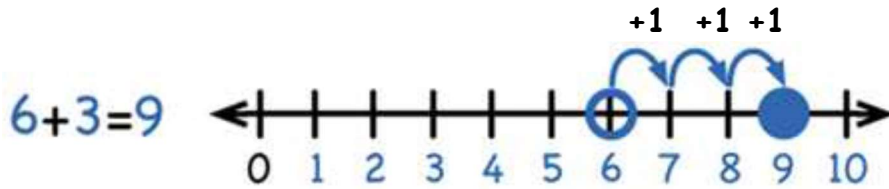


## Year 1 Add with numbers up to 20

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



### Children should:

- Have access to a wide range of counting equipment, everyday objects, number tracks and number lines, and be shown numbers in different contexts.
- Read and write the addition (+) and equals (=) signs within number sentences.
- Interpret addition number sentences and solve missing box problems, using concrete objects and number line addition to solve them:  $8 + 3 = \square$   
 $15 + 4 = \square$        $5 + 3 + 1 = \square$        $\square + \square = 6$
- This builds on from prior learning of adding by combining two sets of objects into one group (5 cubes and 3 cubes) in Early Years.



Bead strings or bead bars can be used to illustrate addition including bridging through ten by counting on 2 then counting on 3.

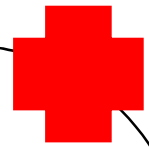
$$8 + 5 = 13$$

### ADDITION YEAR 1

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

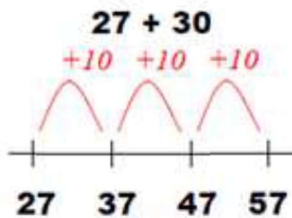
#### **Key skills for addition at Y1:**

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

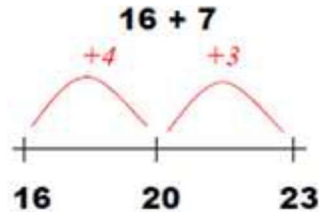


**Year 2 Add with 2-digit numbers** Developing mental fluency with addition and place value involving 2-digit numbers, then establish more formal methods.

Add 2-digit numbers and tens:

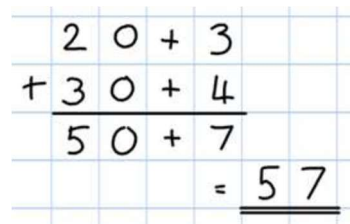
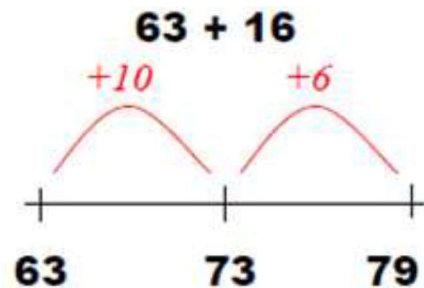


Add 2-digit numbers and units:



Children will use empty number lines and concrete equipment such as hundred squares and bead strings to build confidence and fluency with mental addition

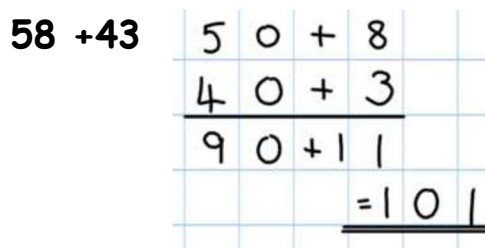
Add pairs of 2-digit numbers, moving to the partitioned column method when



secure adding tens and units:

$$23 + 34 = 57$$

Once children can add a multiple of ten to a 2-digit number mentally (e.g. 80+11), they are ready for adding pairs of 2-digit numbers that DO cross the tens boundary (e.g. 58 + 43).



To support understanding, pupils may physically make and carry out the calculation with Dienes Base 10 apparatus or place value counters, then compare their practical version to the written form, to help them to build an understanding of it.

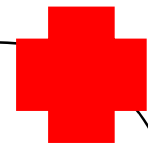
## ADDITION YEAR 2

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

### **Key skills for addition at Y2:**

- Add a 2-digit number and ones (e.g.  $27 + 6$ )
- Add a 2-digit number and tens (e.g.  $23 + 40$ )
- Add pairs of 2-digit numbers (e.g.  $35 + 47$ )
- Add three single-digit numbers (e.g.  $5 + 9 + 7$ )
- Show that adding can be done in any order (the commutative law).
- Recall bonds to 20 and bonds of tens to 100 ( $30 + 70$  etc.)
- Count in steps of 2, 3 and 5 and count in tens from any number.
- Understand the place value of 2-digit numbers (tens and ones)
- Compare and order numbers to 100 using  $<$   $>$  and  $=$  signs.
- Read and write numbers to at least 100 in numerals and words.
- Solve problems with addition, using concrete objects, pictorial representations, involving numbers, quantities and measures, and applying mental and written methods.

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



Introduce the **expanded column addition** method then move onto **compact column addition**:

	2	3	6
+		7	3
<hr/>			
			9
	1	0	0
	2	0	0
<hr/>			
	3	0	9

Add the units first in preparation for the compact method. Children need to understand the value of Hundreds, tens and Units without recording the partitioning



236
+ 73
<hr/>
309
<hr/>
1

Children who are confident with the expanded method will move into Expanded method will move onto the compact Method and be introduced to carrying for the first time.

## ADDITION YEAR 3

**Key vocabulary:** *add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, vertical, expanded, compact*

### **Key skills for addition at Y3:**

- Read and write numbers to 1000 in numerals and words.
- Add 2-digit numbers mentally, incl. those exceeding 100.
- **Add a three-digit number and ones mentally (175 + 8)**
- **Add a three-digit number and tens mentally (249 + 50)**
- **Add a three-digit number and hundreds mentally (381 + 400)**
- Estimate answers to calculations, using inverse to check answers.
- Solve problems, including missing number problems, using number facts, place value, and more complex addition.
- Recognise place value of each digit in 3-digit numbers (hundreds, tens, ones.)
- Continue to practise a wide range of mental addition strategies, ie. number bonds, adding the nearest multiple of 10, 100, 100 and adjusting, using near doubles, partitioning and recombining.

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

Move from expanded addition to the compact column method, **adding units first**, and "carrying" numbers **underneath** the calculation. Also include money and measures contexts.

Children will discuss the similarities and differences of the compact method with the expanded method. Teachers will model the two method side by side

Reinforce correct place value by reminding them the actual value is 5 hundred add 3 hundred for example, **not 5 add 3**.

e.g.  $3517 + 396 = 3913$

	3	5	1	7	
+		3	9	6	
	3	9	1	3	

This method should be applied to money and measures

## ADDITION YEAR 4

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

### **Key skills for addition at Y4:**

- Select most appropriate method: mental, jottings or written and explain why.
- Recognise the place value of each digit in a four-digit number.
- Round any number to the nearest 10, 100 or 1000.
- Estimate and use inverse operations to check answers.
- Solve 2-step problems in context, deciding which operations and methods to use and why.
- Find multiples of 10, 100 and 1000 more than a given number.
- Continue to practise a wide range of mental addition strategies, ie. number bonds, add the nearest multiple of 10, 100, 1000 and adjust, use near doubles, partitioning and recombining.
- Add numbers with up to 4 digits and amounts of money using the formal written method of column addition
- Estimate and use inverse operations to check answers to a calculation.

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

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

- Children should understand the position of the decimal point and the importance of lining it up as in other place value columns.
- The decimal point **must** be in the same column in the answer.
- Answers should exceed 4 digits.
- Children should be able to add more than two values.

£	2	3	2	.	5	9	
£		1	9	.	2	4	+
£	2	5	1	.	8	3	
			1			1	

2	1	9	.	0	1		
			3	.	6	5	+
			0	.	7	4	
2	2	3	.	4	0		
			1			1	

4	9	6	3	1			
			2	7	5	8	+
5	2	3	8	9			
			1			1	

## ADDITION YEAR 5

**Key vocabulary:** *add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, 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 for addition at Y5:**

- Add numbers mentally with increasingly large numbers, using and practising a range of mental strategies eg add the nearest multiple of 10, 100, 100 and adjust; use near doubles, inverse, partitioning and re-combining; using number bonds.
- 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.

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

Adding 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 in the answer row.
- Zeros could be added into any empty Decimal places, to show there is no value to add.

$$\begin{array}{r} 23.361 \\ 9.080 \\ 59.770 \\ 1.300 \\ 93.511 \\ \hline 212 \end{array}$$

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

## **ADDITION YEAR 6**

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

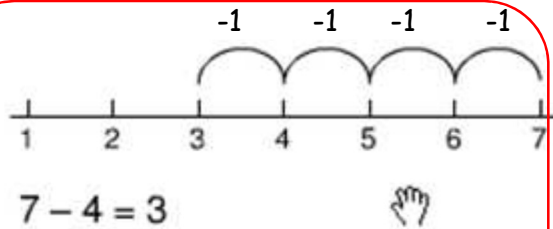
### **Key skills for addition at Y6:**

- Perform mental calculations, including with mixed operations and large numbers, using and practising a range of mental strategies.
- Solve multi-step problems in context, deciding which operations and methods to use and why.
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.
- Read, write, order and compare numbers up to 10 million and determine the value of each digit.
- Round any whole number to a required degree of accuracy.
- Pupils understand how to add mentally with larger numbers and calculations of increasing complexity.

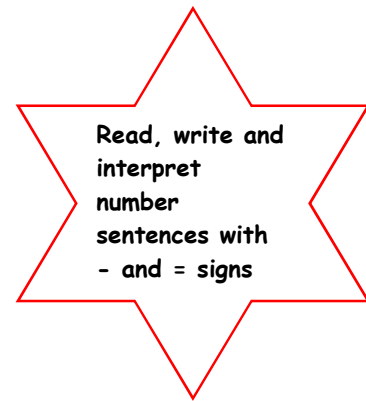
## Year 1 Subtract from numbers up to 20

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:

### Subtract by taking away

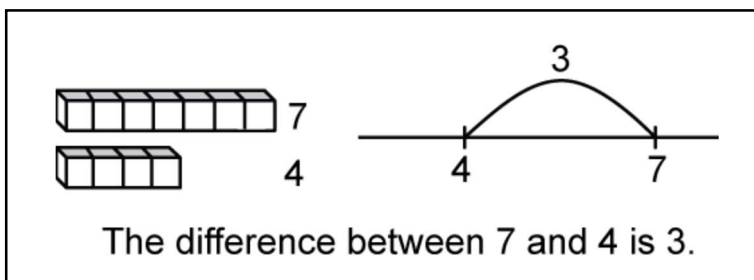


Count back in ones on a number line to  
Take away with numbers up to 20



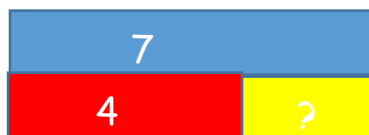
Model subtract using hundred squares, bead strings, numbered number lines, numicon and practically.

### Find the 'distance between'



This will be introduced practically using the language 'find the distance between...' and 'how much more...' It should be put into contexts e.g I am 3 years older than my brother.

A simple bar model can be used to show this



### Mental subtraction

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



## **SUBTRACTION YEAR 1**

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

### **Key skills for subtraction at Y1:**

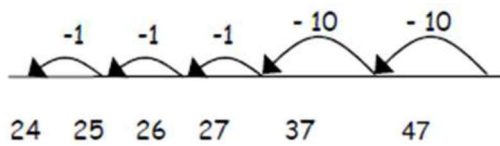
- Given a number, say **one more or one less**.
- Count to and over 100, **forward and back**, from any number.
- Represent and use **subtraction facts to 20 and within 20**.
- Subtract with **one-digit and two-digit** numbers to 20, including zero.
- Solve one-step problems that involve addition and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

## Year 2 Subtract with 2-digit numbers

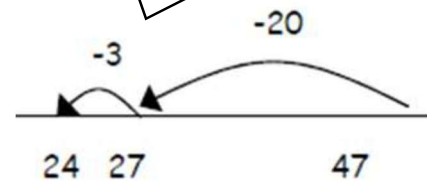
Subtract on a number line by **counting back**, aiming to develop mental subtraction skills. This strategy will be used for:

- 2-digit numbers subtract units (by taking away / counting back) e.g.  $36 - 7$
- 2-digit numbers subtract tens (by taking away / counting back) e.g.  $48 - 30$
- Subtracting pairs of 2-digit numbers (see below:)

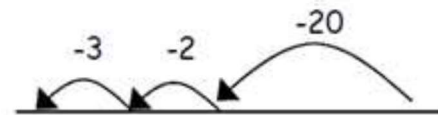
$47 - 23 = 24$  by partitioning the second number  
And subtracting the tens then the ones, as below



Move to a more efficient jumps back, as below



Teaching children to **bridge through ten** can help them to become more efficient, for example  $42 - 25$

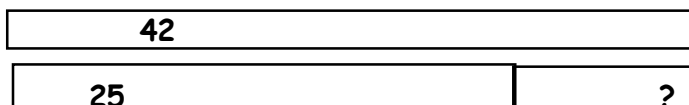


17 20 22 42

Use Dienes blocks for subtraction calculations too.

Combine methods with the use of a number square to reinforce number value and order

Use bar models to show subtraction and its relationship with addition

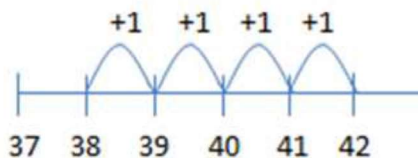


$$42 - 25 = ? \quad 42 - ? = 25$$

$$25 + ? = 42 \quad ? + 25 = 42$$

Mental strategy - subtract numbers close together by **counting on**:

$$42 - 38 = 4$$



Many mental strategies are taught. 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.

## SUBTRACTION YEAR 2

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

### **Key skills for subtraction at Y2:**

- Recognise the place value of each digit in a two-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 two digit number and ones, a two-digit number and tens, and two two-digit numbers.
- Show that subtraction of one number from another **cannot** be done in any order.
- Recognise and use inverse relationship between addition and subtraction, using this to check calculations and missing number problems.
- Solve simple addition and subtraction problems including measures, using concrete objects, pictorial representation, and also applying their increasing knowledge of mental and written methods.
- Read and write numbers to at least 100 in numerals and in words.

## Year 3 Subtracting with 2 and 3-digit numbers.

Counting on as a mental strategy for subtraction:

Start with the smallest number and add on to the largest number. Children should be encouraged to use their knowledge of number bonds

$$82 - 27 = 55$$

27      30      80      82

+3      +50      +2

Introduce **partitioned column subtraction** method

**STEP 1:** introduce this method with examples where **no exchanging** is require

$$79 - 46 = 33$$

$$\begin{array}{r} 70 + 9 - \\ \underline{40 + 6} \\ 30 + 3 \end{array}$$

**STEP 2:** introduce "exchanging"

$$72 - 47$$

Through practical subtraction. Make the larger number with Base10, then subtract 47 from it.



$$\begin{array}{r} 60 + 12 \\ \underline{\cancel{70} + \cancel{2}} \\ 40 + 7 \\ \hline 20 + 5 \end{array}$$

Before subtracting the 7 from the 7 tens they will need to exchange one ten for ten ones

**STEP 3:** Once pupils are secure with the understanding of "exchanging", they can use the partitioned column method to subtract any 2 and 3-digit numbers.

$$\begin{array}{r} 238 - 146 = 92 \\ \hline \begin{array}{r} 100 \\ \cancel{200} + 30 + 8 \\ - 100 + 40 + 6 \\ \hline 0 + 90 + 2 \end{array} \end{array}$$

### **SUBTRACTION YEAR 3**

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

#### **Key skills for subtraction at Y3:**

- 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.
- Practise mental subtraction strategies, such as subtracting near multiples of 10 and adjusting (e.g. subtracting 19 or 21), and select most appropriate methods to subtract, explaining why.

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


### Partitioned column subtraction with "exchanging" (decomposition)

As introduced in Y3, but moving towards more complex numbers and values. Use **place value counters** to reinforce "exchanging".

2	7	5	4	-	1	5	6	2	=	1	1	9	2
2	0	0	0	+	<del>7</del> <sup>600</sup>	0	0	+	5	0	+	4	
-	1	0	0	0	+	5	0	0	+	6	0	+	2
1	0	0	0	+	1	0	0	+	9	0	+	2	

### Moving onto Compact Column addition

To introduce the compact method, ask children to perform 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.



2	<del>7</del>	5	4	
-	1	5	6	2
<hr/>				
1	1	9	2	

Give opportunities to apply this to money and measures

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

### Mental strategies

A variety of mental strategies must be taught and practised, including counting on to find the difference where numbers are closer together, or where it is easier to count on.

## SUBTRACTION YEAR 4

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

### Key skills for subtraction at Y4:

- Subtract by counting on where numbers are close together or they are near to multiples of 10, 100 etc.
- Children select the most appropriate and efficient methods for given subtraction calculations.
- Estimate 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 measure and money problems involving fractions and decimals to two decimal places.
- Find multiples of 10, 100 and 1000 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 4 digit number to the nearest 10, 100 or 1000

## Year 5 Subtract with at least 4-digit numbers

including money, measures, decimals

### Compact column subtraction

(with "exchanging")

Children who are still not secure with number facts and place value will need to remain on the partitioned column method until ready for the compact method

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

Lots of opportunities should be given for subtracting and finding differences with money and measures

Add a zero in any empty decimal places to aid understanding of what to subtract in that column

$$\begin{array}{r} \cancel{2}^2 \cancel{8}^8 \cancel{9}^9 \cancel{2}^2 \cancel{8}^8 \\ - \phantom{2} \phantom{8} \phantom{9} \phantom{2} \phantom{8} \\ \hline 26848 \end{array}$$

Subtracting with larger integers.

$$\begin{array}{r} \cancel{6}^6 \cancel{7}^7 \cancel{9}^9 \cancel{6}^6 \cancel{.}^{\cdot} \cancel{0}^0 \\ - \phantom{6} \phantom{7} \phantom{9} \phantom{6} \phantom{.} \phantom{0} \\ \hline 6423.5 \end{array}$$

## SUBTRACTION YEAR 5

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

### Key skills for subtraction at Y5:

- 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 each digit.

- Interpret negative numbers in context, counting forwards and backwards with positive and negative integers through 0.
- Round any number up to 1 million to the nearest 10, 100, 1000, 10 000 and 100 000.

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

Using the compact column method to subtract more complex integers.

$$\begin{array}{r}
 \cancel{9}^{\text{th}} \cancel{5}^{\text{th}} \cancel{0}^{\text{th}}, 699 \\
 - \quad 89,949 \\
 \hline
 60,750
 \end{array}$$

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

$$\begin{array}{r}
 \cancel{10}^{\text{th}} 5 \cdot \cancel{1}^{\text{th}} 9 \text{ kg} \\
 - \quad 36 \cdot 08 \text{ kg} \\
 \hline
 69 \cdot 339 \text{ kg}
 \end{array}$$

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

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.



## **SUBTRACTION YEAR 6**

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

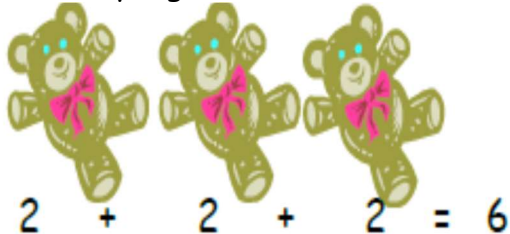
### **Key skills for subtraction at Y6:**

- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.
- Read, write, order and compare numbers up to 10 million and determine the value of each digit
- Round any whole number to a required degree of accuracy
- Use negative numbers in context, and calculate intervals across zero.
- Children need to utilise and consider a range of mental subtraction strategies, jottings and written methods learned in previous years before choosing how to calculate.

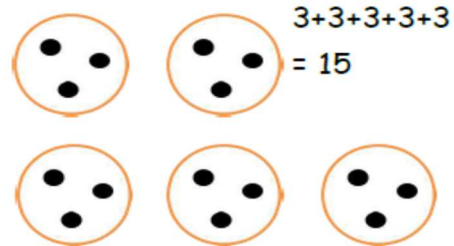


## Year 1 Multiply with concrete objects, arrays and pictorial representations.

How many legs will 3 teddies have?



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



- Give children experience of counting equal groups of objects In 2's, 5's and 10's.
- Give opportunities for practical problem solving involving counting equal sets or groups (as above).

### MULTIPLICATION YEAR 1

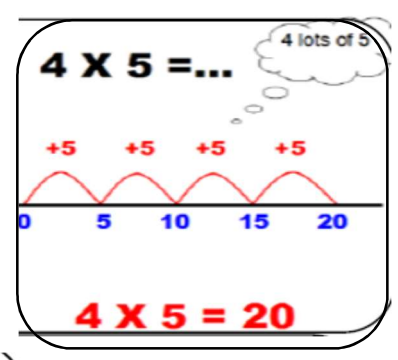
**Key vocabulary:** groups of, lots of, times, array, altogether, multiply, count  
**Key skills for multiplication at Y1:**

- Count in multiples of 2, 5 and 10.
- 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.
- Begin to understand doubling using concrete objects and pictorial representations.



## Year 2 Multiply 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.



### Use arrays



$3 \times 5 = 15$

$5 \times 3 = 15$

$5 \times 3 = 3 + 3 + 3 + 3 = 15$

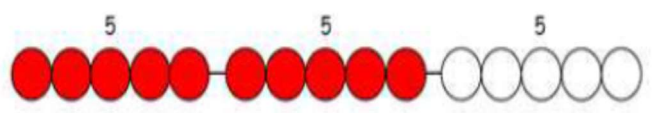
$3 \times 5 = 5 + 5 + 5 = 15$

Use arrays to help children to understand the commutative law of multiplication. Present in different ways

e.g  $3 \times \square = 6$

$5 + 5 + 5 = 3 \times 5$

Use practical apparatus



### Use mental recall

Children should begin to recall multiplication facts for the 2,5 and 10 times tables through regular practice.

## MULTIPLICATION YEAR 2

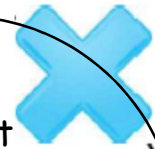
**Key vocabulary:** groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times...

**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.

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

Introduce the **grid method** for multiplying 2 digits by 1 digit

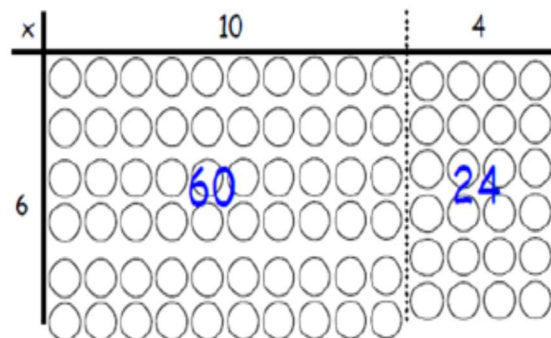


Link to an array initially

Eg.  $23 \times 8 = 184$

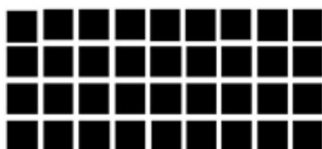
X	20	3
8	160	24

$$160 + 24 = 184$$

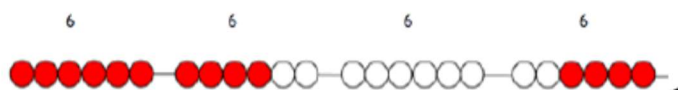
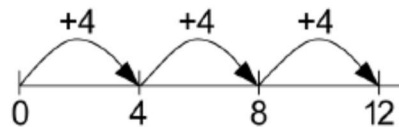


To do this, children must be able to:

- 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:



$$9 \times 4 = 36$$



## **MULTIPLICATION YEAR 3**

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

### **Key skills for multiplication: Y3**

- Recall and use multiplication facts for the **2, 3, 4, 5, 8 and 10** multiplication tables, and multiply multiples of 10.
- Write and calculate number statements using the multiplication tables they know, including **2-digit × 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.

## Year 4 Multiply 3 digits by 1 digit using all multiplication facts up to $12 \times 12$



$$144 \times 4 = 576$$

Grid method

x	100	40	4
4	400	160	16

	4	0	0	
	1	6	0	
+		1	6	
	5	7	6	

Encourage column addition to add accurately.

Move onto expanded column multiplication

Children can be asked to compare the grid method to the column method to see what is the same.

This method is important as it prepares for to short multiplication method taught in Year 5

$$126 \times$$

5

$$30 \text{ (} 5 \times 6 \text{)}$$

$$100 \text{ (} 5 \times 20 \text{)}$$

$$500 \text{ (} 5 \times 100 \text{)}$$

$$\underline{630}$$

Children may choose to use the grid method when multiplying amounts of money

Children 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:  $346 \times 9$  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  $12 \times 12$

## MULTIPLICATION YEAR 4

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

**Key skills for multiplication: Y4**

- Recall multiplication facts for **all multiplication tables up to  $12 \times 12$** .
- 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 Multiply up to 4-digits by 1 or 2 digits.



### Introducing column multiplication

- Children need to be taught to approximate first, e.g. for  $72 \times 38$ , they will use rounding:  $72 \times 38$  is approximately  $70 \times 40 = 2800$ , and use the approximation to check the reasonableness of their answer against

### Introduce short multiplication

x	300	20	7
4	1200	80	28



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

Children should look at the grid method and the expanded column method to see what is the same and different and understand that this method is just reducing the steps.

### Introduce long multiplication for multiplying by 2 digits

	10	8
10	100	80
3	30	24



$$\begin{array}{r} \phantom{18}18 \\ \times \phantom{18}13 \\ \hline \phantom{18}54 \\ \phantom{18}2 \phantom{0} \\ \hline 234 \end{array}$$

**$18 \times 3$**  on the first row

(  $8 \times 3 = 24$ , carrying the 2 for 20, then  $1 \times 3$ , adding the 2 to make '5' for 50)

**$18 \times 10$**  on the second row

( putting a zero in the units column, then saying  $18 \times 1$ )

Children need to understand the place value of the digits to understand how the method works

Moving onto

More complex numbers



	1	2	3	4		
x			1	6		
	7	4	0	4	(1234 × 6)	
	1	2	3	4	0	(1234 × 10)
	1	9	7	4	4	

	3	6	5	2	
x				8	
	2	9	2	1	6
	5	4			

## MULTIPLICATION YEAR 5

**Key vocabulary:** groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, \_times as big as, once, twice, three times..., partition, grid method, total, multiple, product, inverse, square, factor, integer, decimal, short/long multiplication, 'carry'

- **Key skills for multiplication at Y5:**
- Identify multiples and factors, using knowledge of **multiplication tables to 12x12.**
- 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** short and long multiplication, as in Year 5, and multiply decimals up to 2 decimal places by a single digit



$$\begin{array}{r} 3.19 \\ \times 8 \\ \hline 25.52 \\ \phantom{25.} \underset{1}{5} \phantom{.} \underset{7}{2} \end{array}$$

Remind children that the single digit belongs in the units column.

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

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

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**.

## MULTIPLICATION YEAR 6

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

**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.

## Year 1 Group and share small quantities

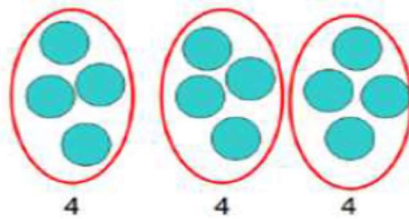
Using objects, diagrams and pictorial representations to solve problems involving both grouping and sharing

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

Grouping:



Sharing:



12 shared between 3 is 4

**Example division problem in a familiar context:**

There are 6 pupils on this table and there are 18 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... ?

"18 shared between 6 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.

### DIVISION YEAR 1

**Key Vocabulary:** share, share equally, one each..., two each..., group, groups of, lots of, array

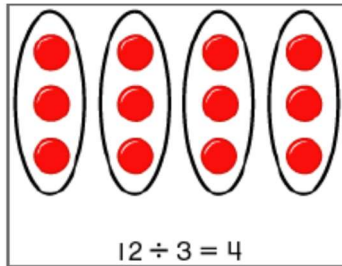
**Key number skills needed for division at Y1:**

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

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

Array:



This represents  $12 \div 3 = 4$ , or posed as

'how many groups of 3 are in 12?'

Children should also be able to

Show the same array as  $12 \div 4 = 3$  if

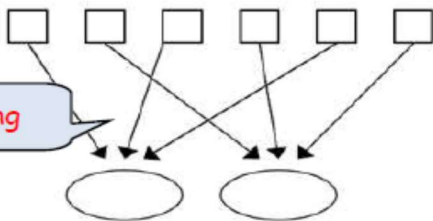
Grouped horizontally

## Know and understand sharing and grouping:

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

Grouping

Sharing



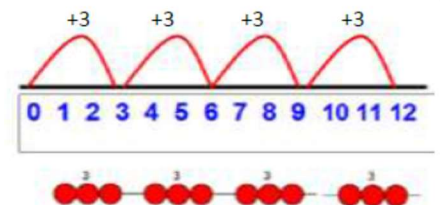
There are 6 sweets, how many people can have 2 sweets each?



Children should be taught to recognise whether problems require sharing or grouping.

## Grouping using a number line:

Group from zero in equal jumps of the divisor to find out 'how many groups of  $\_$  in  $\_$ ?'. Pupils could use a bead string or practical apparatus to work out problems like: A CD costs £3. How many CDs can I buy with £12? This is an important method to develop understanding of division as grouping.



$$12 \div 3 = 4$$

## DIVISION YEAR 2

**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 multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.
- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the  $\times$ ,  $\div$  and  $=$  signs.

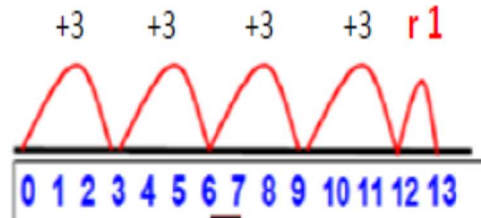
## Year 3 Divide 2-digit numbers by a single digit

Grouping on a number line:

$$13 \div 3 = 4 \text{ r } 1$$

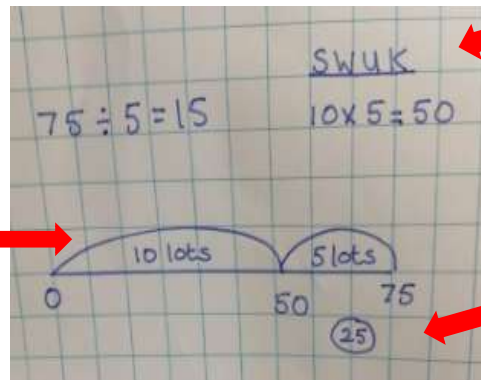
**STEP 1:** Children continue to work out unknown division facts by grouping on a number line from zero.

They are also now taught the concept of **remainders**, as in the example. This should be introduced practically and with arrays, as well as being translated to a number line. Children should work towards calculating some basic division facts with remainders mentally for the 2s, 3s, 4s, 5s, 8s and 10s.



**STEP 2:** Children move onto work out unknown division facts 'chunking' multiples of that number on a number line from zero.

2. Children take out the first 'chunk' (10 x 5)



1. Show What You Know Box (multiple of 10)

3. Children should be encouraged to put what is left in a circle and then work out that division

Children can do the same with divisions that include Remainders.

**Real Life contexts need to be used routinely to help children gain a full understanding and the ability to recognise the place of division and how to apply it to problem solving**

## DIVISION YEAR 3

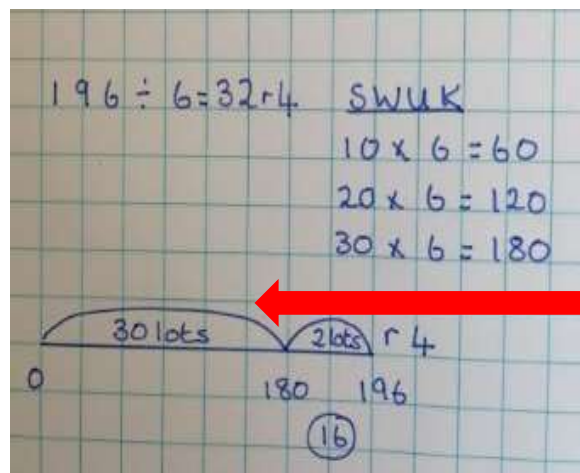
**Key Vocabulary:** share, share equally, one each, two each..., group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, carry, remainder, multiple

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

- Recall and use multiplication and division facts for the 2, 3, 4, 5, 8 and 10 multiplication tables (through doubling, connect the 2, 4 and 8s).
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.
- Solve problems, in contexts, and including missing number problems, involving multiplication and division.

## **Year 4** Divide up to 3-digit numbers by a single digit with and without remainders

Continue with number lines as taught in Year 3, but extending to 3 digit numbers



The SWUK box should show multiples of 10 up to the nearest multiple to the number they are dividing. Children should be encouraged to take the largest 'chunk' (30 x 6 = 180) out of the number

Regular opportunities to apply the method to problem solving in real life contexts should be given, including ones where they have to decide how to interpret the remainder

## DIVISION YEAR 4

**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

**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 multiply and divide mentally, including: multiplying and dividing by 10 and 100 and 1.
- Pupils practise to become fluent in written methods of short division with exact answers and remainders when dividing by a one-digit number
- Pupils practise mental methods and extend this to three-digit numbers to derive facts, for example  $200 \times 3 = 600$  so  $600 \div 3 = 200$
- Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers.

### **Year 5** Divide up to 4 digits by a single digit

Short division, including remainder answers:

**Step 1-** no remainders

Use 3 and 4 digit numbers

	3	2	
3	9	6	

**Step 2-** remainders

within the calculation

	2	1	8
4	8	7	<sup>3</sup> 2

**Step 3-** with remainders

Build up to 4 digit numbers

	0	6	6	3	<sup>r</sup> 5
8	5	<sup>5</sup> 3	<sup>5</sup> 0	<sup>2</sup> 9	

**Short division with remainders:** Children should be introduced to examples that give rise to remainder answers. Divisions needs to have a real life problem solving context, where **pupils consider the meaning of the remainder and how to express it**, ie. as a fraction, a decimal, or as a rounded number or value , depending upon the context of the problem.

## DIVISION YEAR 5

**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, quotient, prime number, prime factors, composite number (non-prime)*

### **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.
- 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.  $98 \div 4 = 24 \text{ r } 2 = 24 \frac{1}{2} = 24.5 \approx 25$ ).
- 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.

## Year 6 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: e.g.  $6497 \div 8$  introduce

$$\begin{array}{r} 8 \overline{) 6497.000} \\ \underline{64} \phantom{00} \\ 97 \phantom{00} \\ \underline{72} \phantom{00} \\ 25 \phantom{00} \\ \underline{24} \phantom{00} \\ 10 \phantom{00} \\ \underline{8} \phantom{00} \\ 20 \phantom{00} \\ \underline{16} \phantom{00} \\ 40 \phantom{00} \\ \underline{40} \phantom{00} \\ 0 \phantom{00} \\ 0 \phantom{00} \\ \underline{0} \phantom{00} \\ 0 \phantom{00} \\ \underline{0} \phantom{00} \\ 0 \phantom{00} \end{array}$$

**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 r 1, a decimal point is added after the units 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. Where **remainders** occur, pupils should express them as fractions, decimals or use rounding, depending upon the problem.

### Introduce long division by chunking for dividing by 2 digits.

Find out 'How many 36s are in 972?' by subtracting 'chunks' of 36, until zero is reached (or until there is a remainder).

- Teach pupils to write a SWUK ( show what you know ) box first at the side that will help them decide what chunks to use, e.g.:

Where remainders occur, pupils should express them as fractions, decimals or use rounding, depending upon the problem.

**SWUK**  $1x = 36$   
 $10x = 360$   
 $20x = 720$   
 $100x = 3600$

$$\begin{array}{r} 27 \\ 36 \overline{) 972} \\ \underline{- 720} \\ 252 \\ \underline{- 252} \\ 0 \end{array}$$

Answer : 27

- Introduce the method in a simple way by limiting the choice of chunks to 'Can we use 10 lots? Can use 100 lots? As children become confident with the process, encourage more efficient chunks to get to the answer more quickly (e.g. 20x, 5x), and expand on their SWUK box



## DIVISION YEAR 6

**Key Vocabulary:** *As previously, & common factor*

**Key number skills needed for division at Y6:**

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