

Llantilio Pertholey Primary School - Calculation Policy 2022

At Llantilio Pertholey Primary School, the aim of our calculation policy is to ensure all children receive equity of offer. Calculation procedures are taught according to this document so they can be seamlessly built upon year after year, as the child moves through school. The policy has been taken and adapted to suit from White Rose Maths. We have found their calculation policy to be the one which works for the needs of our children and suits the way in which we teach Maths. The use of concrete resources and visuals underpins this calculation policy, which is what you would see in a Llantilio maths lesson.

The policy goes through:

- Addition
- Subtraction
- Multiplication and Division (including expectations of times tables)

Each operation is broken down into skills for the year group and shows recommended models and visuals to support the teaching of the corresponding concepts alongside, along with clear CPA guidance for each skill in every year group.

Addition - Overview

Skill: Add 1-digit numbers within 10	Year: 1
<p style="text-align: center;">$4 + 3 = 7$</p>	<p>When adding numbers to 10, children can explore both aggregation and augmentation.</p> <p>The part-whole model, discrete and continuous bar model, number shapes and ten frame support aggregation.</p> <p>The combination bar model, ten frame, bead string and number track all support augmentation.</p>

Skill: Add 1 and 2-digit numbers to 20	Year: 1/2
<p style="text-align: center;">$8 + 7 = 15$</p>	<p>When adding one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten.</p> <p>Different manipulatives can be used to represent this exchange. Use concrete resources alongside number lines to support children in understanding how to partition their jumps.</p>

Skill: Add three 1-digit numbers

Year: 2

$7 + 6 + 3 = 16$

$7 + 6 + 3 = 16$

When adding three 1-digit numbers, children should be encouraged to look for number bonds to 10 or doubles to add the numbers more efficiently.

This supports children in their understanding of commutativity.

Manipulatives that highlight number bonds to 10 are effective when adding three 1-digit numbers.

Skill: Add 1-digit and 2-digit numbers to 100

Year: 2/3

$38 + 5 = 43$

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

When adding single digits to a two-digit number, children should be encouraged to count on from the larger number.

They should also apply their knowledge of number bonds to add more efficiently e.g. $8 + 5 = 13$ so $38 + 5 = 43$.

Hundred squares and straws can support children to find the number bond to 10.

Skill: Add two 2-digit numbers to 100

Year: 2/3

38 + 23 = 61

Tens	Ones
38	23
61	1

At this stage, encourage children to use the formal column method when calculating alongside straws, base 10 or place value counters. As numbers become larger, straws become less efficient.

Children can also use a blank number line to count on to find the total. Encourage them to jump to multiples of 10 to become more efficient.

Skill: Add numbers with up to 3 digits

Year: 3

265 + 164 = 429

Hundreds	Tens	Ones
265	164	
429	1	

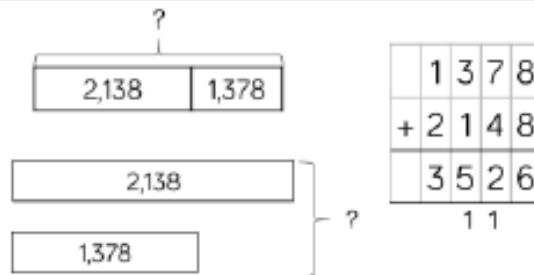
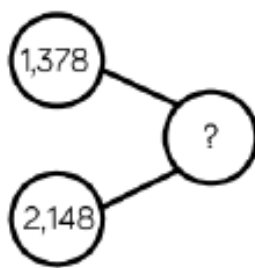
Base 10 and place value counters are the most effective manipulatives when adding numbers with up to 3 digits.

Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method.

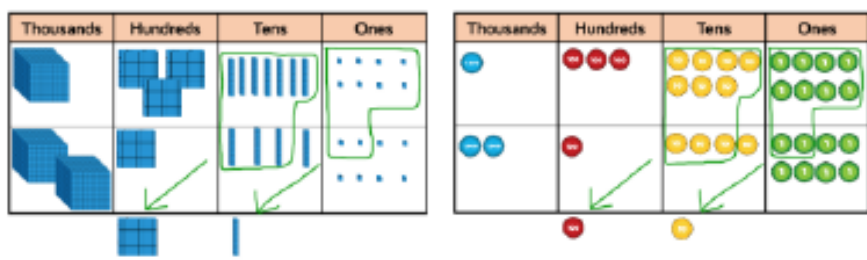
Plain counters on a place value grid can also be used to support learning.

Skill: Add numbers with up to 4 digits

Year: 4



$1,378 + 2,148 = 3,526$



Base 10 and place value counters are the most effective manipulatives when adding numbers with up to 4 digits.

Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method.

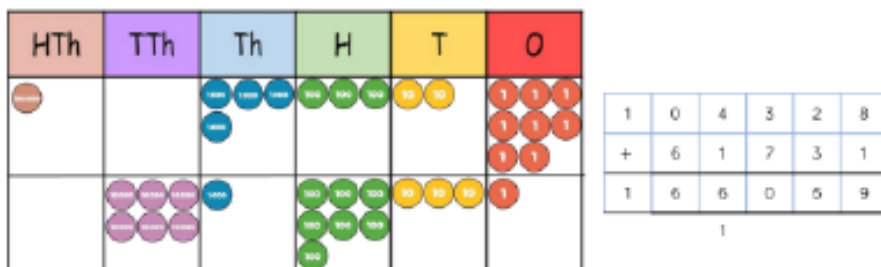
Plain counters on a place value grid can also be used to support learning.

Skill: Add numbers with more than 4 digits

Year: 5/6



$104,328 + 61,731 = 166,059$

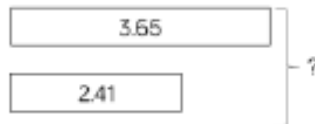
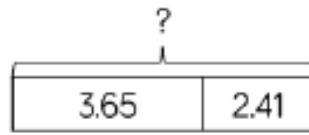
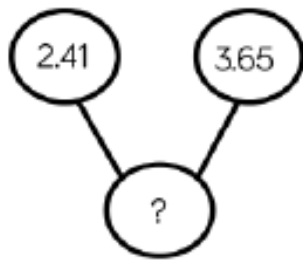


Place value counters or plain counters on a place value grid are the most effective concrete resources when adding numbers with more than 4 digits.

At this stage, children should be encouraged to work in the abstract, using the column method to add larger numbers efficiently.

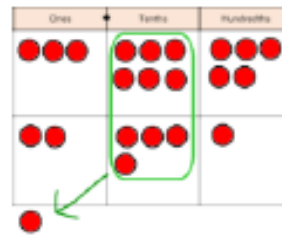
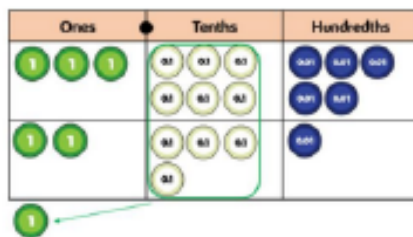
Skill: Add with up to 3 decimal places

Year: 5



$$\begin{array}{r} 3.65 \\ + 2.41 \\ \hline 6.06 \\ 1 \end{array}$$

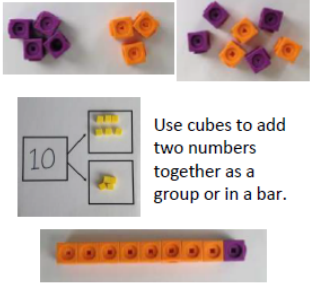
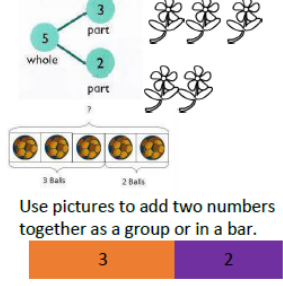

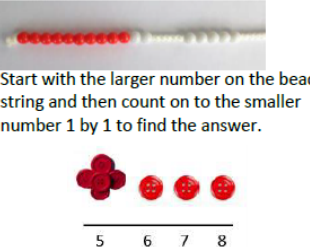

$$3.65 + 2.41 = 6.06$$

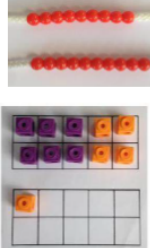
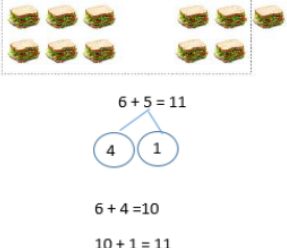

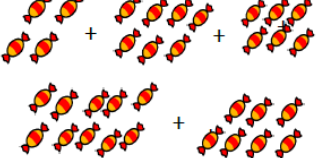
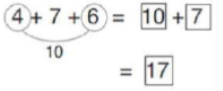


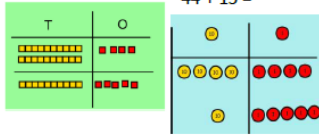
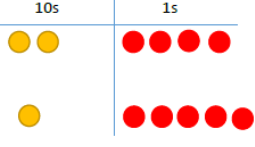
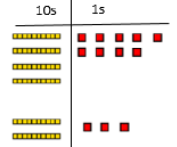
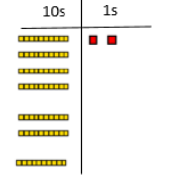
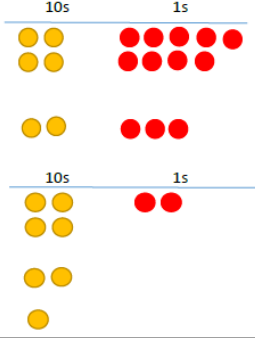
Place value counters and plain counters on a place value grid are the most effective manipulatives when adding decimals with 1, 2 and then 3 decimal places.

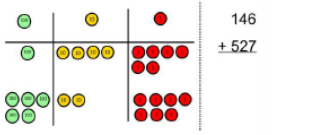
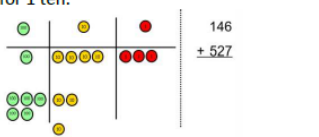
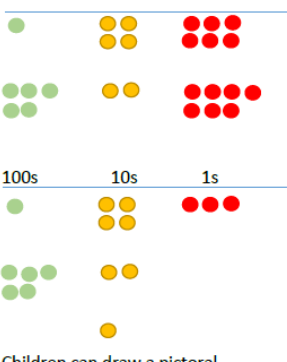

Ensure children have experience of adding decimals with a variety of decimal places. This includes putting this into context when adding money and other measures.

Addition – CPA Calculation Guidance

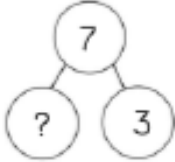

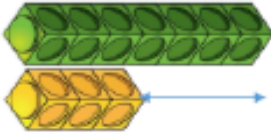
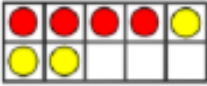


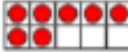
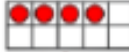
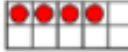


	Objective	Concrete	Pictorial	Abstract
Year 1	Number bonds of 5, 6, 7, 8, 9 and 10	 <p>Use cubes to add two numbers together as a group or in a bar.</p>	 <p>Use pictures to add two numbers together as a group or in a bar.</p>	$2 + 3 = 5$ $3 + 2 = 5$ $5 = 3 + 2$ $5 = 2 + 3$  <p>Use the part-part-whole diagram as shown above to move into the abstract.</p>
	Counting	 <p>Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.</p>	<p>Use a number line to count on in ones.</p> 	$5 + 3 = 8$

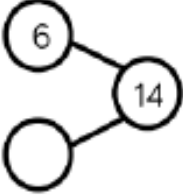
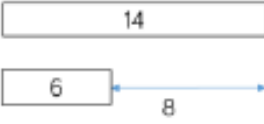
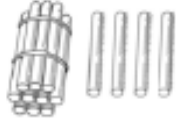

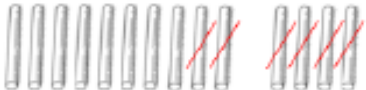

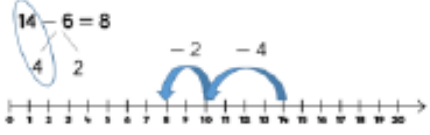
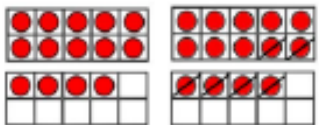
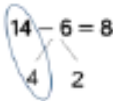
	Objective	Concrete	Pictorial	Abstract
Year 1	Regrouping to make 10	 <p>$6 + 5 = 11$</p> <p>Start with the bigger number and use the smaller number to make 10.</p>	 <p>$6 + 5 = 11$</p> <p>$6 + 4 = 10$</p> <p>$10 + 1 = 11$</p>	$6 + 5 = 11$
	Adding 3 single digit numbers	<p>$4 + 7 + 6 = 17$</p> <p>Put 4 and 6 together to make 10. Add on 7.</p>  <p>Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit.</p>	 <p>Add together three groups of objects. Draw a picture to recombine the groups to make 10.</p>	 <p>Combine the two numbers that make 10 and then add on the remainder.</p>

	Objective	Concrete	Pictorial	Abstract
Year 2	Column method without regrouping	<p>Add together the ones first, then add the tens. Use the Base 10 blocks first before moving onto place value counters.</p> <p>$24 + 15 =$</p> 	<p>After physically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions.</p> 	<p>$24 + 15 = 39$</p> $\begin{array}{r} 24 \\ + 15 \\ \hline 39 \end{array}$
	Column method with regrouping	<p>Make both numbers on a place value grid.</p>  <p>Add up the units and exchange 10 ones for 1 ten.</p> 	<p>Using place value counters, children can draw the counters to help them to solve additions.</p> 	<p>$40 + 9$</p> $\begin{array}{r} 40 \\ + 9 \\ \hline 49 \end{array}$ <p>$60 + 12 = 72$</p>

	Objective	Concrete	Pictorial	Abstract
Year 3/4	Column method with regrouping	<p>Make both numbers on a place value grid.</p>  <p>Add up the units and exchange 10 ones for 1 ten.</p>  <p>As children move on to decimals, money and decimal place value counters can be used to support learning.</p> <p>NB By Year 4 children will progress on to adding four digit numbers.</p>	<p>100s 10s 1s</p>  <p>100s 10s 1s</p>  <p>Children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding.</p> <p>NB Addition of money needs to have £ and p added separately.</p>	<p>$100 + 40 + 6$</p> $\begin{array}{r} 100 + 40 + 6 \\ + 500 + 20 + 7 \\ \hline 600 + 70 + 3 = 673 \end{array}$ <p>As the children progress, they will move from the expanded to the compacted method.</p> $\begin{array}{r} 146 \\ + 527 \\ \hline 673 \end{array}$ <p>1</p> <p>As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here.</p>
Year 5/6	Column method with regrouping	<p>Consolidate understanding using numbers with more than 4 digits and extend by adding numbers with up to 3 decimal places.</p>		

Subtraction - Overview

Skill: Subtract 1-digit numbers within 10	Year: 1
<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <div style="display: flex; justify-content: center; align-items: center; margin: 10px 0;">  <div style="margin: 0 20px;"> $7 - 3 = 4$ </div>  </div> <div style="display: flex; justify-content: center; align-items: center; margin: 10px 0;">  <div style="margin: 0 20px;"> <p>First </p> <p>Then </p> <p>Now </p> </div>  </div> <div style="display: flex; justify-content: center; align-items: center; margin-top: 10px;">  </div>	<p>Part-whole models, bar models, ten frames and number shapes support partitioning.</p> <p>Ten frames, number tracks, single bar models and bead strings support reduction.</p> <p>Cubes and bar models with two bars can support finding the difference.</p>

Skill: Subtract 1 and 2-digit numbers to 20	Year: 1/2
<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <div style="display: flex; justify-content: center; align-items: center; margin: 10px 0;">  <div style="margin: 0 20px;"> $14 - 6 = 8$ </div>  </div> <div style="display: flex; justify-content: center; align-items: center; margin: 10px 0;">  </div> <div style="display: flex; justify-content: space-between; align-items: center; margin-top: 10px;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>	<p>When subtracting one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten.</p> <p>Children should be encouraged to find the number bond to 10 when partitioning the subtracted number. Ten frames, number shapes and number lines are particularly useful for this.</p>

Skill: Subtract 1 and 2-digit numbers to 100

Year: 2

65

28

65

?

28

$65 - 28 = 37$

Tens	Ones
65	28
37	

65
- 28

37

Tens	Ones
65	28
37	

At this stage, encourage children to use the formal column method when calculating alongside straws, base 10 or place value counters. As numbers become larger, straws become less efficient.

Children can also use a blank number line to count on to find the difference. Encourage them to jump to multiples of 10 to become more efficient.

Skill: Subtract numbers with up to 3 digits

Year: 3

435

273

?

435

273

?

$435 - 273 = 262$

Hundreds	Tens	Ones
435	273	
262		

435
- 273

262

Hundreds	Tens	Ones
435	273	
262		

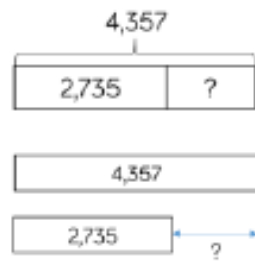
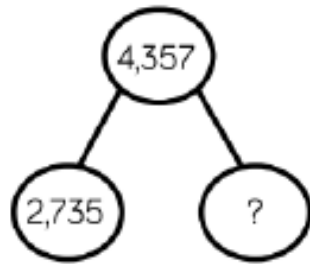
Base 10 and place value counters are the most effective manipulative when subtracting numbers with up to 3 digits.

Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method.

Plain counters on a place value grid can also be used to support learning.

Skill: Subtract numbers with up to 4 digits

Year: 4



$$\begin{array}{r} 3 \ 1 \\ 4357 \\ - 2735 \\ \hline 1622 \end{array}$$

$$4,357 - 2,735 = 1,622$$

Thousands	Hundreds	Tens	Ones

Thousands	Hundreds	Tens	Ones

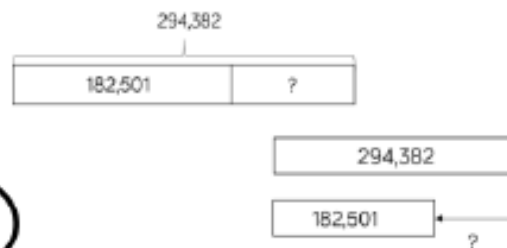
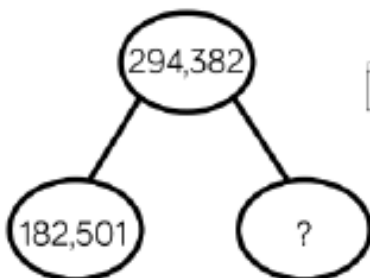
Base 10 and place value counters are the most effective manipulatives when subtracting numbers with up to 4 digits.

Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method.

Plain counters on a place value grid can also be used to support learning.

Skill: Subtract numbers with more than 4 digits

Year: 5/6



$$294,382 - 182,501 = 111,881$$

HTh	TTh	Th	H	T	O

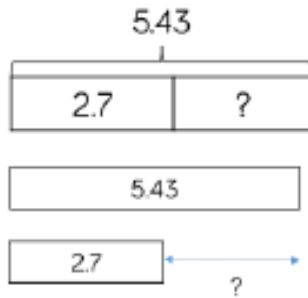
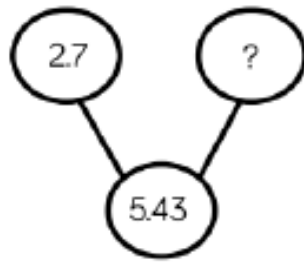
	2	9	3	1 3	8	2
-	1	8	2	5	0	1
	1	1	1	8	8	1

Place value counters or plain counters on a place value grid are the most effective concrete resource when subtracting numbers with more than 4 digits.

At this stage, children should be encouraged to work in the abstract, using column method to subtract larger numbers efficiently.

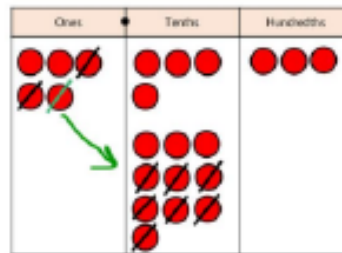
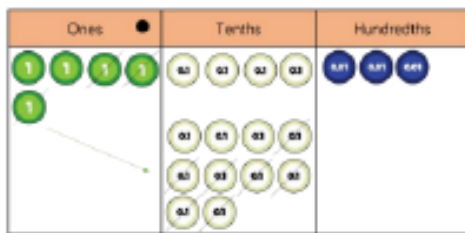
Skill: Subtract with up to 3 decimal places

Year: 5



$$\begin{array}{r} 4 \quad 1 \\ 5.43 \\ - 2.7 \\ \hline 2.73 \end{array}$$



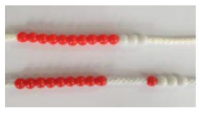
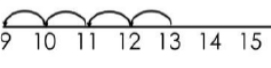
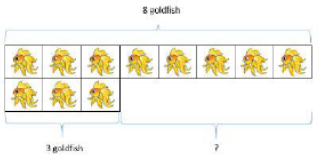
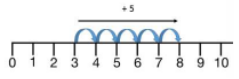
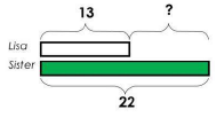
$$5.43 - 2.7 = 2.73$$

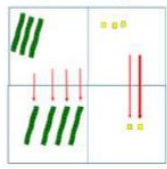
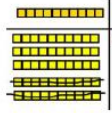
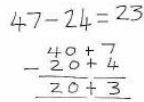
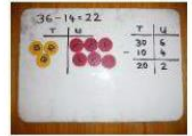
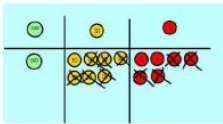



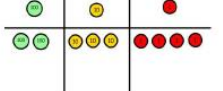
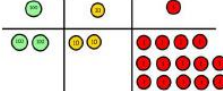
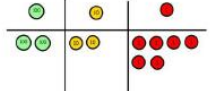
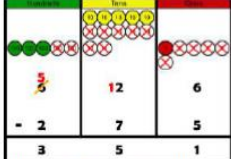



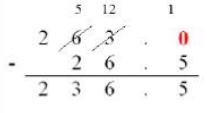
Place value counters and plain counters on a place value grid are the most effective manipulative when subtracting decimals with 1, 2 and then 3 decimal places.

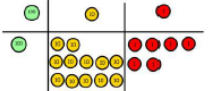

Ensure children have experience of subtracting decimals with a variety of decimal places. This includes putting this into context when subtracting money and other measures.

Subtraction - CPA Calculation Guidance

	Objective	Concrete	Pictorial	Abstract
Year 1	Taking away ones	Use physical objects, counters, cubes etc. to show how objects can be taken away. $4 - 2 = 2$ 	Cross out drawn objects to show what has been taken away. $4 - 2 = 2$ 	$4 - 2 = 2$
	Counting back	Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones.  $13 - 4 = 9$	Count back on a number line or number track  Start at the bigger number and count back the smaller number, showing the jumps on the number line.	Put 13 in your head, count back 4. What number are you at? Use your fingers to help.
	Find the difference	Compare amounts and objects to find the difference.  Use cubes to build towers or make bars to find the difference. Use basic bar models with items to find the difference.	Count on to find the difference.  Lisa is 13 years old. Her sister is 22 years old. Find the difference in age between them.  Draw bars to find the difference between 2 numbers.	Hannah has 8 goldfish. Helen has 3 goldfish. Find the difference between the number of goldfish the girls have.

	Objective	Concrete	Pictorial	Abstract
Year 2	Column method without regrouping	$75 - 42 = 33$  Use Base 10 to make the bigger number then take the smaller number away.	 Draw the Base 10 or place value calculation to help to show working.	$47 - 24 = 23$  This will lead to a clear written column subtraction.
		Show how you partition numbers to subtract. Again make the larger number first. 	 $176 - 64 = 112$	

	Objective	Concrete	Pictorial	Abstract
Year 3 onwards	Column method with regrouping	<p>Use Base 10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges.</p> <p>Make the larger number with the place value counters</p>  <p>Calculations</p> $\begin{array}{r} 234 \\ - 88 \\ \hline \end{array}$ <p>Start with the ones, can I take away 8 from 4 easily? I need to exchange 1 of my tens for 10 ones.</p>  <p>Calculations</p> $\begin{array}{r} 234 \\ - 88 \\ \hline \end{array}$ <p>Now I can subtract my ones.</p>  <p>Calculations</p> $\begin{array}{r} 234 \\ - 88 \\ \hline \end{array}$	 <p>Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make.</p> <p>When confident, children can find their own way to record the exchange/regrouping.</p> <p>Just writing the numbers as shown here shows that the child understands the method and knows when to exchange/regroup.</p> 	 <p>Children can start their formal written method by partitioning the number into clear place value columns.</p>  <p>Moving forward the children use a more compact method.</p> <p>This will lead to an understanding of subtracting any number including decimals.</p> 

	Objective	Concrete	Pictorial	Abstract
Year 3 up	Column method with regrouping	<p>Now look at the tens, can I take away 8 tens easily? I need to exchange 1 hundred for 10 tens.</p>  <p>Calculations</p> $\begin{array}{r} 234 \\ - 88 \\ \hline \end{array}$ <p>Now I can take away 8 tens and complete my subtraction.</p>  <p>Calculations</p> $\begin{array}{r} 234 \\ - 88 \\ \hline 146 \end{array}$ <p>Show children how the concrete method links to the written method alongside your working. Cross out the numbers when exchanging and show where we write our new amount.</p>		

Multiplication and Division – Times Tables and Number Facts

Learning the multiplication facts are essential as they make a very large contribution to numeracy and underpin our maths system like counting, number bonds and place value. If children can get a firm grasp of their times tables then they have a solid arithmetical foundation for future problem-solving.

When exploring multiplication and division facts, our teaching will include a balanced range of experiences that ensure children consolidate and extend their learning. Where possible they will be integrated into every maths lesson.

It's a good idea to SMASH them to pieces. By this we mean:

- **Short and sweet** – spend approximately 5 minutes on a times table related activity every day.
- **Mix it up** – ensure that children can recall their multiplication facts forwards, backwards and jumbled up so they can work out related division calculations.
- **Arrangement** – represent numbers in as many ways as possible (e.g. arrays, patterns etc)
- **Stir and stimulate** – encourage variety, movement and competition through times tables circuit training (make several stations where pupils use times tables to solve questions each station requiring physical activity)
- **Hammer away** – consistent practise and plenty of repetition to develop resilience and perseverance.



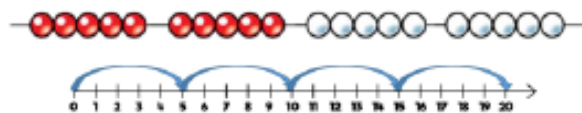
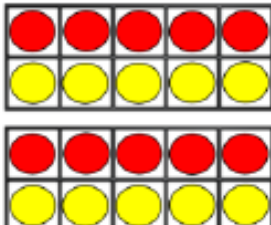


It's worth remembering, times tables is a 'long game' and children need to go through several learning stages over many years before they can understand them.

Learning the multiplication facts are essential as they make a very large contribution to numeracy and underpin our maths system like counting, number bonds and place value. If children can get a firm grasp of their times tables then they have a solid arithmetical foundation for future problem-solving.

The table below shows which times table we will focus on in each year group:

Year 1	Counting in 2's, Counting in 5's Counting in 10's
Year 2	2X, 5X, 10X
Year 3	3X, and 4X
Year 4	6X and 9X
Year 5	7X and 8X
Year 6	Revision of all

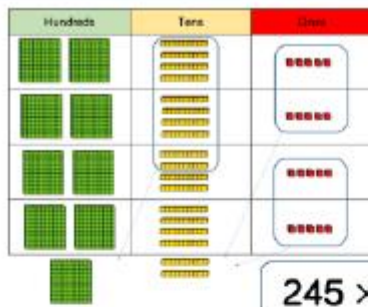
Multiplication and Division - Overview

Skill: Solve 1-step problems using multiplication	Year: 1/2
<div style="display: flex; justify-content: space-around; align-items: center;">   </div> <div style="display: flex; justify-content: center; align-items: center; margin: 10px 0;">  </div> <div style="border: 1px solid black; border-radius: 15px; padding: 10px; width: fit-content; margin: 10px auto;"> <p style="text-align: center;">One bag holds 5 apples. How many apples do 4 bags hold?</p> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <div style="display: flex; justify-content: center; align-items: center; margin-top: 10px;">  <div style="margin-left: 20px;"> $5 + 5 + 5 + 5 = 20$ $4 \times 5 = 20$ $5 \times 4 = 20$ </div> </div>	<p>Children represent multiplication as repeated addition in many different ways.</p> <p>In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record multiplication formally.</p> <p>In Year 2, children are introduced to the multiplication symbol.</p>

Skill: Multiply 2-digit numbers by 1-digit numbers	Year: 3/4																																																																																																						
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #d9e1f2;"> <th style="width: 33%;">Hundreds</th> <th style="width: 33%;">Tens</th> <th style="width: 33%;">Ones</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table> </div> <div style="width: 45%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #d9e1f2;"> <th style="width: 33%;">H</th> <th style="width: 33%;">T</th> <th style="width: 33%;">O</th> </tr> </thead> <tbody> <tr><td> </td><td>3</td><td>4</td></tr> <tr><td>x</td><td> </td><td>5</td></tr> <tr style="border-top: 1px solid black;"><td> </td><td>2</td><td>0</td></tr> <tr><td>+</td><td>1</td><td>5</td></tr> <tr style="border-top: 1px solid black;"><td> </td><td>1</td><td>7</td></tr> <tr><td> </td><td>1</td><td>2</td></tr> </tbody> </table> </div> </div> <div style="text-align: center; margin: 10px 0;"> <div style="border: 1px solid black; border-radius: 15px; padding: 10px; display: inline-block;"> $34 \times 5 = 170$ </div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <table border="1" style="width: 30%; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #d9e1f2;"> <th style="width: 33%;">H</th> <th style="width: 33%;">T</th> <th style="width: 33%;">O</th> </tr> </thead> <tbody> <tr><td> </td><td>3</td><td>4</td></tr> <tr><td>x</td><td> </td><td>5</td></tr> <tr style="border-top: 1px solid black;"><td> </td><td>1</td><td>7</td></tr> <tr><td> </td><td>1</td><td>2</td></tr> </tbody> </table> <table border="1" style="width: 30%; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #d9e1f2;"> <th style="width: 33%;">Hundreds</th> <th style="width: 33%;">Tens</th> <th style="width: 33%;">Ones</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table> </div>	Hundreds	Tens	Ones																															H	T	O		3	4	x		5		2	0	+	1	5		1	7		1	2	H	T	O		3	4	x		5		1	7		1	2	Hundreds	Tens	Ones																															<p>Teachers may decide to first look at the expanded column method before moving on to the short multiplication method.</p> <p>The place value counters should be used to support the understanding of the method rather than supporting the multiplication, as children should use times table knowledge.</p>
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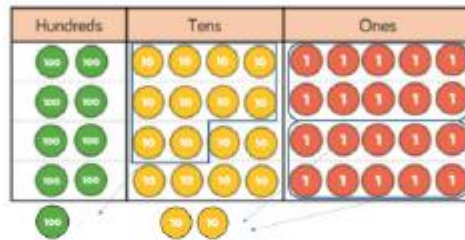
Skill: Multiply 3-digit numbers by 1-digit numbers

Year: 3/4



	H	T	O
	2	4	5
x			4
	9	8	0
	1	2	

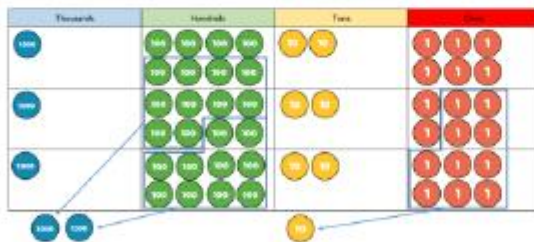
$$245 \times 4 = 980$$



When moving to 3-digit by 1-digit multiplication, encourage children to move towards the short, formal written method. Base 10 and place value counters continue to support the understanding of the written method. Limit the number of exchanges needed in the questions and move children away from resources when multiplying larger numbers.

Skill: Multiply 4-digit numbers by 1-digit numbers

Year: 5



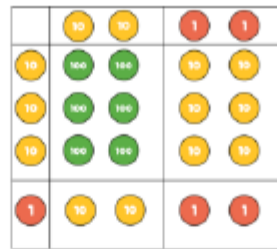
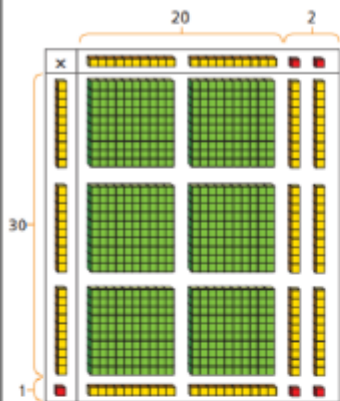
$$1,826 \times 3 = 5,478$$

	Th	H	T	O
	1	8	2	6
x				3
	5	4	7	8
	2		1	

When multiplying 4-digit numbers, place value counters are the best manipulative to use to support children in their understanding of the formal written method. If children are multiplying larger numbers and struggling with their times tables, encourage the use of multiplication grids so children can focus on the use of the written method.

Skill: Multiply 2-digit numbers by 2-digit numbers

Year: 5



x	20	2
30	600	60
1	20	2

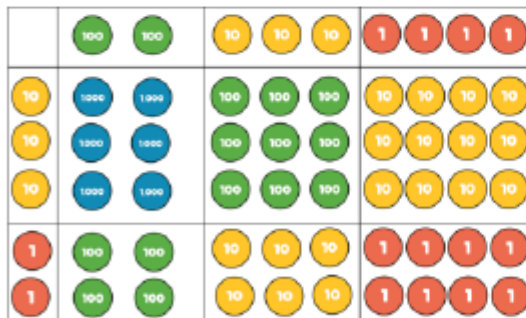
	H	T	O
		2	2
x		3	1
		2	2
	6	6	0
	6	8	2

$22 \times 31 = 682$

When multiplying a multi-digit number by 2-digits, use the area model to help children understand the size of the numbers they are using. This links to finding the area of a rectangle by finding the space covered by the Base 10. The grid method matches the area model as an initial written method before moving on to the formal written multiplication method.

Skill: Multiply 3-digit numbers by 2-digit numbers

Year: 5



	Th	H	T	O
		2	3	4
x			3	2
		4	6	8
17	1	0	2	0
7		4	8	8

x	200	30	4
30	6,000	900	120
2	400	60	8

$234 \times 32 = 7,488$

Children can continue to use the area model when multiplying 3-digits by 2-digits. Place value counters become more efficient to use but Base 10 can be used to highlight the size of numbers. Encourage children to move towards the formal written method, seeing the links with the grid method.

Skill: Multiply 4-digit numbers by 2-digit numbers

Year: 5/6

TTh	Th	H	T	O
	2	7	3	9
x			2	8
2	1	9	1	2
₂	₅	₃	₇	
5	4	7	8	0
₁		₁		
7	6	6	9	2
				₁

$$2,739 \times 28 = 76,692$$

When multiplying 4-digits by 2-digits, children should be confident in the written method.





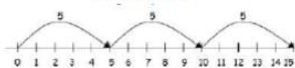







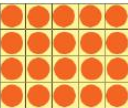

If they are still struggling with times tables, provide multiplication grids to support when they are focusing on the use of the method.

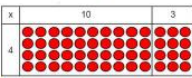
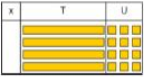
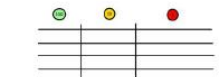
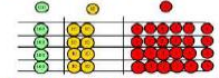

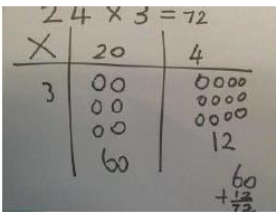
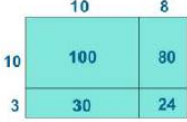
Consider where exchanged digits are placed and make sure this is consistent.

Multiplication and Division – CPA Calculation

Guidance

Multiplication


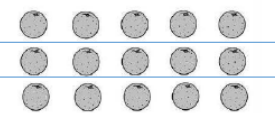

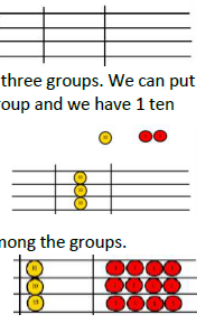
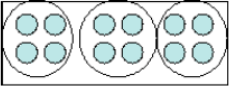
	Objective	Concrete	Pictorial	Abstract
Year 1/2	Repeated addition	   <p>Use different objects to add equal groups.</p>	<p>There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there?</p>  $2 + 2 + 2 = 6$  $5 + 5 + 5 = 15$	<p>Write addition sentences to describe objects and pictures.</p>  $2 + 2 + 2 = 6$
	Arrays- showing commutative multiplication	<p>Create arrays using counters/cubes to show multiplication sentences.</p>  	<p>Draw arrays in different rotations to find commutative multiplication sentences.</p>  $4 \times 2 = 8$  $2 \times 4 = 8$  $2 \times 4 = 8$  $4 \times 2 = 8$ <p>Link arrays to area of rectangles.</p> 	<p>Use an array to write multiplication sentences and reinforce repeated addition.</p>  $5 + 5 + 5 = 15$ $3 + 3 + 3 + 3 + 3 = 15$ $5 \times 3 = 15$ $3 \times 5 = 15$

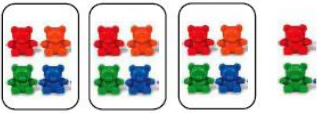
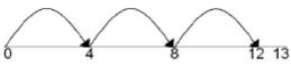

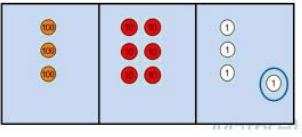
	Objective	Concrete	Pictorial	Abstract																					
Year 3/4	Grid method	<p>Show the link with arrays to first introduce the grid method.</p>  <p>4 rows of 10 4 rows of 3</p> <p>Move on to using Base 10 to move towards a more compact method.</p>  <p>4 rows of 13</p> <p>Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows.</p>  <p>Fill each row with 126.</p>  <p>Add up each column, starting with the ones making any exchanges needed.</p>  $4 \times 126 = 504$	<p>Children can represent the work they have done with place value counters in a way that they understand.</p> <p>They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.</p> 	<p>Start with multiplying by one digit numbers and showing the clear addition alongside the grid.</p> <table border="1" data-bbox="1038 1384 1235 1442"> <tr> <td>x</td> <td>30</td> <td>5</td> </tr> <tr> <td>7</td> <td>210</td> <td>35</td> </tr> </table> <p>$210 + 35 = 245$</p> <p>Moving forward, multiply by a 2 digit number showing the different rows within the grid method.</p>  <table border="1" data-bbox="1038 1756 1289 1877"> <tr> <td>x</td> <td>1000</td> <td>300</td> <td>40</td> <td>2</td> </tr> <tr> <td>10</td> <td>10000</td> <td>3000</td> <td>400</td> <td>20</td> </tr> <tr> <td>8</td> <td>8000</td> <td>2400</td> <td>320</td> <td>16</td> </tr> </table>	x	30	5	7	210	35	x	1000	300	40	2	10	10000	3000	400	20	8	8000	2400	320	16
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	Objective	Concrete	Pictorial	Abstract
	Expanded method	<p>Show the link with arrays to first introduce the expanded method.</p>		<p>Start with long multiplication, reminding the children about lining up their numbers clearly in columns.</p> $\begin{array}{r} 18 \\ \times 13 \\ \hline 24 \quad (3 \times 8) \\ 30 \quad (3 \times 10) \\ \hline 80 \quad (10 \times 8) \\ 100 \quad (10 \times 10) \\ \hline 234 \end{array}$
Year 5/6	Compact method	<p>Children can continue to be supported by place value counters at the stage of multiplication.</p> <p>It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.</p>	<p>Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.</p>	<p>Start with long multiplication, reminding the children about lining up their numbers clearly in columns. If it helps, children can write out what they are solving next to their answer.</p> $\begin{array}{r} 74 \\ \times 63 \\ \hline 12 \\ 210 \\ \hline 240 \\ + 4200 \\ \hline 4662 \end{array}$ <p>This moves to the more compact method.</p> $\begin{array}{r} 74 \\ \times 63 \\ \hline 1342 \\ \times 18 \\ \hline 13420 \\ 10736 \\ \hline 24156 \end{array}$

Division

	Objective	Concrete	Pictorial	Abstract
	Sharing	<p>I have 8 cubes, can you share them equally between two people?</p>	<p>Children use pictures or shapes to share quantities.</p> $8 \div 2 = 4$	<p>Share 8 buns between two people.</p> $8 \div 2 = 4$
Year 1/2	Grouping	<p>Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.</p>	<p>Use a number line to show jumps in groups. The number of jumps equals the number of groups.</p> <p>Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group.</p> $10 \div 5 = ?$ $5 \times ? = 10$	<p>$10 \div 5 = 2$</p> <p>Divide 10 into 5 groups. How many are in each group?</p>

	Objective	Concrete	Pictorial	Abstract
Year 3/4	Division with arrays	Link division to multiplication by creating an array and thinking about the number sentences that can be created. Eg $15 \div 3 = 5$ $5 \times 3 = 15$ $15 \div 5 = 3$ $3 \times 5 = 15$ 	 <p>Draw an array and use lines to split the array into groups to make multiplication and division sentences.</p>	Find the inverse of multiplication and division sentences by creating four linking number sentences. $5 \times 3 = 15$ $3 \times 5 = 15$ $15 \div 5 = 3$ $15 \div 3 = 5$
	Short division	Use place value counters to divide using the short division method alongside. $96 \div 3$  $42 \div 3$ Start with the biggest place value. We are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over. We exchange this ten for 10 ones and then share the ones equally among the groups. We look at how many are in each group. 	Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.  <p>Encourage them to move towards counting in multiples to divide more efficiently.</p>	Begin with divisions that divide equally with no remainder. $\begin{array}{r} 218 \\ 3 \overline{) 872} \end{array}$

	Objective	Concrete	Pictorial	Abstract
Year 5/6	Division with remainders	$14 \div 3 =$ Divide objects between groups and see how much is left over 	Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.  <p>Draw dots and group them to divide an amount and clearly show a remainder.</p> 	Complete written divisions and show the remainder using r. $\begin{array}{r} 29 \div 8 = 3 \text{ REMAINDER } 5 \\ \uparrow \quad \uparrow \quad \uparrow \quad \uparrow \\ \text{dividend} \text{ divisor} \text{ quotient} \quad \text{remainder} \end{array}$
	Short division with remainders	$364 \div 3 =$ 		Move onto divisions with a remainder. Once children understand remainders, begin to express as a fraction or decimal according to the context. $\begin{array}{r} 86 \text{ r } 2 \\ 3 \overline{) 258} \\ 5 \overline{) 432} \end{array}$ $\begin{array}{r} 186 \frac{1}{5} \\ 5 \overline{) 931} \end{array}$ $\begin{array}{r} 14 \frac{6}{5} \\ 35 \overline{) 511.0} \end{array}$

	Objective	Concrete	Pictorial	Abstract
Year 6	Long division			<p>Children will use long division to divide numbers with up to 4 digits by 2 digit numbers.</p> $ \begin{array}{r} 015 \\ 32 \overline{)487} \\ \underline{-0} \\ 48 \\ \underline{-32} \\ 167 \\ \underline{-160} \\ 7 \end{array} $ $ \begin{array}{r} 17 \text{ r } 19 \\ 31 \overline{)546} \\ \underline{31} \\ 236 \\ \underline{217} \\ 19 \end{array} $