



Calculations Policy

Date of issue	Next review	Version	Signed: Chair of Governors	Signed: Headteacher
Sept 2021	Sept 2022			

Single Equality Statement

The [Equality Information and Objectives](#) document, for Veritas MAT, provides a format for addressing the statutory duties of the Equality Act 2010 and The Children and Families Act 2014. This supersedes and brings together all previous statutory duties in relation to race, gender and disability and also addresses the duty to promote community cohesion, thus meeting the school's statutory duties in these areas.

Governor Statement

The headteacher in each school is the leader of their school. Each member school has autonomy over its curriculum and provision and, while upholding the three core values of the trust, we expect each school to have an individual character relevant to the community it serves.

Each school has a Regional Governing Body. Warden House and Pilgrims' Way Primary Schools share a Regional Governing Body while Mundella Primary has its own Regional Governing Body. The Regional Governing Body sits six times a year. Each Regional Governing Body reports up to the MAT Board and Trust Members who quality assure their work.

The Regional Governing Body is responsible for a hub of up to three academies. The Regional Governing Body reports up to the Trust Board who quality assure their work. Veritas MAT has two Regional Governing Bodies. Key areas of responsibility for the Regional Governing Body are:

Standards, Finance and Audit, Human Resources, Infrastructure and Procurement

The Executive Board consists of the CEO and Company Secretary / Trust Business Manager who run a team that support core operational tasks across the trust. Roles include finance, standards, research, training, school-to-school support and mentor-coaching. The CEO and a designated Trust Board Trustee also sit on the Regional Governing Body.

The Board of Trustees set the strategic direction, vision and ethos of Veritas Multi Academy Trust and are accountable to the Secretary of State for Education for standards across trust schools.



Developmental Aims:

- To introduce children to the processes of calculation through practical, oral and mental activities.
- To support children in developing ways of recording to support their thinking and calculation methods
- Enable children to learn to interpret and use the signs and symbols.
- To facilitate children's use of models and images, such as empty number lines, to support their mental and informal written methods of calculation.
- To enable children to strengthen and refine their mental methods in order to develop informal written methods.
- To support children in becoming more efficient and succinct in their recordings which will ultimately lead to efficient written methods that can be used more generally.
- By the end of Key Stage 2 children should be equipped with mental and written methods that they understand and can use correctly.
- By the end of Key Stage 2, when faced with a calculation, children will be able to decide which method is most appropriate and have strategies to check its accuracy.
- At whatever stage in their learning, and whatever method is being used, children's methods of calculating will be underpinned by a secure and appropriate knowledge of number facts, along with the mental skills that are needed to carry out the process and judge if it was successful.

The overall aims when children leave primary school are for them to:

- have a secure understanding of mental maths facts to apply to written mathematics;
- have a secure knowledge of number facts and a good understanding of the four operations
- have an efficient, reliable, compact written method of calculation for each operation that children can apply with confidence when undertaking calculations that they cannot carry out mentally;
- be able to use this knowledge and understanding to solve problems;

Mental methods of calculation

Oral and mental mathematics is essential, particularly so in calculation. Early practical, oral and mental work lays the foundations by providing children with a good understanding of how the four operations build on efficient counting strategies and a secure knowledge of place value and number facts. Later learning and skill development must ensure that children recognise how the operations relate to one another and how the rules and laws of arithmetic are to be used and applied. Ongoing oral and mental mathematics learning provides practice and consolidation of these ideas. It must give children the opportunity to apply what they have learned to particular cases, exemplifying how the rules and laws work, and to general cases where children make decisions and choices for themselves.

The ability to calculate mentally forms the basis of all methods of calculation and has to be maintained and refined. A good knowledge of numbers or a 'feel' for numbers is the product of structured practice and repetition. It requires an understanding of number patterns and relationships developed through directed enquiry, use of models and images and the application of acquired number knowledge and skills. Secure mental calculation requires the ability to:

- recall key number facts instantly - for example, all addition and subtraction facts for each number to at least 10, sums and differences of multiples of 10
- recall all times tables up to 12 x 12 by the end of year 4 -

Foundation – by end of year begin counting sequences, doubling, halving and sharing

Year 1 – counting sequences (which follow times tables e.g. 2, 4, 6, 8 10 ... for x2). By the end of year 1, children can start learning 2, 10 and 5 times tables.

Year 2 – Refine 2, 10, 5 times tables. Learn 11 times table

Year 3 – Recall and use 2, 10, 5, 11 times tables. Learn 3, 4, 8 times tables.

Year 4 – Recall and use 2, 10, 5, 11, 3, 4, 8 and learn 6, 7 and 12 times tables.

Year 5/6 – continue practice of all times tables up to 12 x 12, use these to inform division and to work out other times tables higher than 12 (e.g. double 12 times tables to generated 24 times tables).

- use taught strategies to work out the calculation - for example, recognise that addition can be done in any order and use this to add mentally a one-digit number or a multiple of 10 to a one-digit or two-digit number, partition two-digit numbers in different ways including into multiples of ten and one and add the tens and ones separately and then recombine, when applying mental methods in special cases.
- understand how the rules and laws of arithmetic are used and applied - for example, to add or subtract mentally combinations of one-digit and two-digit numbers, and to calculate mentally with whole numbers and decimals.

The aim is that by the end of Key Stage 2, the great majority of children should be able to use an efficient written method for each operation with confidence and understanding. Children will develop the ability to use what are commonly known as 'standard' written methods - methods that are efficient and work for any calculations, including those that involve whole numbers or decimals. They are compact and consequently help children to keep track of their recorded steps. Being able to use these written methods gives children an efficient set of tools they can use when they are unable to carry out the calculation in their heads or do not have access to a calculator. We want children to know that they have a reliable, written method to which they can turn when the need arises.

In setting out these aims, the intention is that there will be a consistent approach to the learning of calculation strategies and that all teachers understand the progression of skills and key concepts. The great majority of children will benefit greatly from learning how to use the most efficient methods. The challenge for teachers will be in determining when their children should move on to a refinement in the method and become confident and more efficient at written calculation. Guidance is given below for the steps in reaching the most efficient methods for each of the four number operations.

Progression in Teaching Addition

Mental Skills

Recognise the size and position of numbers

Count on in ones and tens

Know number bonds to 10 and 20

Add multiples of 10 to any number

Partition and recombine numbers

Bridge through 10

Models and Images

Counting apparatus

Place value apparatus

Place value cards

Number tracks

Numbered number lines

Marked but unnumbered number lines

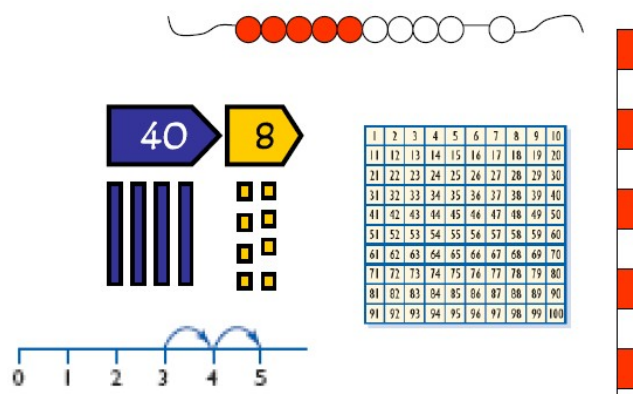
Empty number lines

Hundred square

Counting stick

Bead string

Cuisenaire rods (bar modelling)



Key Vocabulary

add

addition

Plus

And

count on

more


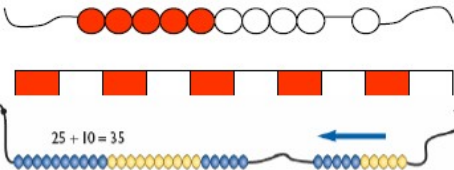
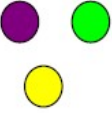
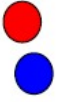

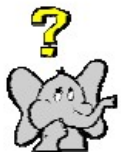
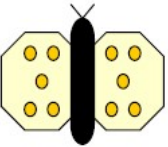
sum

total

altogether

increase

add and count on
addition plus
more sum total
altogether increase

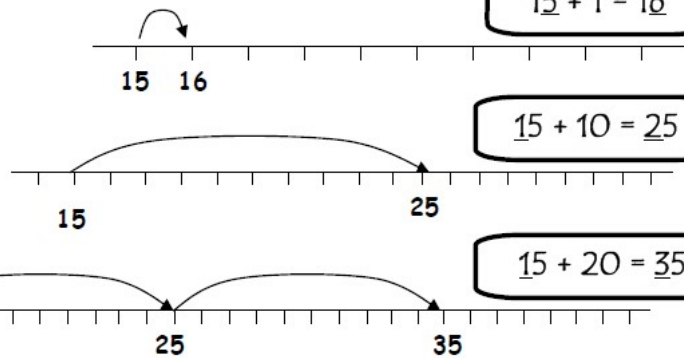
End of year expectation	Progression of skills and methods
	(addition)
EYFS	<div>Recognise numbers 0 to 10</div> <div>0 1 2 3 4 5 6 7 8 9 10</div>
EYFS	<div>  <div>1, 2, 3, 4, 5, 6 ... there are 6 teddies</div> <div>Count reliably up to 10 everyday objects</div> </div>
EYFS	<div>  <div>Count in ones and tens</div> </div>
EYFS	<div> <div>Begin to relate addition to combining two groups of objects</div> <div>  <div>and</div>  <div>makes 5</div> </div> </div>
EYFS	<div> <div>3 + 2 = 5</div> <div>  <div>Count along a number line to add numbers together</div> </div> </div>
EYFS	<div> <div>Begin to use the + and = signs to record mental calculations in a number sentence</div> <div>6 + 4 = 10</div> <div>  </div> </div>
EYFS	<div>  <div>5 + 5 = 10</div> <div>Know doubles of numbers</div> </div>

Y1	<div data-bbox="304 241 662 353" data-label="Text"> <p>Know by heart all pairs of numbers with a total of 10 and 20</p> </div> <div data-bbox="687 241 1201 338" data-label="Image"> </div> <div data-bbox="284 376 475 544" data-label="Image"> </div> <div data-bbox="483 376 691 544" data-label="Image"> </div> <div data-bbox="707 409 938 510" data-label="Image"> </div> <div data-bbox="946 387 1066 499" data-label="Image"> </div> <div data-bbox="1090 387 1233 544" data-label="Image"> </div>
Y1	<div data-bbox="443 577 691 678" data-label="Image"> </div> <div data-bbox="730 611 1002 701" data-label="Image"> </div> <div data-bbox="475 723 659 824" data-label="Image"> </div> <div data-bbox="1050 689 1353 790" data-label="Text"> <p>Know that addition can be done in any order</p> </div>
Y1	<div data-bbox="379 958 595 1081" data-label="Text"> <p>Put the biggest number first and count on</p> </div> <div data-bbox="627 947 762 1126" data-label="Image"> </div> <div data-bbox="842 947 970 1081" data-label="Image"> </div> <div data-bbox="978 902 1401 1104" data-label="Image"> </div>
Y1	<div data-bbox="531 1149 770 1227" data-label="Equation-Block"> $8 + 7 = 15$ </div> <div data-bbox="403 1261 850 1350" data-label="Figure"> </div> <div data-bbox="978 1227 1313 1317" data-label="Text"> <p>Add two single-digit numbers that bridge 10</p> </div> <div data-bbox="587 1406 1177 1478" data-label="Text"> <p>Y1 – number bonds to 20 1 step problems/ missing number problems</p> </div>
Y1 into Y2	<div data-bbox="411 1563 722 1653" data-label="Text"> <p>Begin to partition numbers in order to add</p> </div> <div data-bbox="834 1507 954 1686" data-label="Diagram"> </div> <div data-bbox="1010 1552 1369 1630" data-label="Image"> </div>

Y2

Know which digit changes when adding 1s or 10s to any number

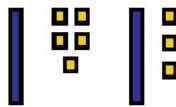
Can be demonstrated visually as in diagram but this **should not** be used as a written method.



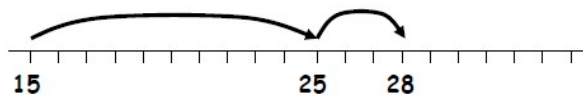
Y2

Y2 – know that addition is commutative

Missing number problems/ check calculations using inverse knowledge



Adding two two-digit numbers (without bridging)
Counting in tens and ones
Partitioning and recombining



$$15 + 13 = 28$$

Y2 into Y3

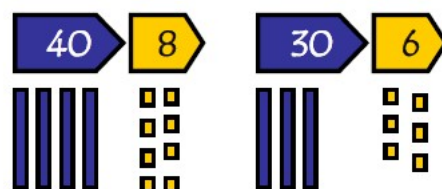
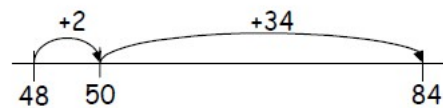
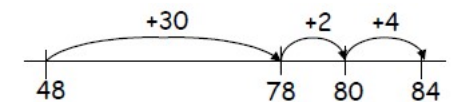
Y3

Adding two two-digit numbers (bridging through tens boundary)

Using a number line

OR

Using place value cards and place value apparatus to partition numbers and recombine



$$48 + 36 = 84$$

Partition is a mental method, but it is useful for children to record jottings as in the diagram.

$$40 + 30 + 8 + 6$$

$$40 + 30 = 70$$

$$8 + 6 = 14$$

$$70 + 14 = 84$$

Y3

Y3 –
estimate
and check
answers
using
inverses

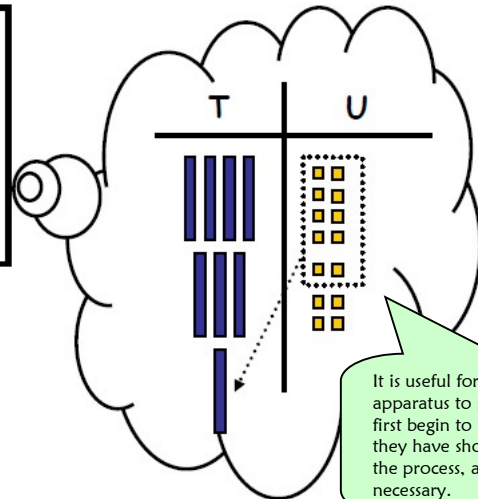
Missing
number
problems
using
number
facts and
place value

Y3 into Y4
(building up
to 4 digit
numbers)

Expanded method
It is important that the children have a good understanding of place value and partitioning using concrete resources and visual images to support calculations. The expanded method enables children to see what happens to numbers in the standard written method.

$$48 + 36$$

$$\begin{array}{r} 48 \\ + 36 \\ \hline \end{array}$$



It is useful for children to use apparatus to support them when they first begin to use this method. When they have shown an understanding of the process, apparatus may not be necessary.

T	U
40	+ 8
30	+ 6
80	+ 4
10	—

Y4

Column
addition of
up to 4
digits

Estimate
using
inverse
knowledge

2-step
problems

$$\begin{array}{r} 48 \\ + 36 \\ \hline 84 \\ \hline 1 \end{array}$$

Standard written method
The previous stages reinforce what happens to the numbers when they are added together using more formal written methods.

Y5

Children should now be expected to: Use standard written method for column addition

- use this method for larger numbers including more than 4 digits
- use this method to add numbers with up to 2 decimal places.
- solve addition problems involving measures and money.
- Estimate using rounding and expect a fair level of accuracy
- Multi-step problems

Y6	<p>Using the standard written method to:</p> <ul style="list-style-type: none"> • add decimals (including those which do not have the same amount of decimals digits). • solve addition problems involving measures and money. • use as an inverse operation to check subtraction calculations. • use BODMAS to solve multi-function problems of several steps • estimate with an appropriate degree of accuracy.
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To add successfully, children need to be able to:

- recall all addition pairs to $9 + 9$ and complements in 10;
- add mentally a series of one-digit numbers, such as $5 + 8 + 4$;
- add multiples of 10 (such as $60 + 70$) or of 100 (such as $600 + 700$) using the related addition fact, $6 + 7$, and their knowledge of place value;
- partition two-digit and three-digit numbers into multiples of 100, 10 and 1 in different ways.

Note: It is important that children's mental methods of calculation are practised and secured alongside their learning and use of an efficient written method for subtraction.

Progression in Teaching Subtraction

Mental Skills

Recognise the size and position of numbers Count back in ones and tens

Know number facts for all numbers to 20 Subtract multiples of 10 from any number

Partition and recombine numbers (only partition the number to be subtracted)

Bridge through 10

Counting apparatus

Place value apparatus

Place value cards

Number tracks

Numbered number lines

Marked but unnumbered lines

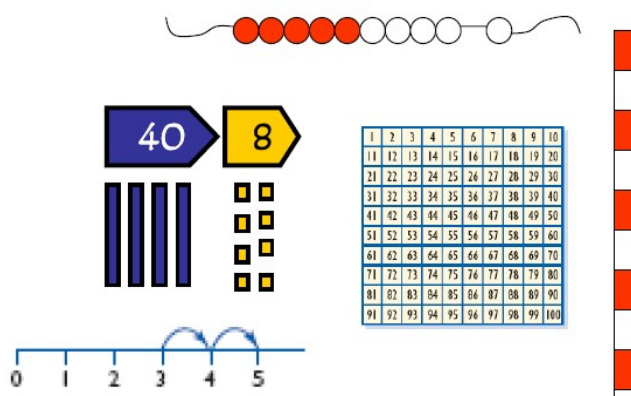
Hundred square

Empty number lines.

Counting stick

Bead strings

Cuisenaire rods (bar modelling)



Vocabulary

subtract

take away

minus

count back

less

fewer

difference between

count back take away
fewer subtract
minus less
difference between

End of year expectation	<p>Progression of skills and methods</p> <p>(subtraction)</p>
EYFS	<p>Begin to count backwards in familiar contexts such as number rhymes or stories</p> <p>Five fat sausages frying in a pan ...</p> <p>Ten green bottles hanging on the wall ...</p>
EYFS	<p>10, 9, 8, 7 ...</p> <p>Continue the count back in ones from any given number</p>
EYFS	<p>Begin to relate subtraction to 'taking away'</p> <p>Three teddies take away two teddies leaves one teddy</p>
EYFS	<p>1 less than 8 is? 7</p> <p>2 less than 8 is? 7, 6</p> <p>3 less than 8 is? 7, 6, 5</p> <p>Find one less than a number</p> <p>count back one, two or three</p>
EYFS/ Y1	<p>Count back in tens</p> <p>Count back in ones</p>

EYFS

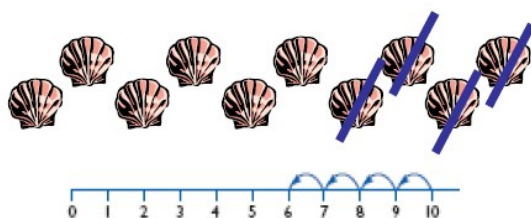
Begin to use the - and = signs to record mental calculations in a number sentence

Maria had six sweets and she ate four. How many did she have left?



$$6 - 4 = 2$$

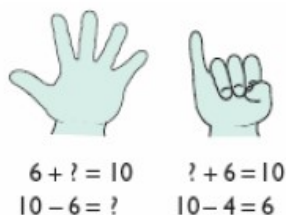
Y1



If I take away four shells there are six left

Count backwards along a number line to 'take away'

Y1



		$20 = 12 + 8$	$8 + 12 = 20$
		$20 - 8 = 12$	$20 - 12 = 8$

Know by heart subtraction facts for numbers up to 10 and 20

Y1

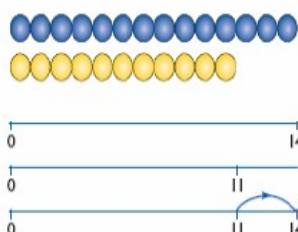
Number bonds to 20 by end of Y1

1-step problems

Missing number problems



The difference is?



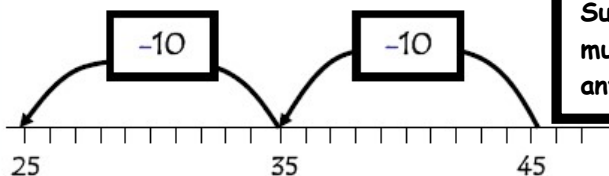
The difference between 11 and 14 is 3.
 $14 - 11 = 3$
 $11 + \square = 14$

Begin to find the difference by counting up from the smallest number

Y1/Y2

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Children should be able to do this mentally. This visual aid (in the form of a number line) may be used support those who need it.



Subtract 1 or multiples of 10 from any two-digit number.

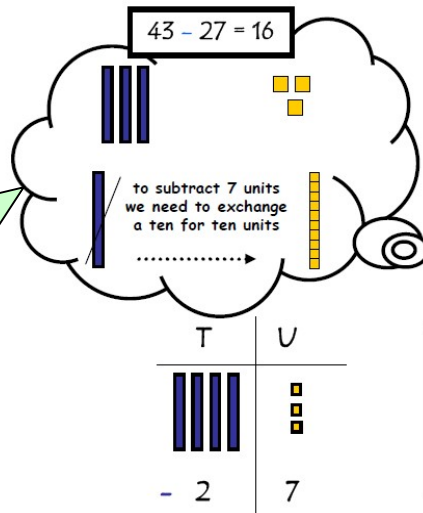
$$45 - 20$$

<p>Y2</p>	<div data-bbox="293 244 663 533"> <p>Continue to use a number line to find the difference by adding on from the smaller to the larger number. (including bridging through tens boundary).</p> </div> <div data-bbox="668 300 844 353"> $42 - 25 =$ </div> <div data-bbox="668 360 1361 504"> <p>Children may choose to add on different quantities first. They may prefer to add on 5 to begin with to get themselves to the nearest tens number.</p> </div>
<p>Y2</p> <p>To know that subtraction is NOT commutative</p> <p>Missing number problems</p> <p>Check calculations using inverse knowledge</p>	<div data-bbox="421 660 807 754"> <p>Begin to partition numbers in order to take away</p> </div> <div data-bbox="948 598 1123 878"> </div>
<p>Y3</p> <p>Use up to 3 digits</p>	<div data-bbox="293 1077 504 1256"> <p>*This method is a mental method, but it is useful for children to record jottings as in the diagram.</p> </div> <div data-bbox="633 1113 876 1270"> <p>Partitioning number to be subtracted - with exchanging (links to counting back on number line)</p> </div> <div data-bbox="622 1301 865 1364"> $43 - 27 = 16$ </div> <div data-bbox="979 1113 1390 1169"> <p>43 20 7</p> </div> <div data-bbox="1031 1202 1305 1424"> $\begin{array}{r} 43 - 20 = 23 \\ 23 - 7 = 16 \end{array}$ </div> <p>Estimate and check using inverse knowledge. Missing number problems using number facts and place value.</p>

Level 3
leading
into Level
4

This is an important method that should not be skipped as it helps children understand the process of subtraction (particularly the 'borrowing' element).

Apparatus can be used to demonstrate the process of 'borrowing'.



Expanded method

It is important that the children have a good understanding of place value and partitioning using concrete resources and visual images to support calculations. The expanded method enables children to see what happens to numbers in the standard written method.

Y4 –
Formal
method
using up to
4 digits
Estimate
using inverse
knowledge.
2-step
problems

Y5

Standard written method
The previous stages reinforce what happens to numbers when they are subtracted using more formal written methods. It is important that the children have a good understanding of place value and partitioning.

$$\begin{array}{r} 30 - 20 = 10 \\ 13 - 7 = 6 \\ \hline 16 \end{array}$$

Children at Y5 should now be expected to:

- use this method for larger numbers with more than 4 digits
- use this method to subtract numbers with up to 2 decimal places.
- solve subtraction problems involving measures and money.
- **Multi-step problems**
- **Estimate using rounding and expect a fair level of accuracy**

Y6

Using the standard written method:

- subtract decimals (including those which do not have the same amount of decimal digits).
- solve subtraction problems involving measures and money.
- use as an inverse operation to check addition calculations.
- **use BODMAS to solve multi-step problems**
- **estimation with an appropriate degree of accuracy**

To subtract successfully, children need to be able to:

- recall all addition and subtraction facts to 20
- subtract multiples of 10 (such as 160 - 70) using the related subtraction fact, 16 - 7, and their knowledge of place value
- partition two-digit and three-digit numbers into multiples of one hundred, ten and one in different ways (e.g. partition 74 into 70 + 4 or 60 + 14).

Note: It is important that children's mental methods of calculation are practised and secured alongside their learning and use of an efficient written method for subtraction.

Progression in Teaching Multiplication

Mental Skills

Recognise the size and position of numbers

Count on in different steps 2s, 5s, 10s

Double numbers up to 10

Recognise multiplication as repeated addition

Quick recall of multiplication facts

Use known facts to derive associated division facts

Use known facts to generate other facts (e.g. double the 2 x table to find 4 x table)

Multiplying by 10, 100, 1000 and understanding the effect

Counting apparatus

Place value apparatus

Arrays

100 squares

Number tracks

Numbered number lines

Marked but unnumbered lines

Empty number lines

Multiplication squares

Counting stick

Bead strings

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



Vocabulary

lots of

groups of

times

multiply

multiplication

multiple

product

once, twice, three times

array, row, column

double

repeated addition

multiplication product
once, twice, three times
double groups of
repeated addition lots of
array, row, column multiply
times multiple

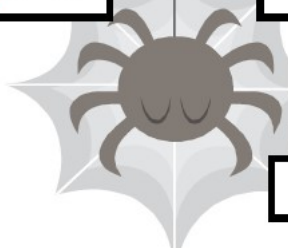
End of year expectation	Progression of skills and methods (multiplication)
EYFS <div data-bbox="124 376 408 477" style="border: 1px solid green; border-radius: 10px; padding: 5px; display: inline-block;"> NB Introduce in Foundation if children are ready. </div>	<div data-bbox="443 360 651 454" style="border: 1px solid black; padding: 5px; display: inline-block;"> Count in tens from zero </div> <div data-bbox="419 506 740 544"> </div> <div data-bbox="746 353 1453 562"> </div>
EYFS	<div data-bbox="1214 618 1514 752" style="border: 1px solid green; border-radius: 10px; padding: 5px; display: inline-block;"> NB Introduce in Foundation if children are ready. </div> <div data-bbox="1139 748 1347 842" style="border: 1px solid black; padding: 5px; display: inline-block;"> Count in twos from zero </div> <div data-bbox="384 678 1075 909"> </div> <div data-bbox="1107 853 1406 947"> </div>
EYFS <div data-bbox="156 1104 440 1205" style="border: 1px solid green; border-radius: 10px; padding: 5px; display: inline-block;"> NB Introduce in Foundation if children are ready. </div>	<div data-bbox="443 1093 651 1187" style="border: 1px solid black; padding: 5px; display: inline-block;"> Count in fives from zero </div> <div data-bbox="405 1205 699 1267"> </div> <div data-bbox="719 1077 1410 1308"> </div>
EYFS Solve problems using doubling, halving and sharing.	<div data-bbox="496 1368 715 1585"> <div data-bbox="496 1541 715 1585"> <div>half of 8 is 4 $8 \div 2 = 4$</div> <div>double 4 is 8 $4 \times 2 = 8$</div> </div> </div> <div data-bbox="1027 1420 1347 1514" style="border: 1px solid black; padding: 5px; display: inline-block;"> Know doubles and corresponding halves </div>

Y1

Know multiplication tables to 10×10

$2 \times 5 = 10$ $3 \times 5 = 15$ $4 \times 5 = 20$ $5 \times 5 = 25$ $6 \times 5 = 30$ $7 \times 5 = 35$ $8 \times 5 = 40$ $9 \times 5 = 45$ $10 \times 5 = 50$

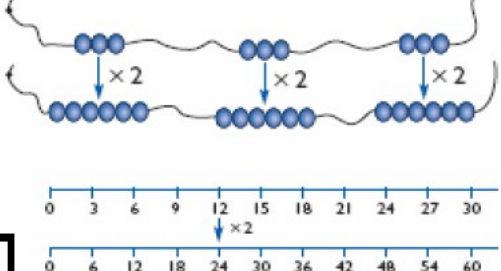
$\times 5$



Twice as many

Use known facts to work out new ones

$12 \times 2 = 24$



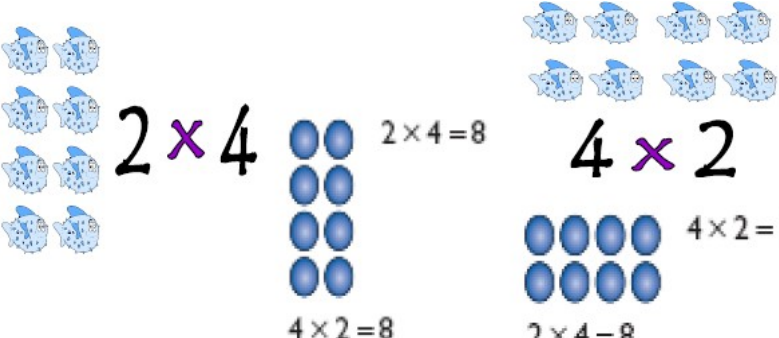
Y1 and Y2

Y1 – Solve 1-step problems using arrays, concrete and pictorial representations with adult support

Understand multiplication as an array

$2 \times 4 = 8$ $4 \times 2 = 8$

$2 \times 4 = 8$ $4 \times 2 = 8$



Y2

Understand that ...

$24 \times 20 = 24 \times 2 \times 10$

$24 \times 50 = 24 \times 5 \times 10$

Use factors to multiply

Y2


Understand multiplication as repeated addition

$2 + 2 + 2 + 2 = 8$

$4 \times 2 = 10$

2 multiplied by 4

4 lots of 2

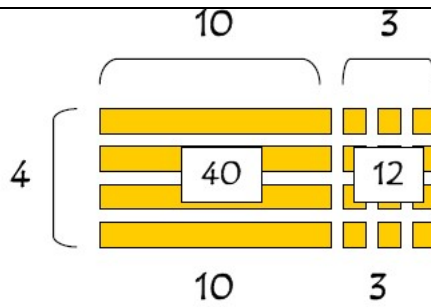


Y2 into Y3

Solve problems using arrays, repeated addition and multiplication facts.

Problem solving in context.

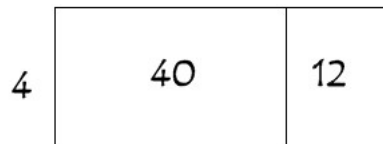
Visual



When first introducing the grid method, use resources to show the visual process, as well as recording the workings within a grid.

Use place value apparatus to support the multiplication of $U \times TU$ alongside the grid method

Written recording



$$4 \times 13$$

The grid method should be introduced during Year 3 for those children who are working at a level 3 or above.

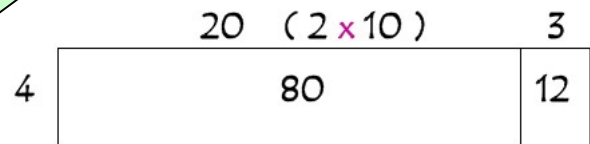
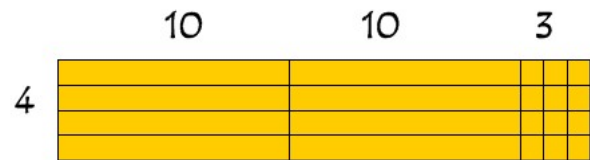
$$40 + 12 = 52$$

Y3

Use place value apparatus to represent the multiplication of $U \times TU$ alongside the grid method

$$4 \times 23$$

The top grid method is made simpler by partitioning the 23 down further to $10 + 10 + 3$. If children are confident with this, they may just partition 23 into $20 + 3$ (as in bottom diagram).



$$80 + 12 = 92$$

Y3

Informal written (grid) progressing towards formal written.

Solve missing number problems

Positive integer scaling problems

Correspondence problems

Multiplying TU x TU

		30	3	
X				
10		300	30	= 330 +
4		120	12	= 132
				<u>462</u>

14 x 33

300
120
30
+ 12
<u>462</u>

Y4 – then onto standard written method (see below)

Multiply 2 and 3 digits by 1 digit using formal written method

Solve x problems (using distributive law)
Integer scaling problems
Harder correspondence problems

Expanded standard written method

38 x 7 =

$$\begin{array}{r} 30 + 8 \\ \times \quad 7 \\ \hline 56 \\ 210 \\ \hline 266 \end{array} \quad \begin{array}{l} (7 \times 8 = 56) \\ (7 \times 30 = 210) \end{array}$$

38 x 7 =

$$\begin{array}{r} \text{TU} \\ 38 \\ \times \quad 7 \\ \hline 56 \\ 210 \\ \hline 266 \end{array}$$

To demonstrate the process, it may help to record, in brackets, each step. Move away from this as children are ready.

Y5

4-digit numbers by 1 or 2 digits using formal method

Solve problems combining 4 rules
Solve x problems including scaling by simple fractions
Problems involving simple rates

Standard written method

38 x 7 =

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

5

This step involves adding the 56 and 210 mentally.

38 x 27 =

$$\begin{array}{r} 38 \\ \times \quad 27 \\ \hline 266 \\ 760 \\ \hline 1026 \end{array}$$

1

This method can then be used to multiply TU by TU numbers. If needed, the brackets, as in previous step, could be used to support mental workings.

Y6	<p>Using the standard written method:</p> <ul style="list-style-type: none"> • multiply decimals (including those which do not have the same amount of decimals digits). • solve multiplication problems involving measures and money. • multiply multi-digit numbers by a 2-digit whole number using the formal written method of long multiplication • problem solving using all 4 rules • use BODMAS to know the order of operations in calculations involving the 4 rules • estimate to an appropriate degree of accuracy • use as an inverse operation to check division calculations.
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To multiply successfully, children need to be able to:

- recall all multiplication facts to 12x12
- partition number into multiples of one hundred, ten and one
- work out products such as 70×5 , 70×50 , 700×5 or 700×50 using the related fact 7×5 and their knowledge of place value
- add two or more single-digit numbers mentally
- add multiples of 10 (such as $60 + 70$) or of 100 (such as $600 + 700$) using the related addition fact, $6 + 7$, and their knowledge of place value
- add combinations of whole numbers using the column method (see above).

Note: It is important that children's mental methods of calculation are practised and secured alongside their learning and use of an efficient written method for multiplication.

Progression in Teaching Division

Mental Skills

Recognise the size and position of numbers

Count back in different steps 2s, 5s, 10s

Halve numbers to 20

Recognise division as repeated subtraction

Quick recall of division facts

Use known facts to derive associated facts

Divide by 10, 100, 1000 and understanding the effect

Divide by multiples of 10

Counting apparatus

Arrays

100 squares

Number tracks

Numbered number lines

Marked but unnumbered lines

Empty number lines

Multiplication squares

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



Vocabulary

lots of

groups of

share

group

halve

half

divide

division

divided by

remainder

factor

quotient

divisible

group

groups of

lots of

divide

divided by

quotient

division

factor

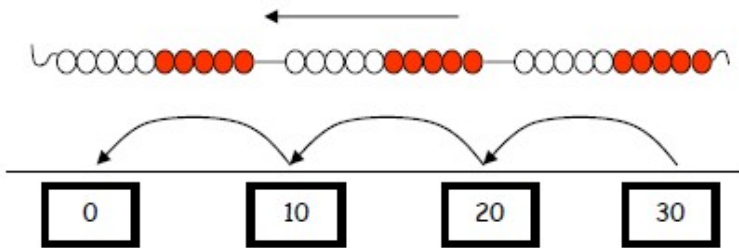
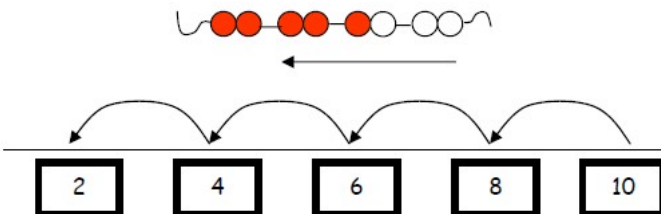
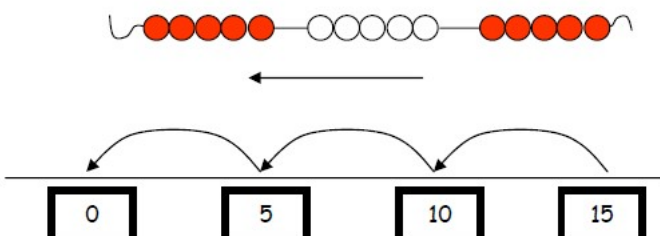
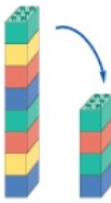
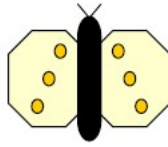
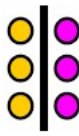
remainder

divisible

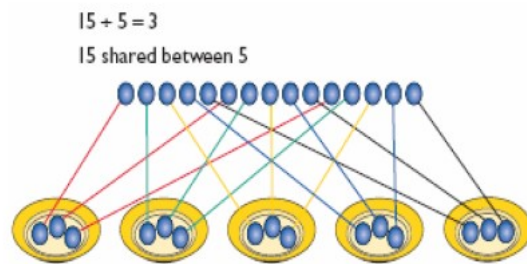
half

halve

share

End of year expectation	Progression of skills and methods
EYFS	<p style="text-align: center;">(division)</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 20px;">Count back in tens</div> <div style="text-align: center;">  </div> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px; width: fit-content;">NB Introduce in Foundation if children are ready.</div>
EYFS	<div style="text-align: center;">  </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px; width: fit-content;">Count back in twos</div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px; width: fit-content;">NB Introduce in Foundation if children are ready.</div>
EYFS	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px; width: fit-content;">NB Introduce in Foundation if children are ready.</div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 20px;">Count back in fives</div> <div style="text-align: center;">  </div> </div>
EYFS	<div style="display: flex; align-items: center;"> <div style="text-align: center; margin-right: 20px;">  <p>half of 8 is 4 $8 \div 2 = 4$</p> </div> <div style="text-align: center; margin-right: 20px;">  </div> <div style="text-align: center; margin-right: 20px;">  </div> <div style="border: 1px solid black; padding: 5px; margin-left: 20px;">Know halves</div> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px; width: fit-content;">Half of 6 is 3 $\frac{1}{2}$ of 6 = 3</div>
Y1	<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;">Use known multiplication facts to work out corresponding division facts</div> <div style="margin-top: 20px; text-align: right;"> <p>If $2 \times 10 = 20$ then $20 \div 10 = 2$ $20 \div 2 = 10$</p> </div>

Y1&2



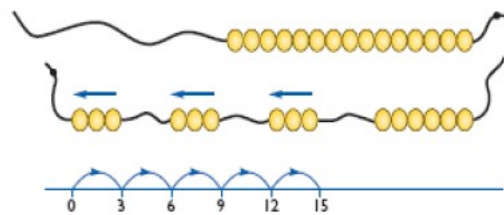
Understand division as sharing

Y2&3

Understand division as grouping

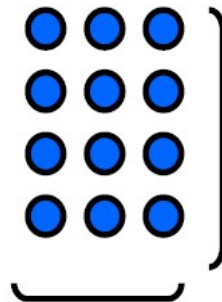


$15 \div 3 = 5$



Y2&3

Y1,2 &3 – to solve problems (in context) using manipulatives



12 divided into groups of 3 gives 4 groups

$12 \div 3 = 4$

12 divided into groups of 4 gives 3 groups

$12 \div 4 = 3$

Reinforce division as grouping through the use of arrays

Y4 – NB this method should **only** be used if children find it hard to move between the arrays method and the standard written method. For some children this method may be confusing and time consuming due to its multiple steps.

Chunking method

$$\begin{array}{r}
 100 \div 7 = 14 \text{ r } 2 \\
 100 \\
 - 70 \quad (10 \times 7) \\
 \hline
 30 \\
 - 28 \quad (4 \times 7) \\
 \hline
 2
 \end{array}$$

$$\begin{array}{r}
 518 \div 7 = 74 \\
 518 \\
 - 350 \quad (50 \times 7) \\
 \hline
 168 \\
 - 140 \quad (20 \times 7) \\
 \hline
 28 \\
 - 28 \quad (4 \times 7) \\
 \hline
 0
 \end{array}$$



Fact Box	
1 × 7 =	7
2 × 7 =	14
5 × 7 =	35
10 × 7 =	70
20 × 7 =	140
50 × 7 =	350
100 × 7 =	700

Y4 & 5

Standard written method (short division)

$$\begin{array}{r}
 27 \\
 3 \overline{) 821}
 \end{array}$$

Children at Y5 will

- use this method for larger numbers HTU ÷ U, ThHTU ÷ U
- use this method to divide numbers with up to 2 decimal places.
- solve division problems involving measures and money.
- use as the inverse operation to check multiplication calculations.
- Problem solving – remainders expressed according to the context
- Mixed 4 rules problem solving
- Scaling by simple fractions
- Simple rates

Y6

Up to 4 digits by 2 digits

Standard written method (long division)

To calculate 748 divided by 51,
First, set the sum out as shown:

$$51 \overline{) 748}$$

We work out 74 divided by 51, and write the answer (1) above the 4.

1 × 51 = 51, so we write this underneath 74.

Subtract 51 from 74 to get the remainder (23).

As we are dividing by 51, children may find it useful to write their 51 times tables down the side of there page to support them. This can be done using mental repeated addition.

$$\begin{array}{r} 1 \\ 51 \overline{)748} \\ \underline{-51} \\ 23 \end{array}$$

We now bring down the next digit (8) and write it on the end of the 23. This is the same as writing the remainder at the top:

$$\begin{array}{r} 1 \\ 51 \overline{)748} \\ \underline{-51} \\ 238 \end{array}$$

We now work out 238 divided by 51, and write the answer (4) above the 8. You use estimation skills here: 51 is roughly 50 and $4 \times 50 = 200$. You can work out $51 \times 4 = 204$ separately.

We write 204 underneath the 238 and subtract to find the remainder. There are no more digits to bring down, so we have our answer:

$$\begin{array}{r} 14 \\ 51 \overline{)748} \\ \underline{-51} \\ 238 \\ \underline{-204} \\ 34 \end{array}$$

NB: In Year 6, children will also be expected to convert their remainder to a fraction or decimal answer depending on the context of the problem.

So the answer is **14 remainder 34**.

Children working at Y6 should also be expected to:

- solve division problems involving measures and money.
- use as an inverse operation to check multiplication calculations.
- convert remainders to decimal remainders.
- **problem solving using all 4 rules**
- **use BODMAS to know the order of operations in calculations involving the 4 rules**
- **estimate to an appropriate degree of accuracy**

To carry out written methods of division successful, children need to be able to:

- understand division as repeated subtraction
- estimate how many times one number divides into another - for example, how many sixes there are in 47, or how many 23s there are in 92
- multiply a two-digit number by a single-digit number mentally
- subtract numbers using the column method.

Note: It is important that children's mental methods of calculation are practised and secured alongside their learning and use of an efficient written method for division.

Concluding Statement

Calculation strategies, both mental and written, underpin much of children's achievement in other areas of mathematics, especially in problem solving and investigative learning. Encourage children to reflect upon which method or strategy they find most reliable and suits their style of learning.

By the end of Key Stage 2 it is important that children record their working out, and often marks may be awarded in SATs for clear calculations. Children should therefore be encouraged to jot down their thought processes from an early age. Many children enjoy the challenge of completing calculations at speed: mental maths challenges involving all four operations should be encouraged, especially in Key Stage 2.