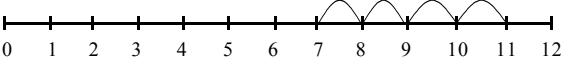
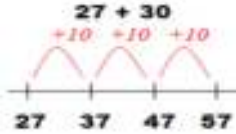
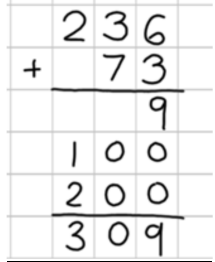




YORKE MEAD CALCULATION POLICY



Addition		
Year 1	Year 2	Year 3
<p>Children should: Have access to a wide range of counting equipment, everyday objects, number tracks and number lines, and be shown numbers in different con-texts.</p> <p>Key skills for addition at Y1:</p> <ul style="list-style-type: none"> 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. read, interpret and practise writing mathematical statements involving addition (+), subtraction (-) and equals (=) signs accurately add and subtract 1-digit and 2-digit numbers to 20 ($9 + 9$, $18 - 9$), including zero add three 1-digit numbers 1 more/ 1 less <p>Use numbered number lines to add, by counting on in ones. Encourage children to start with the larger number and count on.</p> <p style="text-align: center;">$7 + 4$</p>  <p>Read and write the addition (+) and equals (=) signs within number sentences.</p>	<p>Key skills for addition at Y2:</p> <ul style="list-style-type: none"> 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. Identify, represent and estimate numbers Record and use inverse <p>Partition in different ways $23 = 20 + 3$ $23 = 10 + 13$ Initially work practically using Dienes apparatus and move into drawing this using pictures to support their work.</p> <p>Add two digit numbers and tens</p> 	<p>Key skills for addition at Y3:</p> <ul style="list-style-type: none"> Read, write, compare and order 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 Find 10/ 100 more or less <p>Introduce the expanded column addition method:</p> 



YORKE MEAD CALCULATION POLICY

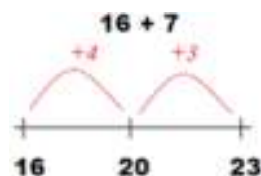


+ = signs and missing numbers

$$\begin{array}{ll} 3 + 4 = \square & \square = 3 + 4 \\ 3 + \square = 7 & 7 = \square + 4 \\ \square + 4 = 7 & 7 = 3 + \square \\ \square + \nabla = 7 & 7 = \square + \nabla \end{array}$$

Promoting covering up of operations and numbers.

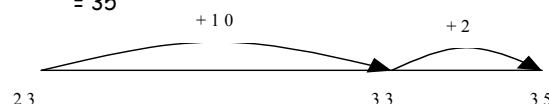
Add two digit numbers and units



Introduce empty number line - partitioning the second number only:

$$23 + 12 = 23 + 10 + 2$$

$$= 35$$



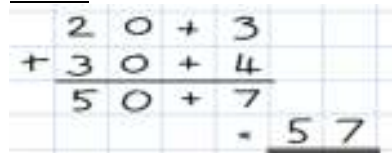
Add 9 or 11 by adding 10 and adjusting by 1 $35 + 9 = 44$

Introduce recording using partitioning initially recording in a line

$$\begin{array}{l} 42 + 76 = 40 + 2 + 70 + 6 \\ = 40 + 70 + 2 + 6 \\ = 110 + 8 \\ = 118 \end{array}$$

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

$$23 + 34 =$$



STEP 1: Only provide examples that do **NOT** cross the tens boundary until they are secure with the method itself.

STEP 2: 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

Add the units first so children are ready for compact method.

In order to carry out this method of addition:

- Children need to recognise the value of the hundreds, tens and units without recording the partitioning.
- Pupils need to be able to add in columns.

Move to the compact column addition method, with "carrying":

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

236

Add units first

+ 73

Carry numbers underneath the bottom

309

line.

1

+ = signs and missing numbers

Continue using a range of equations as in Year 1 and 2 but with appropriate, larger numbers.



YORKE MEAD CALCULATION POLICY



2-digit numbers that DO cross the tens boundary (e.g. $58 + 43$).

$$\begin{array}{r} 50 + 8 \\ 40 + 3 \\ \hline 90 + 11 \\ \hline 101 \end{array}$$

+ = signs and missing numbers

Continue using a range of equations as in Year 1 but with appropriate, larger numbers.

Extend to

$$14 + 5 = 10 + \square$$

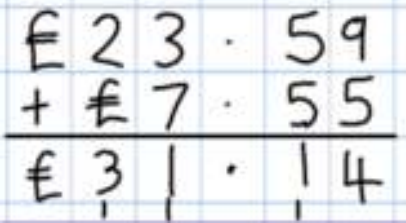
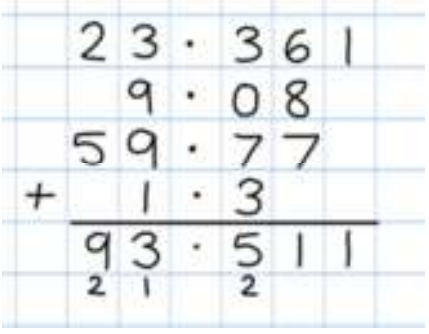
and adding three numbers

$$32 + \square + \square = 100 \quad 35 = 1 + \square + 5$$



YORKE MEAD CALCULATION POLICY



Addition		
Year 4	Year 5	Year 6
<p>Key skills for addition at Y4:</p> <ul style="list-style-type: none"> 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 1000 more or less 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 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. <p>Move from expanded addition to the compact column method, adding units first, and "carrying" numbers underneath the calculation. Also include money and measures contexts.</p> <p>Introduce the compact column addition method by asking children to add the two given numbers together using the method that they are familiar with (expanded column addition—see Y3). Teacher models the compact method with carrying, asking children to discuss similarities and differences and establish how it is carried out.</p> <p>e.g. $3517 + 396 = 3913$</p> <p>1. Add units first.</p>	<p>Key skills for addition at Y5:</p> <ul style="list-style-type: none"> Add numbers mentally with increasingly large numbers, using and practising a range of mental strategies ie. 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. Read roman numerals to 1000 (m) and record years written <p>Add numbers with more than 4 digits including money, measures and decimals with different numbers of decimal places.</p> <p>The decimal point should be aligned in the same way as the other place value columns, and must be in the same column in the answer.</p> 	<p>Key skills for addition at Y6:</p> <ul style="list-style-type: none"> 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. Round any whole number <p>Add several numbers of increasing complexity</p>  <p>Adding several numbers with different numbers of</p>



YORKE MEAD CALCULATION POLICY



2. „Carry“ numbers **underneath** the bottom line.
3. Reinforce correct place value by reminding them the actual value is 5 hundreds add 3 hun-dreds, **not 5 add 3**, for example.

$$\begin{array}{r} 3517 \\ + 396 \\ \hline 3913 \end{array}$$

+ = signs and missing numbers

Continue using a range of equations as in previous years but with appropriate numbers.

May extend to

$$\begin{array}{r} 23 \\ + 1 \Delta \\ \hline 36 \end{array}$$

Extend to decimals in the context of money (vertically)

$$\begin{array}{r} £ 2.50 + £ 1.75 = £ 4.25 \\ £ 2.50 \\ + £ 1.75 \\ \hline £ 4.25 \end{array}$$

+ = signs and missing numbers

Continue using a range of equations as in previous years but with appropriate numbers.

May extend to

$$\begin{array}{r} 23 \\ + 1 \Delta \\ \hline 36 \end{array}$$

Numbers should exceed 4 digits.

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

Pupils should be able to add more than two values, carefully aligning place value columns.

$$\begin{array}{r} 19.01 \\ 3.65 \\ + 0.7 \\ \hline 23.36 \end{array}$$

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

Children should:

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

+ = signs and missing numbers

Continue using a range of equations as in previous years but with appropriate numbers.

May extend to

$$\begin{array}{r} 234 \\ + 1 \Delta 5 \\ \hline 369 \end{array}$$

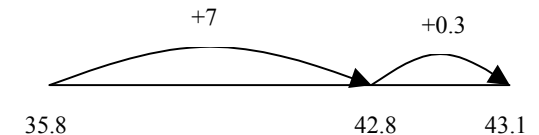
Model negative numbers using a number line.

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.

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

Adding several numbers with more than 4 digits.



+ = signs and missing numbers

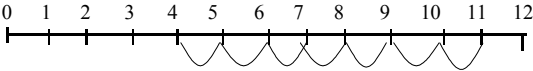
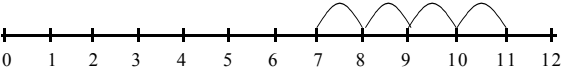
Continue using a range of equations as in previous years but with appropriate numbers.

May extend to

$$\begin{array}{r} 13.8 \\ + 24. \Delta \\ \hline 37.9 \end{array}$$



Subtraction

Year 1	Year 2	Year 3
<p>Children work initially with concrete materials and then move onto working with pictures, number lines and number squares.</p> <p>Key skills for subtraction at Y1:</p> <ul style="list-style-type: none"> 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. <p>Model subtraction using hundred squares and numbered number lines/tracks and practically.</p> <p>Number lines</p> <p>Counting back in ones on a numbered line to take away $11 - 7$</p>  <p>The difference between 7 and 11 (Counting up)</p> 	<p>Key skills for subtraction at Y2:</p> <ul style="list-style-type: none"> 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. <p>Subtract on a number line by counting back, aiming to develop mental subtraction skills. This strategy will be used for:</p> <ul style="list-style-type: none"> 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:) 	<p>Key skills for subtraction at Y3:</p> <ul style="list-style-type: none"> 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 multi-ples of 10 (see examples above) 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. <p>Introduce partitioned column subtraction method.</p> <p>STEP 1: introduce this method with examples where no exchanging is required.</p> <p>$89 - 35 = 54$</p> $\begin{array}{r} 89 + 9 \\ - 30 + 5 \\ \hline 50 + 4 \end{array}$ <p>STEP 2: introduce “exchanging” through practical subtraction. Make the larger number with Base 10, then subtract 47 from it.</p> $\begin{array}{r} 60 \quad 1 \\ 70 + 2 \\ - 40 + 7 \\ \hline 20 + 5 = 25 \end{array}$



YORKE MEAD CALCULATION POLICY



Recording by - drawing jumps on prepared lines
- constructing own lines

Mental subtraction

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

- = signs and missing numbers

$$7 - 3 = \square \quad \square = 7 - 3$$

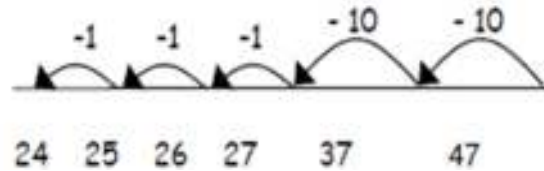
$$7 - \square = 4 \quad 4 = \square - 3$$

$$\square - 3 = 4 \quad 4 = 7 - \square$$

$$\square - \nabla = 4 \quad 4 = \square - \nabla$$

Subtracting pairs of 2-digit numbers on a number line: $47 - 23 = 24$

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

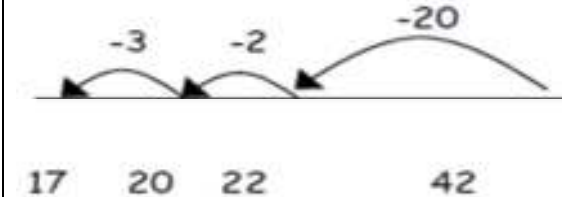


Subtract tens first then the units.

Move towards more efficient jumps back, as below:



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



$72 - 47$



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

When learning to exchange, explore partitioning in different ways so that pupils understand that when you exchange, the **VALUE** is the same ie $72 = 70 + 2 = 60 + 12 = 50 + 22$ etc. Emphasise that the **value hasn't changed**, we have just partitioned it in a different way.

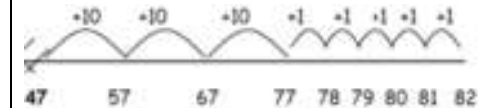
STEP 3: Once pupils are secure with the understanding of "exchanging", they can use the partitioned column method to subtract any 2 and 3-digit numbers.

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

Counting on as a mental strategy for subtraction:

Continue to reinforce counting **on** as a strategy for **close-together numbers** (e.g. $121 - 118$), and also for numbers that are "nearly" multiples of 10, 100, 1000 or £s, which make it easier to count on (e.g. $102 - 89$, $131 - 79$, or calculating change from £1 etc.).

□ Start at the smaller number and count on in **tens** first, then count on in units to find the rest of the difference:



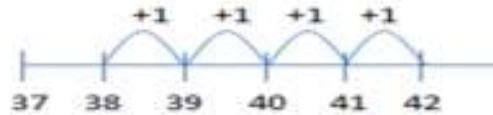


YORKE MEAD CALCULATION POLICY



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

$$42 - 38 = 4$$



Start with the smaller number and count on to the largest.

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.

- = signs and missing numbers

Continue using a range of equations as in Year 1 but with appropriate numbers.

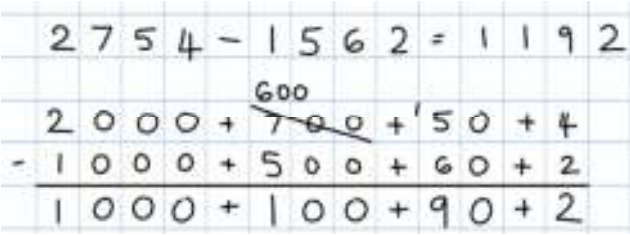
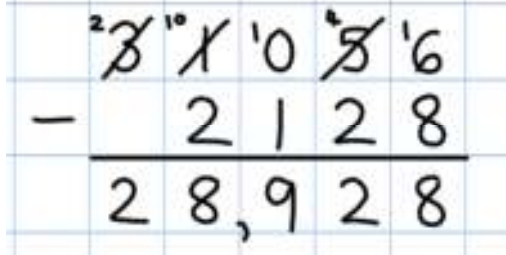
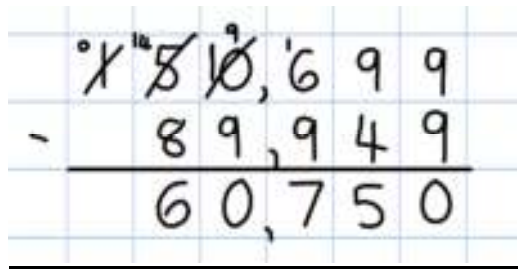
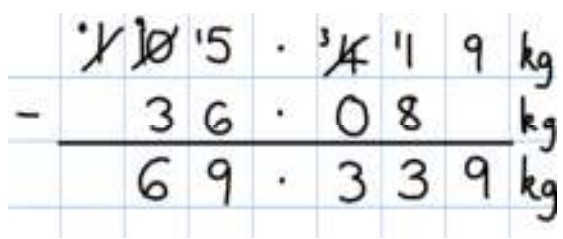
Extend to $14 + 5 = 20 - \square$

Find a small difference by counting up



YORKE MEAD CALCULATION POLICY



Subtraction		
Year 4	Year 5	Year 6
<p>Key skills for subtraction at Y4:</p> <ul style="list-style-type: none"> 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 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 <p>Round any number to the nearest 10, 100 or 1000</p> <p>Partitioned column subtraction with “exchanging” (decomposition):</p>  <p>As introduced in Y3, but moving towards more complex numbers and values. Use place value counters to reinforce “exchanging”.</p> <p><u>Moving into</u></p>	<p>Key skills for subtraction at Y5:</p> <ul style="list-style-type: none"> 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. Count forwards or backwards in steps of powers of 10 for any given number up to 1 million. Interpret negative numbers in context, counting forwards and backwards with positive and negative in-tegers through 0. Round any number up to 1 million to the nearest 10, 100, 1000, 10 000 and 100 000. Subtract whole numbers with more than 4 digits using formal written method <p>Subtract with at least 4-digit numbers including money, measures, decimals.</p> <p>Compact column subtraction (with “exchanging”).</p>  <p>Children who are still not secure with number facts and place</p>	<p>Key skills for subtraction at Y6:</p> <ul style="list-style-type: none"> 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 <p>Subtracting with increasingly large and more complex numbers and decimal values.</p>  <p>Using the compact column method to subtract more complex integers</p> 



YORKE MEAD CALCULATION POLICY



Compact column subtraction

$$\begin{array}{r} 2854 \\ - 1562 \\ \hline 1192 \end{array}$$

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.

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.

- = signs and missing numbers

Continue using a range of equations as in previous years but with appropriate numbers.

Find a small difference by counting up

e.g. $5003 - 4996 = 7$

This can be modelled on an empty number line (see complementary addition below).

value will need to remain on the partitioned column method until ready for the compact method.

$$\begin{array}{r} 7108.69 \\ - 372.5 \\ \hline 6796.19 \end{array}$$

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

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

- = signs and missing numbers

Continue using a range of equations as in previous years but with appropriate numbers.

Find a difference by counting up

e.g. $8006 - 2993 = 5013$

This can be modelled on an empty number line (see complementary addition below).

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

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.


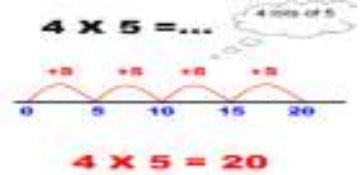
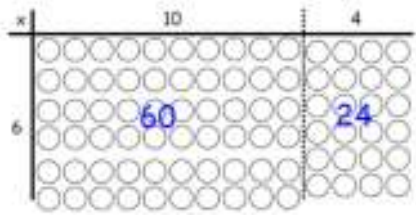
- = signs and missing numbers

Continue using a range of equations as in previous years but with appropriate numbers.



YORKE MEAD CALCULATION POLICY



Multiplication								
Year 1	Year 2	Year 3						
<p>Key skills for multiplication at Y1:</p> <ul style="list-style-type: none"> 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. <p>Multiply with concrete objects, arrays and pictorial representations.</p> <p>How many legs will 3 teddies have? $2 + 2 + 2 = 6$</p> <p>There are 3 sweets in one bag. How many sweets are in 5 bags altogether?</p>  <p>$3 + 3 + 3 + 3 + 3 = 15$</p> <ul style="list-style-type: none"> Give children experience of counting equal group of objects in 2s, 5s and 10s. Present practical problem solving activities involving counting equal sets or groups, as above. 	<p>Key skills for multiplication at Y2:</p> <ul style="list-style-type: none"> Count in steps of 2, 3 and 5 from zero, and in 10s from any number. Recall and use multiplication facts from the 2, 5 and 10 multiplication tables, including recognising odds and evens. Write and calculate number statements using the x and = signs. Show that multiplication can be done in any order (commutative). Solve a range of problems involving multiplication, using concrete objects, arrays, repeated addition, mental methods, and multiplication facts. Pupils use a variety of language to discuss and describe multiplication. <p>x = signs and missing numbers</p> <p> $7 \times 2 = \square$ $\square = 2 \times 7$ $7 \times \square = 14$ $14 = \square \times 7$ $\square \times 2 = 14$ $14 = 2 \times \square$ $\square \times \nabla = 14$ $14 = \square \times \nabla$ </p> <p>Multiply using arrays and repeated addition (using at least 2s, 5s and 10s)</p> <p>Use repeated addition on a number line:</p> <ul style="list-style-type: none"> Starting from zero, make equal jumps up on a number line to work out multiplication facts and write multiplication statements using x and = signs. 	<p>Key skills for multiplication:</p> <ul style="list-style-type: none"> 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 x single-digit, drawing upon mental methods, and progressing to reliable written methods. Solve multiplication problems, including missing number problems. Develop mental strategies using commutativity (e.g. $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$) Solve simple problems in contexts, deciding which operations and methods to use. Develop efficient mental methods to solve a range of problems e.g. using commutativity <p>Multiply 2-digits by a single digit number</p> <p>Introduce the grid method for multiplying 2-digit by single-digits:</p> <p>Eg. $23 \times 8 = 184$</p> <table border="1" data-bbox="1444 981 1926 1053"> <tr> <td>X</td><td>20</td><td>3</td></tr> <tr> <td>8</td><td>160</td><td>24</td></tr> </table>  <p>$160 + 24 = 184$</p>	X	20	3	8	160	24
X	20	3						
8	160	24						



YORKE MEAD CALCULATION POLICY



Use arrays:

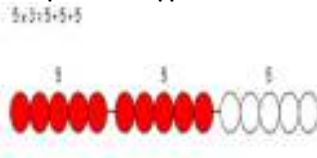


$$5 \times 3 = 3 + 3 + 3 + 3 = 15$$

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

Use arrays to help teach children to understand the commutative law of multiplication, and give examples such as $3 \times \underline{\quad} = 6$.

Use practical apparatus:



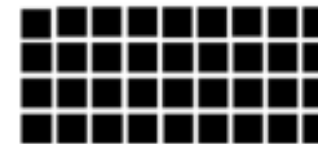
Use mental recall:

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

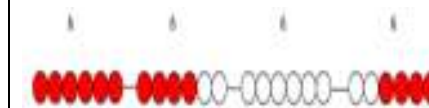
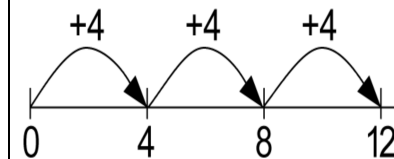
Introduce the grid method with children physically making an array to represent the calculation (e.g. make 8 lots of 23 with 10s and 1s place value counters), then translate this to grid method format.

To do this, children must be able to:

- Partition numbers into tens and units
- Multiply multiples of ten by a single digit (e.g. 20×4) 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 adjust-ing, using doubling etc.) Strategies to support this are repeated addition using a number line, bead bars and arrays:



$$9 \times 4 = 36$$





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Key skills for multiplication at Y4:

- Count in multiples of 6, 7, 9, 25 and 1000
- Recall multiplication facts for all multiplication tables up to 12×12 .
- 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)

x = signs and missing numbers

Continue using a range of equations as in Year 2 but with appropriate numbers

Multiply 2 and 3-digits by a single digit, using all multiplication tables up to 12×12

Developing the grid method:

Eg. $136 \times 5 = 680$

X	100	30	6
5	500	150	30

500
150
+ 30
680

Key skills for multiplication at Y5:

- Identify multiples and factors, using knowledge of multiplication tables to 12×12 .
- Including finding all factor pairs of a number and common factors of 2 numbers.
- 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.

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

- Introducing column multiplication
- Introduce by comparing a grid method calculation to a short multiplication method, to see how the steps are related, but notice how there are less steps involved in the column method (see video).
- Children need to be taught to approximate first, e.g. for 72×38 , they will use rounding: 72×38 is approximately $70 \times 40 = 2800$, and use the approximation to check the reasonableness of their answer against.

Short multiplication for multiplying by a single digit.

Pupils could be asked to work out a given calculation using the grid, and then compare it to „your“ column method. What are the similarities and differences? Unpick the steps and show how it reduces the steps.

X	300	20	7
4	1200	80	28



Key skills for multiplication at Y6:

- Recall multiplication facts for all times tables up to 12×12 (as Y4 and Y5).
- Multiply multi-digit numbers, up to 4-digit \times 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.

x = signs and missing numbers

Continue using a range of equations as in Year 2 but with appropriate numbers

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

	3	.	1	9
\times	8			
	2	5	.	5
		1		7
				2

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

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

Children will be able to:



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Encourage column addition to add accurately.

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

Children 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 x 9 is approximately 350 x 10 = 3500"
- Record an approximation to check the final answer against.
- Multiply multiples of ten and one hundred by a single-digit, using their multiplication table knowledge.
- Recall all times tables up to 12 x 12

$$\begin{array}{r} 327 \\ \times 4 \\ \hline 1308 \end{array}$$

Introduce long multiplication for multiplying by 2 digits

	10	8
10	100	80
3	30	24

The grid could be used to introduce long multiplication, as the relationship can be seen in the answers in each row.



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

18 x 3 on the 1st row

(8 x 3 = 24, carrying the 2 for twenty, then „1“ x 3).

18 x 10 on the 2nd row.

Put a zero in units first, then say 8 x 1, and 1 x 1.

Moving towards more complex numbers:

(1234x6)

$$\begin{array}{r} 1234 \\ \times 6 \\ \hline 7404 \\ 12340 \\ \hline 19744 \end{array}$$

$$\begin{array}{r} 3652 \\ \times 8 \\ \hline 29216 \end{array}$$


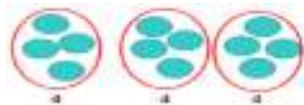
□ Use rounding and place value to make approximations before calculating and use these to check answers against.

- 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



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Division										
Year 1	Year 2	Year 3								
<p>Key number skills needed for division at Y1:</p> <ul style="list-style-type: none">Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations arrays with the support of the teacherThrough 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. <p>Group and share small quantities Using objects, diagrams and pictorial representations to solve problems involving both grouping and sharing.</p> <p>How many groups of 4 can be made with 12 stars? = 3</p> <p>Grouping</p>  <p>Sharing</p> 	<p>Key number skills needed for division at Y2:</p> <ul style="list-style-type: none">Count in steps of 2, 3, and 5 from 0Recall 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 x, ÷ and = signs.Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts. <p><u>÷ = signs and missing numbers</u></p> <table><tr><td>6 ÷ 2 = □</td><td>□ = 6 ÷ 2</td></tr><tr><td>6 ÷ □ = 3</td><td>3 = 6 ÷ □</td></tr><tr><td>□ ÷ 2 = 3</td><td>3 = □ ÷ 2</td></tr><tr><td>□ ÷ ▽ = 3</td><td>3 = □ ÷ ▽</td></tr></table> <p>Group and share, using the ÷ and = sign Use objects, arrays, diagrams and pictorial representations, and grouping on a number line.</p>	6 ÷ 2 = □	□ = 6 ÷ 2	6 ÷ □ = 3	3 = 6 ÷ □	□ ÷ 2 = 3	3 = □ ÷ 2	□ ÷ ▽ = 3	3 = □ ÷ ▽	<p>Key number skills needed for division at Y3:</p> <ul style="list-style-type: none">Recall and use multiplication and division facts for the 2, 3, 4, 5, 8 and 10 multiplication tables (through dou-bling, 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 for-mal written methods.Solve problems, in contexts, and including missing number problems, involving multiplication and division.Pupils develop efficient mental methods, for example, using multiplication and division facts (e.g. using 3 × 2 = 6, 6 ÷ 3 = 2 and 2 = 6 ÷ 3) to derive related facts (30 × 2 = 60, so 60 ÷ 3 = 20 and 20 = 60 ÷ 3).Pupils develop reliable written methods for division, starting with calculations of 2-digit numbers by 1-digit numbers and progressing to the formal written method of short division. <p><u>÷ = signs and missing numbers</u> Continue using a range of equations as in Year 2 but with appropriate numbers.</p> <p>Divide 2-digit numbers by a single digit (where there is no remainder in the final answer)</p>
6 ÷ 2 = □	□ = 6 ÷ 2									
6 ÷ □ = 3	3 = 6 ÷ □									
□ ÷ 2 = 3	3 = □ ÷ 2									
□ ÷ ▽ = 3	3 = □ ÷ ▽									



Example division problem in a familiar context:

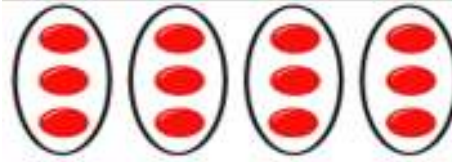
There are 6 pupils on this table and there are 18 pieces of fruit to share between us. If we share them equally, how many will we each get?

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.



$$12 \div 3 = 4$$

Arrays

This represents $12 \div 3$, posed as how many groups of 3 are in 12?

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

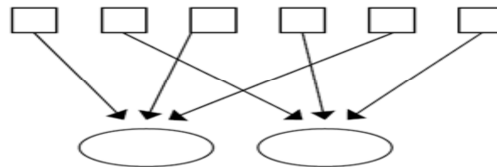
Know and understand sharing and grouping:

Grouping

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



Sharing



Grouping using a number line:

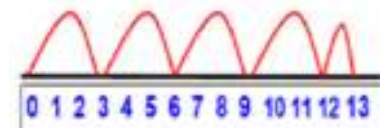
Group from zero in equal jumps of the divisor to find out “how many groups of _ in _?”. Pupils could use a bead string or practical apparatus to work out problems like “A CD costs £3. How many CDs can I buy with £12?” This is an important method to develop understanding of division as grouping.

Sharing – 6 sweets are shared between 2 people. How many do they have each?

Grouping on a number line:

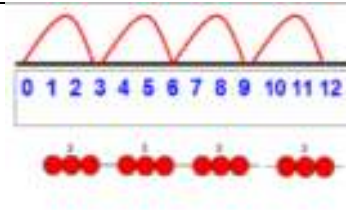
STEP 1: Children continue to work out unknown division facts by grouping on a number line from zero. They are also now taught the concept of remainders, as in the example. This should be introduced practically and with arrays, as well as being translated to a number line. Children should work towards calculating some basic division facts with remainders mentally for the 2s, 3s, 4s, 5s, 8s and 10s, ready for “carrying” remainders across within the short division method.

$$13 \div 3 =$$





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$$12 \div 3 = 4$$



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Division		
Year 4	Year 5	Year 6
<p>Key number skills needed for division at Y4:</p> <ul style="list-style-type: none"> Recall multiplication and division facts for all numbers up to 12×12. Use place value, known and derived facts to multiply and divide mentally, including: multiplying and dividing by 10 and 100 and 1. Pupils practise to become fluent in the formal written method of short division with exact answers when dividing by a one-digit number Pupils practise mental methods and extend this to three-digit numbers to derive facts, for example $200 \times 3 = 600$ so $600 \div 3 = 200$ Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as three cakes shared equally between 10 children. <p>Divide up to 3-digit numbers by a single digit (without remainders initially)</p> <p>Continue to develop short division: Short division should only be taught once children have secured the skill of calculating „remainders“.</p> <p>STEP 1: Pupils must be secure with the process of short division for dividing 2-digit numbers by a single digit</p>	<p>Key number skills needed for division at Y5:</p> <ul style="list-style-type: none"> Recall multiplication and division facts for all numbers up to 12×12 (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. <ul style="list-style-type: none"> 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 	<p>Key number skills needed for division at Y6:</p> <ul style="list-style-type: none"> Recall and use multiplication and division facts for all numbers to 12×12 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. <p>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. $6497 \div 8$</p>



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(those that do not result in a final remainder —see steps in Y3), but must understand how to calculate remainders, using this to „carry“ remainders within the calculation process (see example).

$$\begin{array}{r} 18 \\ 4 \overline{) 732} \end{array}$$

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 remainder at this stage. Children who exceed this expectation may progress to Y5 level.

$$\begin{array}{r} 218 \\ 4 \overline{) 872} \end{array}$$

When the answer for the first column is zero ($1 \div 5$, as in example), children could initially write a zero above to acknowledge its place, and must always „carry“ the number (1) over to the next digit as a remainder.

$$\begin{array}{r} 037 \\ 5 \overline{) 185} \end{array}$$

(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.

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

Short division, including remainder answers:

Short division with remainders: Now that pupils are introduced to examples that give rise to remainder answers, division 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.

The answer to $5309 \div 8$ could be expressed as 663 and five eighths, $663 \text{ r } 5$, as a decimal, or rounded as appropriate to the problem involved.

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

If children are confident and accurate:

- Introduce long division for pupils who are

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 $\text{r } 1$, 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.

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

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 "useful list" first at the side that will help them decide what chunks to use, e.g.:



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ready to divide any number by a 2-digit number (e.g. $2678 \div 19$). This is a Year 6 expectation.

'Useful' list: $1x = 36$

$10x = 360$

$100x = 3600$

- 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 „useful“ lists.

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

Answer: 27

- Where remainders occur, pupils should express them as fractions, decimals or use rounding, depending upon the problem.
- Must be aligned in place value for subtracting.