**Key Vocabulary:** half, share, share equally, one each, two each, group, groups of

**Key skills for division in Reception**

- To understand the concept of halving and making sure there are an equal number of items in both groups
- Begin to solve simple one step problems involving multiplication and division, calculating the answer using concrete objects, pictorial representations and arrays with the support of an adult

# Division

## *Year 1: Group and share small quantities*

Pupils will use objects, diagrams, pictorial representations to solve problems involving **both grouping and sharing**.

**Grouping:**

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



**Sharing:**

12 shared between 3 is 4



**Explore division problems in familiar contexts:**

There are 6 children and there are 18 sweets to share. If we share them equally how many will each child have each?

**Can they work it out and give a division statement?**
**"18 shared between 6 people gives you 3 each".**

Pupils should:

- use lots of apparatus, arrays and picture representations
- be taught to understand the difference between grouping (how many groups can you make) and sharing (share these sweets between ___ people)
- be able to count in multiples of 2, 5 and 10

- find half of a group of objects by sharing into two equal groups.

**Key Vocabulary:** half, share, share equally, equal, groups, groups of, **left, left over, one each, two each, lots of, array**

**Key skills for division in Year 1**

- Solve one step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representation, arrays with the support of an adult.
- Through grouping and sharing small quantities, pupils begin to understand division and finding simple fractions of objects, numbers and quantities.
- Make connections between arrays, number patterns and counting in 2s, 5s and 10s

pictorial representations and groupings on a number line

**Arrays**

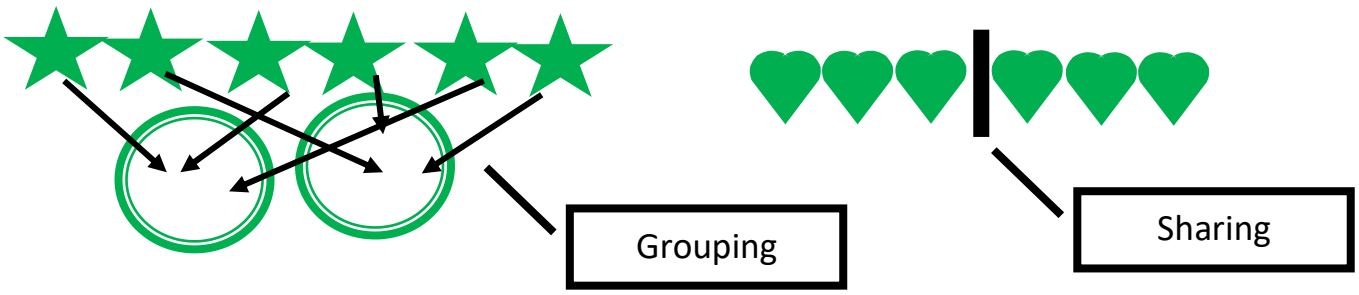
12 ÷ 3, posed as how many groups of 3 are in 12? Pupils should also show that the same array can represent 12 ÷ 4 = 3 if grouped horizontally.



**Sharing and grouping**

Pupils should be taught whether a problem needs sharing or grouping.

*"If 6 sweets shared between 2 people, how many does each person get?"*




**Key Vocabulary:** half, share, share equally, equal, groups, groups of, left, left over, one each, two each, lots of, array, **divisor, quotient, divide, divided by, divided into, division, grouping, left, left over**

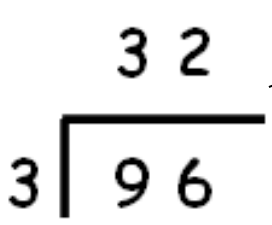
**Key skills for division in Year 2**

- 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

# Division

## *Year 3: Divide 2-digit numbers by a single digit (where there is no remainder in the final answer.*

Pupils to use short division once they are secure with division as grouping and demonstrate this using number lines, arrays etc. short division for larger 2-digit numbers should be introduced, initially with carefully selected examples requiring no calculating of remainders at all. Start by introducing the layout of short division by comparing it to an array. **Limit number to no remainders in the answer or carried – each digit must be a multiple of the divisor.**

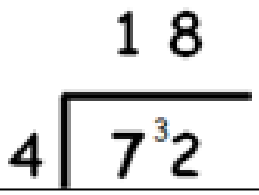



Remind children of correct place value, that 96 is equal to 90 and 6, but in short division pose:

How many 3's in 9? = 3 and record it above the 9 tens.

How many 3's in 6? = 2 and record it above the 6 ones.

Once pupils demonstrate a full understanding of remainders and also the short division method taught, they can be taught how to use the method when remainders occur within the calculation (e.g. 96 ÷ 4), and be taught to carry the remainder onto the next digit. If needed, pupils should use the number line to work out individual division facts that occur which they are not yet able to recall mentally. **Limit numbers to no remainders in the final answer but with remainders occurring within the sum.**




**Key Vocabulary:** half, share, share equally, equal, groups, groups of, left, left over, one each, two each, lots of, array, divisor, quotient, divide, divided by, divided into, division, grouping, left, left over, **inverse, short division, carry, remainder, multiple**

**Key skills for division in Year 3**

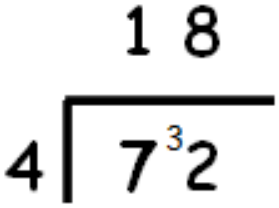
- Recall and use multiplication and division facts for the 2, 3, 4, 5, 8 and 10 multiplication tables (through doubling, connect the 2s, 4s and 8s)
- Write and calculate mathematical statements for multiplication and division using the multiplication

# Division

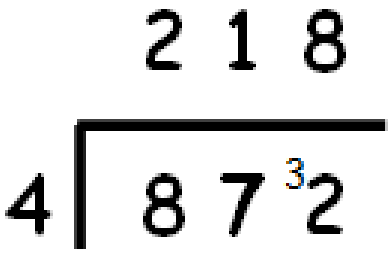
***Year 4: Divide up to 3-digit numbers by a single digit*** without remainders initially

Continue to develop short division.

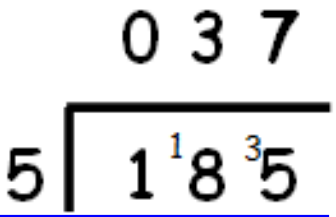
**Step 1:** Pupils must be secure with the process of short division for dividing 2-digit numbers by a single digit (those that do not result in a final reminder – see Year 3.) but must understand how to calculate remainders, using this to 'carry' remainders within the calculation process.




**Step 2:** Pupils move onto dividing numbers with up to 3-digits by a single digit, however problems and calculations provided should not result in a final answer with reminder at this stage. Children who exceed this expectation may progress to Year 5 level.




When the answer for the first column is zero (1 ÷ 5, as an example) children should initially write a zero above to acknowledge its place and must carry the number (1) over to the next digit as a remainder.




Include money and measure contexts when confident.

**Key Vocabulary:** half, share, share equally, equal, groups, groups of, left, left over, one each, two each, lots of, array, divisor, quotient, divide, divided by, divided into, division, grouping, left, left over, inverse, short division, carry, remainder, multiple, **divisible by, factor**

**Key skills for division in Year 4**

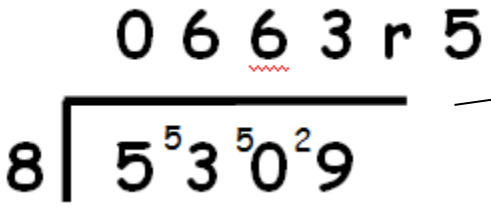
- Recall multiplication and division facts up to 12 x 12
- Use place value, known and derived facts to multiply and divide mentally including: multiplying and dividing by 10 and 100 by 1
- Pupils practice to become fluent in the formal written method of short division with exact answers when

# Division

***Year 5: Divide up to 4-digit numbers by a single digit*** including those with remainders

Short division with remainders

Now that pupils are introduced to examples that give rise to remainder answers, division needs to have real life problem solving context, where pupils consider the meaning of the remainder and how to express it. as a fraction, a decimal, or as a rounded number or value, depending upon the context of the problem.




The answer to 5309 ÷ 8 could be expressed as 663 and 5 eighths, 663 r 5, as a decimal, or rounded as appropriate to the problem involved.

Include money and measure contexts when confident.

If pupils are confident and accurate introduce long division for pupils who are ready to divide any number by a 2-digit number e.g. 2678 ÷ 20. (See Year 6 for method).

See Year 6 for how to continue the short division to give a decimal answer for children who are confident.

**Key Vocabulary:** half, share, share equally, equal, groups, groups of, left, left over, one each, two each, lots of, array, divisor, 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 in Year 5**

- Recall multiplication and division facts up to 12 x 12.
- Multiply and divide numbers mentally, drawing upon known facts

- Use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.
- Work out whether a number up to 100 is a prime and recall prime numbers to 19.
- Divide numbers up to 4 digits by a 1- 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 ÷4 = 24 r 2 = 24 ½ = 24.5).
- Solve problems involving combinations of all four operations, including understanding of the equals sign, and including division for scaling by different fractions and problems involving simple rates.

**Key Vocabulary:** share, share equally, one each, two each, group, 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, **quotient, prime number, prime factors, composite number (non-prime)**

**Key Skills for Division at Year 5**

- Recall multiplication and division facts up to 12 x 12.
- 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 numbers.
- 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 a prime and recall prime numbers to 19.
- Divide numbers up to 4 digits by a 1- 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 ÷4 = 24 r 2 = 24 ½ = 24.5).
- Solve problems involving combinations of all four operations, including understanding of the equals sign, and including division for scaling by different fractions and problems involving simple rates.

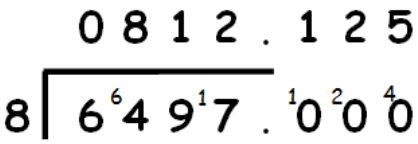
# Division

***Year 6: Divide up to 4-digit numbers by both single digit and 2-digit numbers***

including decimal and quantities

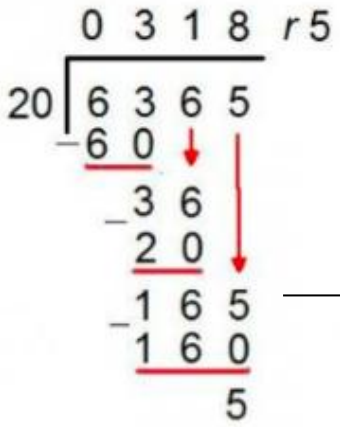
Short division, for dividing by a single digit e.g. 6487 ÷ 8

Short Division with remainders: Pupils should continue to use this method, but with numbers to at least 4 digits, and understand how to express remainders as fractions, decimals whole number remainders, or rounded numbers. Real life problem solving contexts need to be the starting point, where pupils have to consider the most appropriate way to express the remainder.




**Calculating a decimal remainder**: In this example, rather than expressing the remainder as r1, a decimal point is added after the ones because there is still a remainder, and the one remainder 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.

Introduce long division for dividing by 2 digits.




Find out 'How many 20s are in 63? Write the value underneath and subtract. Bring down the next digit (6) and find out 'How may 20s in 36? Teach pupils to write a 'useful list' first at the side that will help them if the times table is difficult to recall. Introduce the method in a simple way by using known tables up to 12 before progressing to more difficult calculations using dividers greater than 12.

Must be aligned in place value for subtracting.

mainders occur, pupils should express them as fractions, decimals, or use rounding, depending on the problem.

**Key Vocabulary:** half, share, share equally, equal, groups, groups of, left, left over, one each, two each, lots of, array, divisor, quotient, 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), **common factor**

**Key skills for division in 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 digit 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
- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.
- Perform mental calculations, including 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.