Elmwood Junior School

Calculation Policy

The Importance of Place Value

Place value is the beginning and end of everything to do with mathematics. Having a secure understanding of place value is incremental and provides the essential number knowledge needed to complete calculations, including addition, subtraction, multiplication, division, and fractions. When children are introduced to place value they should be taught using a place value grid like the ones below. The grid should be adapted for the value that each year group need to work towards.

At KS2, children build on the fact that place value is the value of each digit within a number. They learn to handle larger numbers and the relative place values of each digit. It is important to emphasise the value of each digit when calculating with larger numbers. The use of concrete resources will also help with helping children understand each value.

Year 3

Hundreds	Tens	Ones

Year 4

Thousands	Hundreds	Tens	Ones

Year 5

Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones

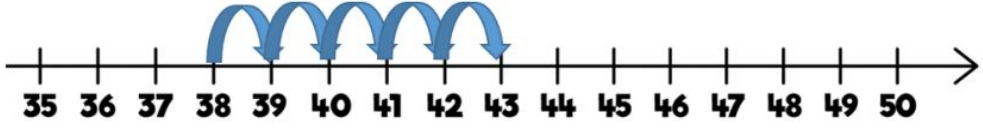
Year 6

Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones

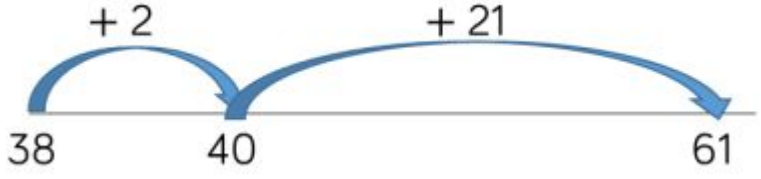
Year 2/3

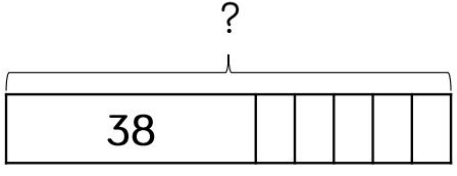
Skill: Add 2 digit to 1 digit numbers to 100

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

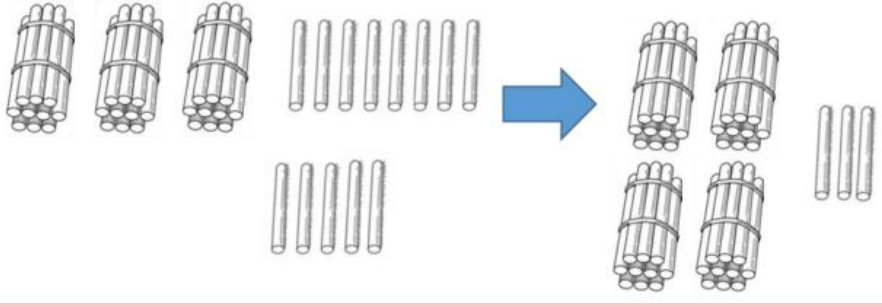


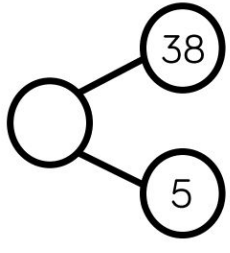
Children should apply their **prior knowledge** of number bonds to add more efficiently.





$$38 + 5 = 43$$





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

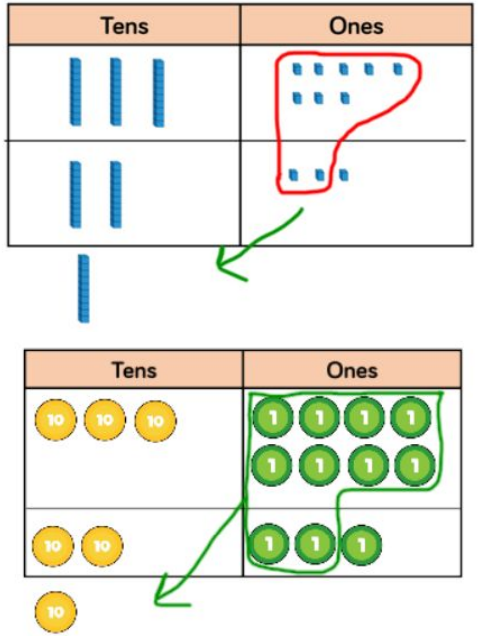
Hundred squares and straws can support children to find the number bond to 10.

Year 2/3

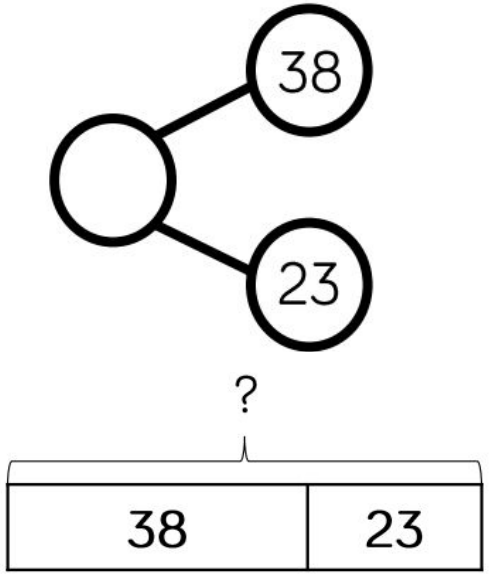
Skill: Add 2 digit numbers

Explore different representations using base ten and counters. Children can use manipulatives to carry across to ten.

$$38 + 23 = 61$$



Children can explore the part whole and bar model when adding.



Formal Written Method

$$\begin{array}{r} 38 \\ +\ 23 \\ \hline 61 \\ \hline 1 \end{array}$$

Children should be encouraged to carry the ten at the bottom of the calculation.

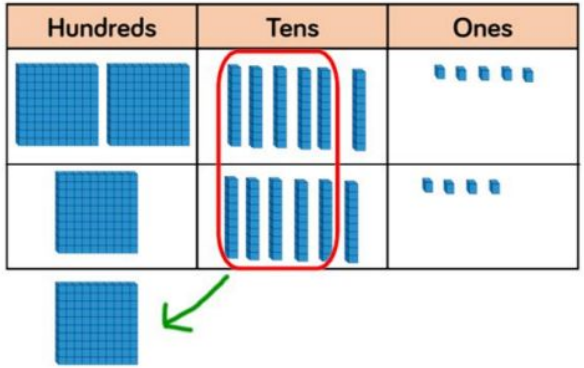
Year 3

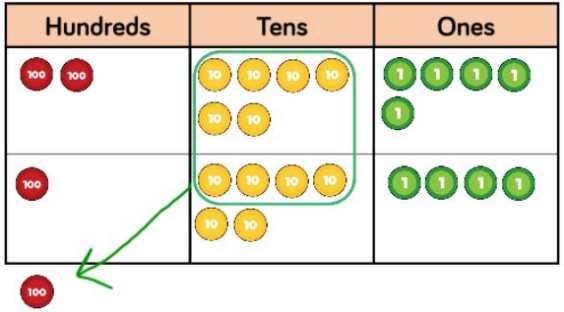
Skill: Add numbers with up to 3 digits

Explore different representations using base ten and counters. Children can use manipulatives to carry across to ten.

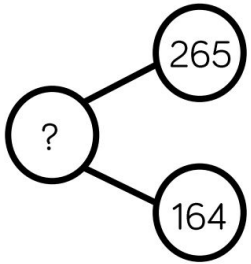
$$265 + 164 = 429$$

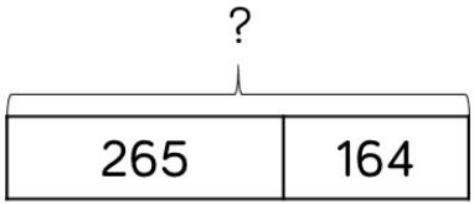
Ensure children write out their calculation alongside any concrete resources so the can see the links to the written column method.





Children can explore the part whole and bar model when adding.





Formal Written Method

$$\begin{array}{r} 265 \\ +\ 164 \\ \hline 429 \\ \hline 1 \end{array}$$

Children should be encouraged to carry the ten at the bottom of the calculation.

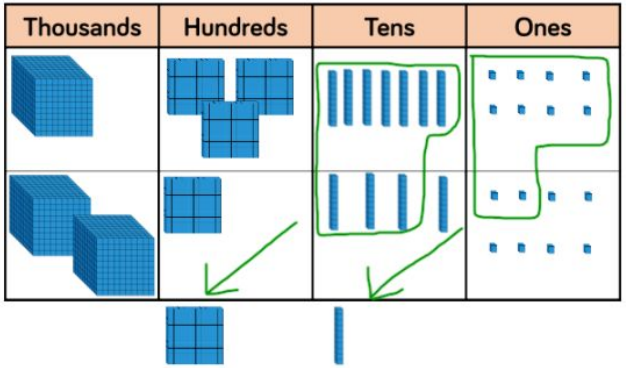
Year 4

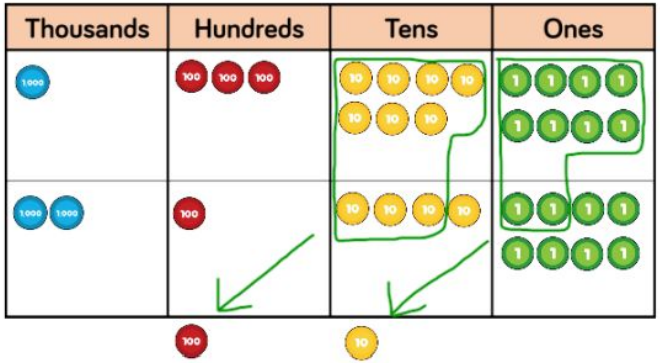
Skill: Add numbers with up to 4 digits

Place value counters are the most effective concrete resource when adding numbers with more than 4 digits.

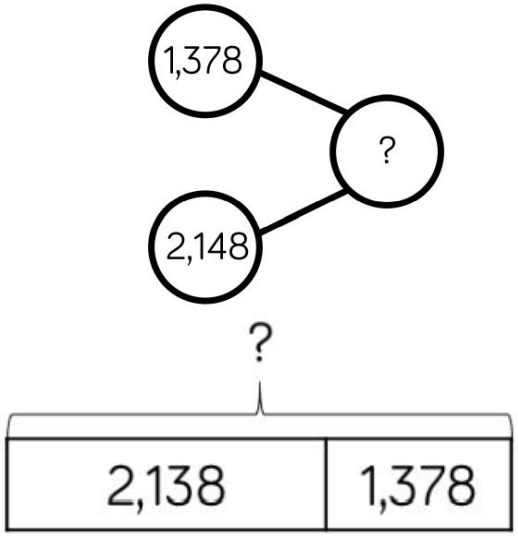
$$1{,}378 + 2{,}148 = 3{,}526$$

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





Children can explore the part whole and bar model when adding.



Formal Written Method

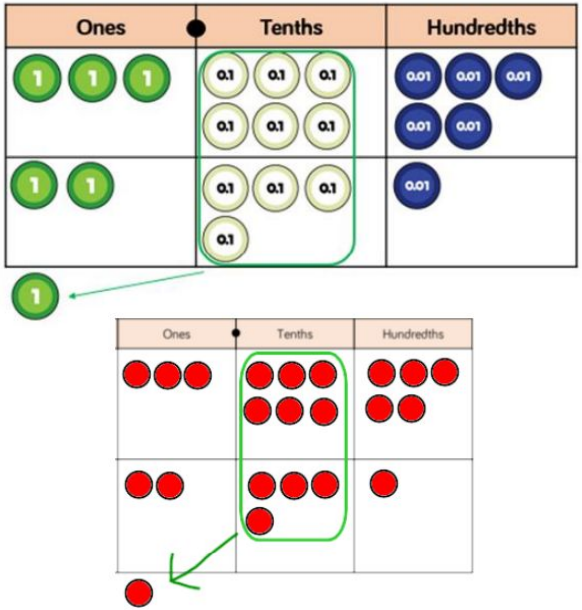
	1	3	7	8
+	2	1	4	8
	3	5	2	6
	1	1		

Year 5

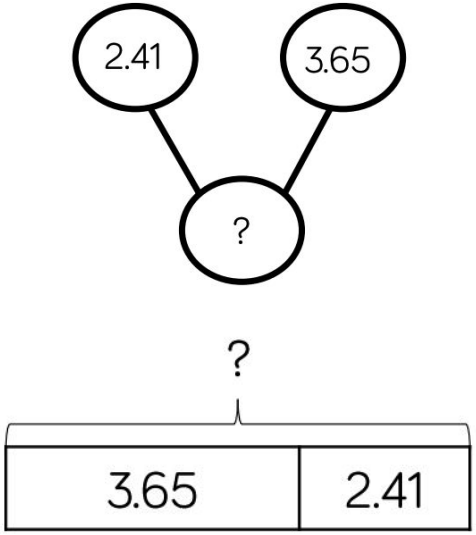
Skill: Add with up to 3 decimal places

$$3.65 + 2.41 = 6.06$$

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



Formal Written Method

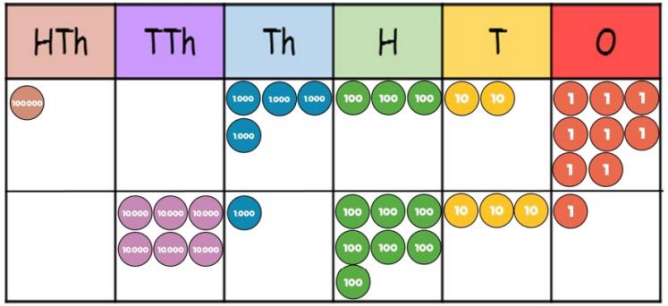
$$\begin{array}{r} 3.65 \\ +\ 2.41 \\ \hline 6.06 \\ \hline 1 \end{array}$$

Year 5/6

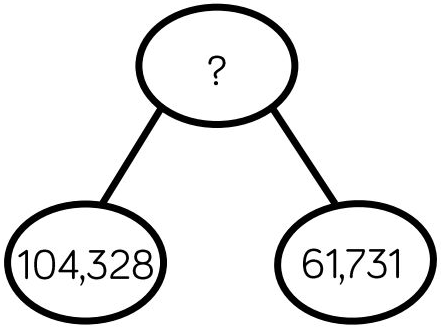
Skill: Add numbers with more than 4 digits

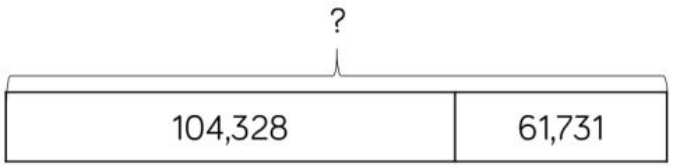
$$104{,}328 + 61{,}731 = 166{,}059$$

Place value counters are the most effective concrete resource when adding numbers with more than 4 digits.



Children can explore the part whole and bar model when adding.





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

Formal Written Method

1	0	4	3	2	8
+	6	1	7	3	1
1	6	6	0	5	9

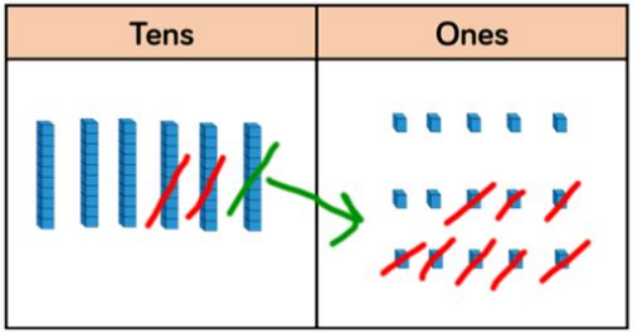
1

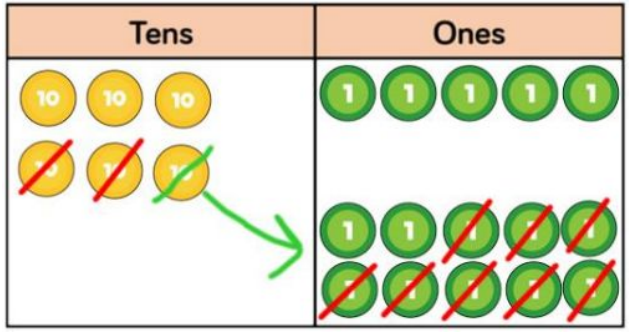
Year 2/3

Skill: Subtract 1 and 2-digit numbers to 100

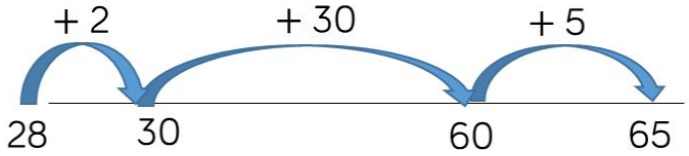
$$65 - 28 = 37$$

Children can use concrete resources to begin to understand exchanging.

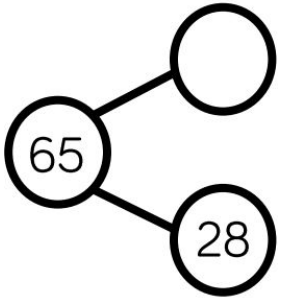




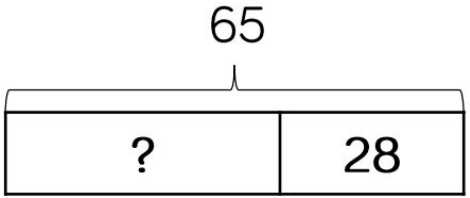
Children can use a blank number line to count on to find the difference. Encourage them to jump to multiples of 10 to become more efficient.



At this stage, encourage children to use the formal written method when calculating alongside concrete resources.



Children can explore the part whole and bar model when adding.



Formal Written Method

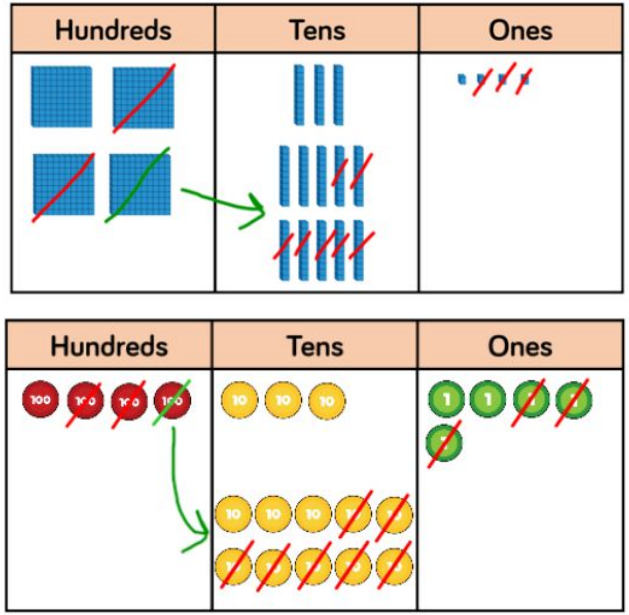
$$\begin{array}{r} {}^{5}\cancel{6}^{1}5 \\ -\ 28 \\ \hline 37 \end{array}$$

Year 3

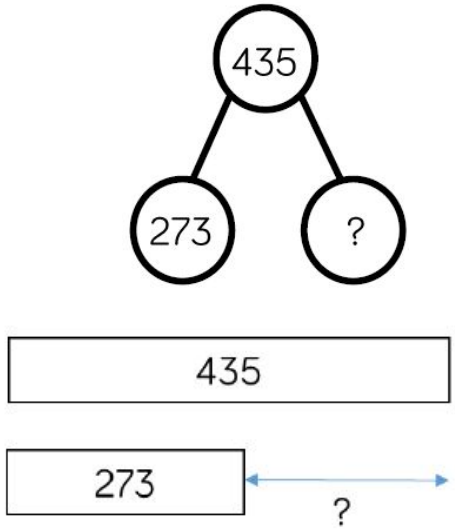
Skill: Subtract numbers with up to 3 digits

$$435 - 273 = 262$$

Children can use concrete resources to begin to understand exchanging.



Children can explore the part whole and bar model when adding.



At this stage, encourage children to use the formal written method when calculating alongside concrete resources.

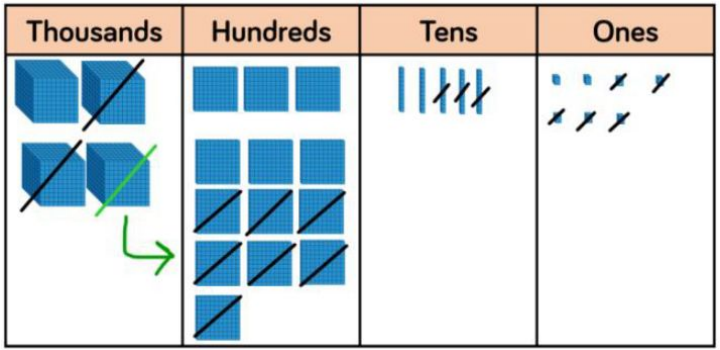
Formal Written Method

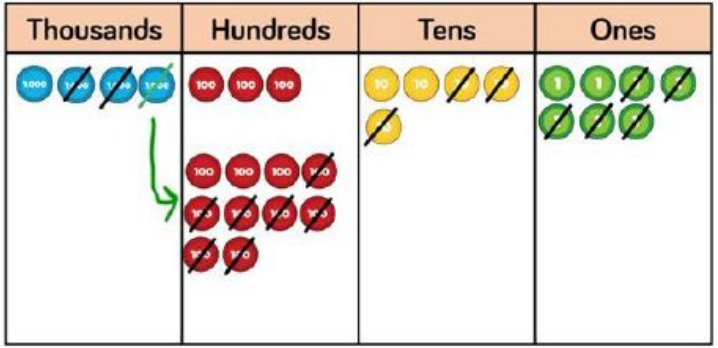
$$\begin{array}{r} {}^{3}\cancel{4}{}^{1}35 \\ -\ 273 \\ \hline 262 \end{array}$$

Year 4

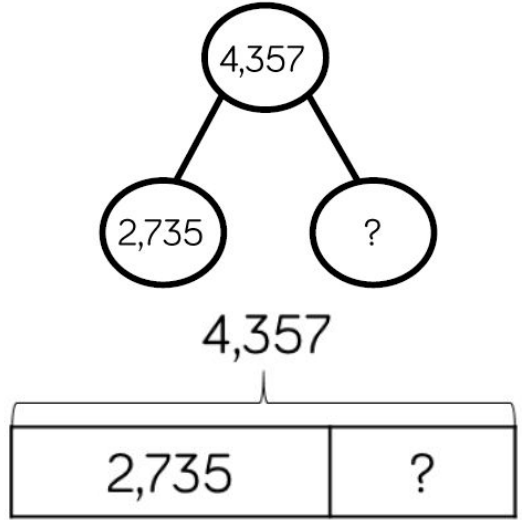
Skill: Subtract numbers with up to 4 digits

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





Children can explore the part whole and bar model when adding.



Encourage children to use the formal written method when calculating alongside concrete resources.

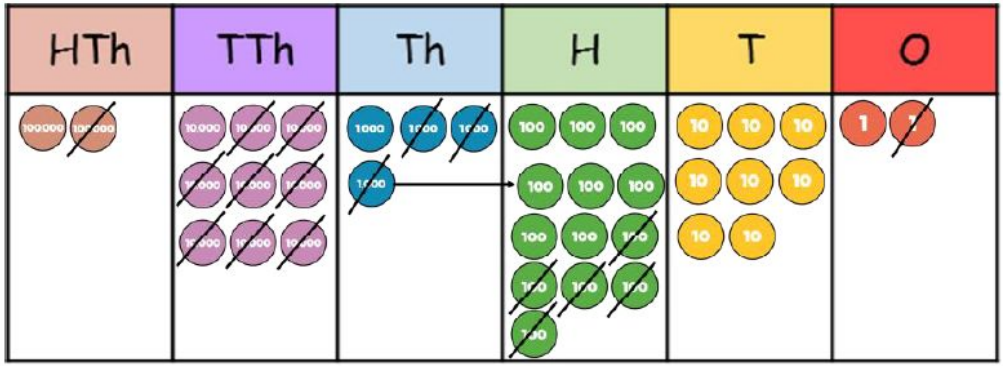
Formal Written Method

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

Year 5/6

Skill: Subtract numbers with more than 4 digits

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

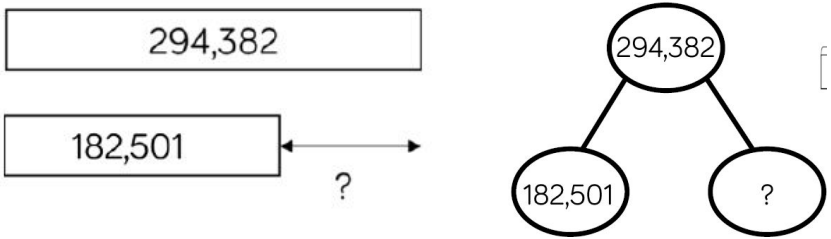


Encourage children to use the formal written method when calculating alongside concrete resources.

Formal Written Method

	2	9	$\cancel{3}\,4$	$^{1}3$	8	2
−	1	8	2	5	0	1
	1	1	1	8	8	1

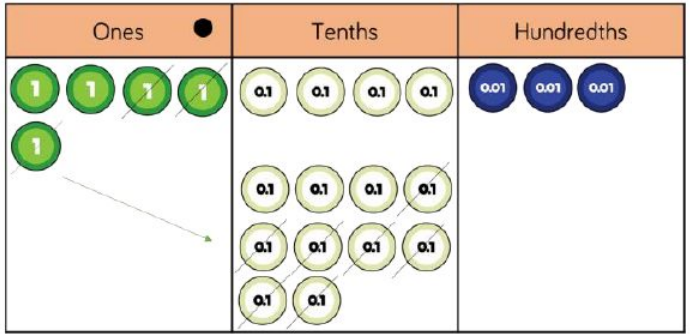
Children can explore the part whole and bar model when adding.

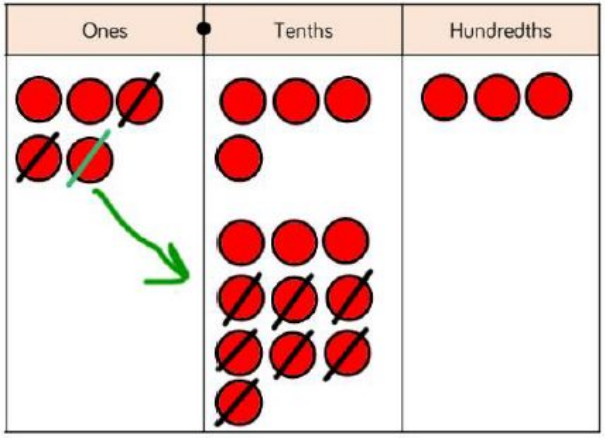


Year 5

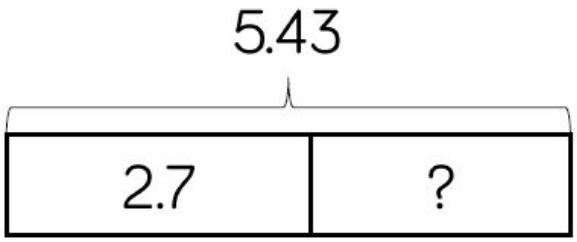
Skill: Subtract with up to 3 decimal places

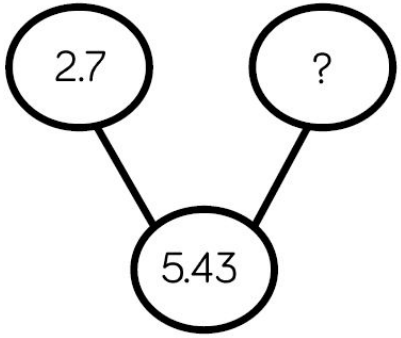
$$5.43 - 2.7 = 2.73$$





Children can explore the part whole and bar model when adding.





Encourage children to use the formal written method when calculating alongside concrete resources.

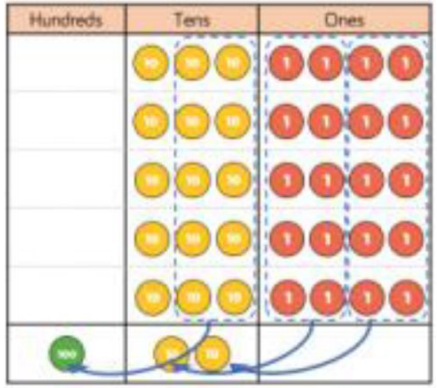
Formal Written Method

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

Year 3/4

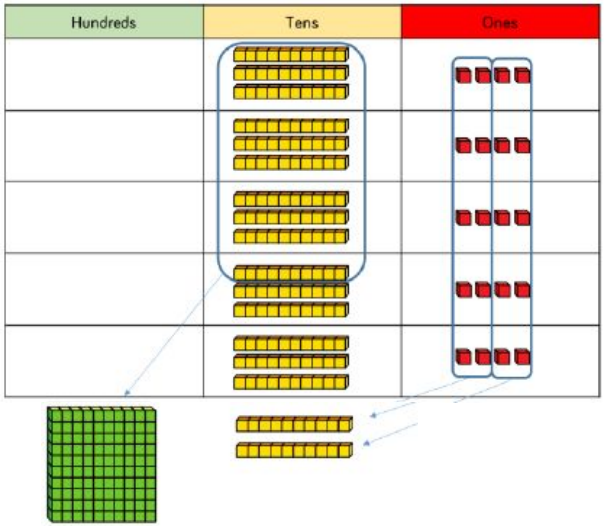
Skill: Multiply 2-digit numbers by 1-digit numbers

$$34 \times 5 = 170$$



Concrete resources should be used to support the understanding of the method rather than supporting multiplication, as children should use times tables knowledge.

Teachers may decide to first look at the expanded (ladder) method before moving on to the short multiplication method.



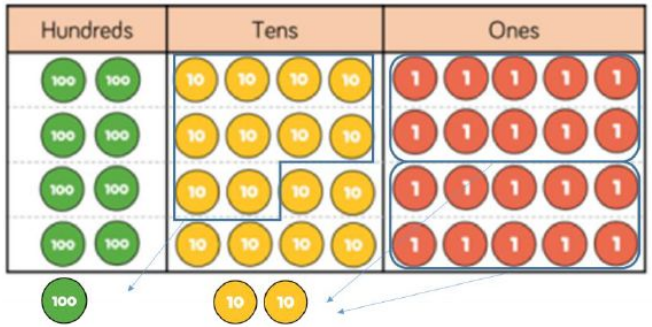
	H	T	O		
		3	4		
×			5		
		2	0	(5 × 4)	
+	1	5	0	(5 × 30)	
	1	7	0		

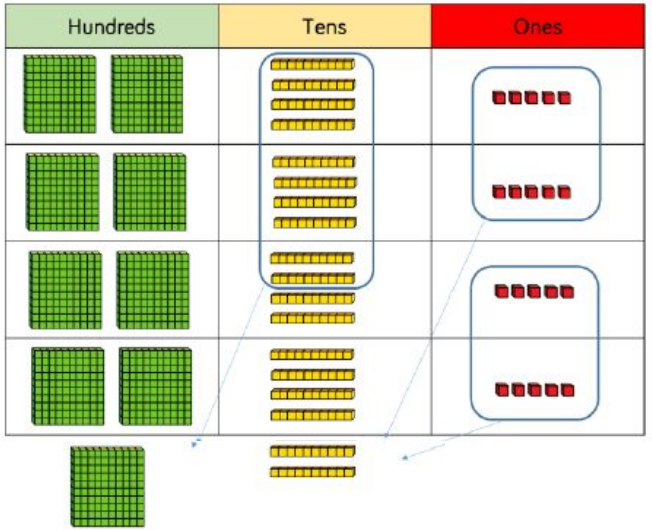
Formal Written Method

	H	T	O	
		3	4	
×			5	
	1	7	0	
	1	2		

Year 3/4

Skill: Multiply 3-digit numbers by 1-digit numbers





$$245 \times 4 = 980$$

When moving to 3-digit by 1-digit multiplication, encourage children to move towards the short formal written method.

Concrete resources can continue to support the understanding of the written method.

Encourage children to use the formal written method when calculating alongside concrete resources.

Formal Written Method

	H	T	O
	2	4	5
×			4
	9	8	0
	1	2	

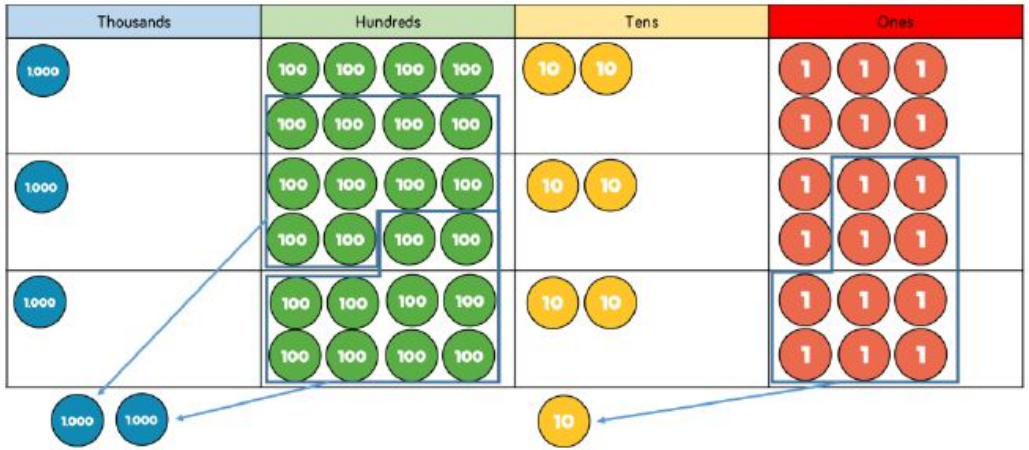
Year 5

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

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

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 wirh their times tables, encourage the use of multiplication grids so children can focus on the use of the written method.



Formal Written Method

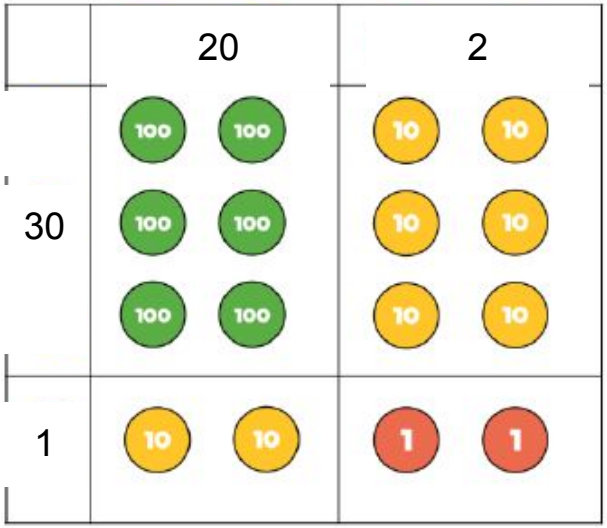
	Th	H	T	O
	1	8	2	6
×				3
	5	4	7	8
	2		1	

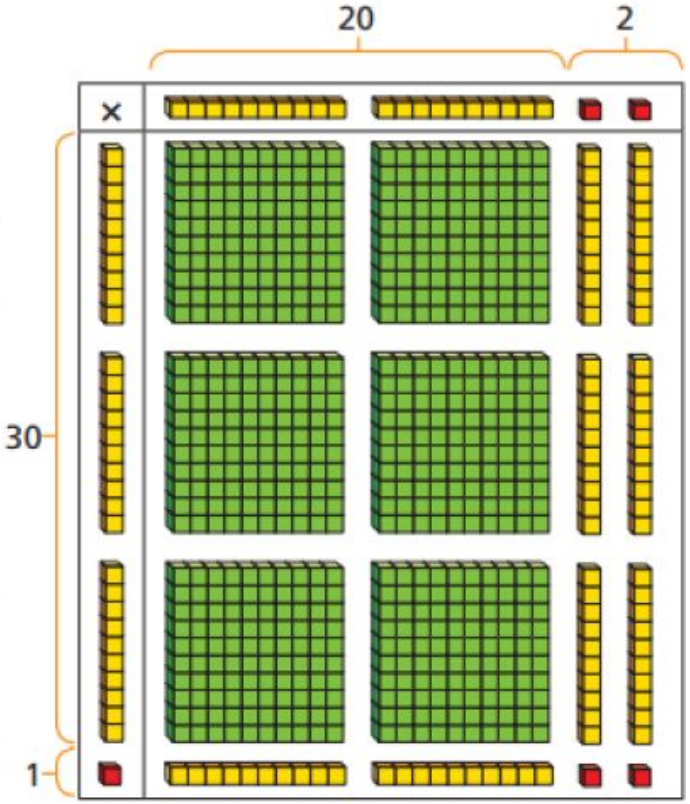
Year 5

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

When being introduced to multiplying by 2 digits, concrete resources, along with the grid method, can help children understand the size of the numbers they are using before moving on to the formal written method

$$22 \times 31 = 682$$





Grid Method

×	20	2
30	600	60
1	20	2

Formal Written Method

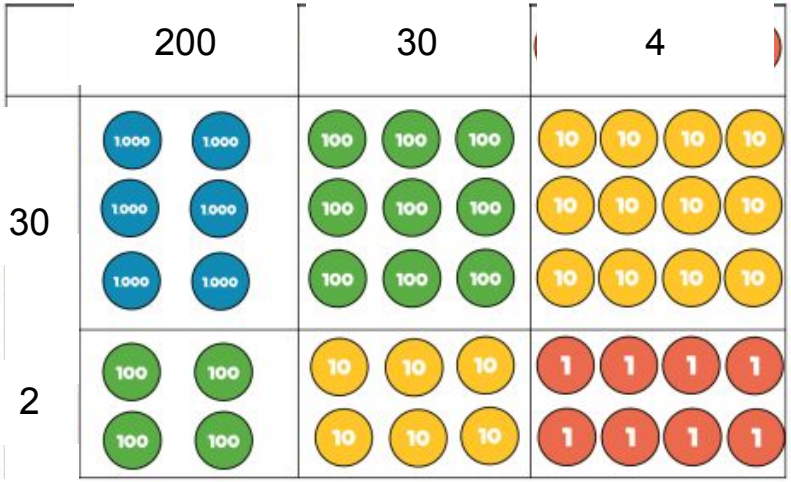
	H	T	O
		2	2
×		3	1
		2	2
	6	6	0
	6	8	2

Year 5

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

$$234 \times 32 = 7{,}488$$

Children can continue to use concrete resources to highlight the size of the numbers they are multiplying.



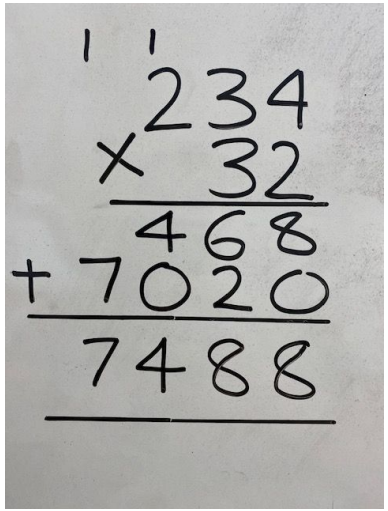
Encourage children to move towards the formal written method, seeing the links with the grid method.

Grid Method

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

Emphasise the importance of the zero and why it needs to be added when multiplying by the tens.

Formal Written Method

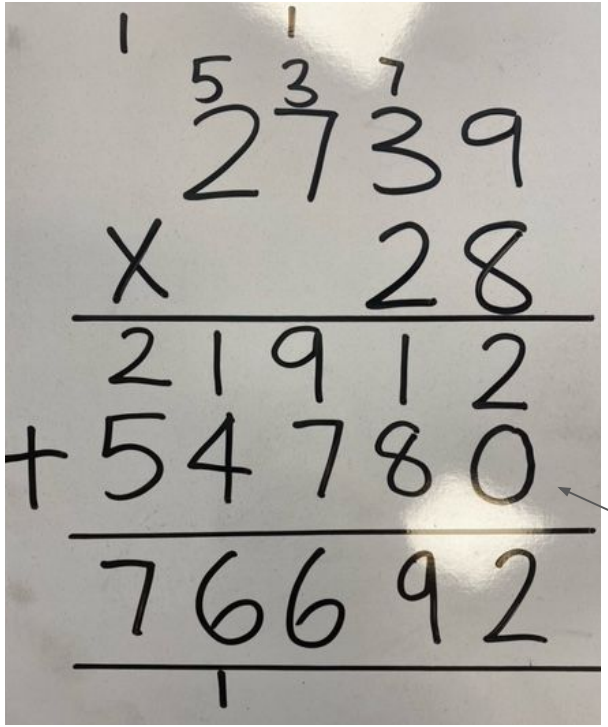


Year 5/6

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

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

Formal Written Method
(long multiplication)



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

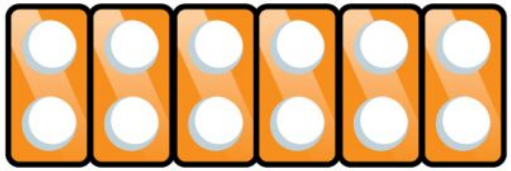
If children are struggling with their times tables, provide multiplication grids to support when they are focussing on the use of the method.

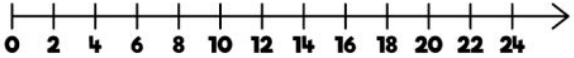
Emphasise the importance of the zero and why it needs to be added when multiplying by the tens.

Times Tables

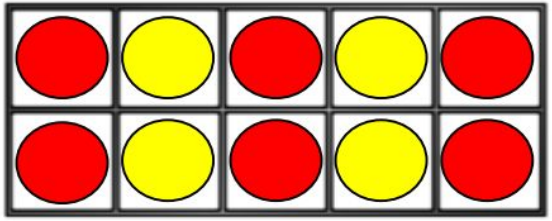
Year 2

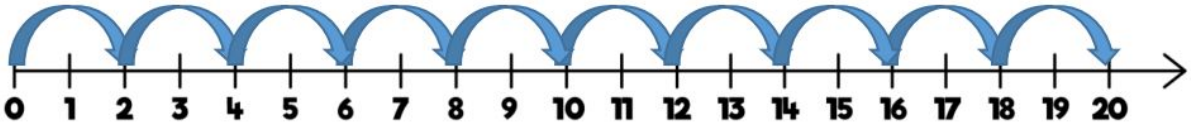
Skill: 2 Times Tables





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



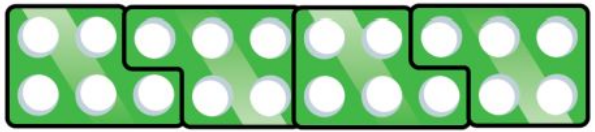


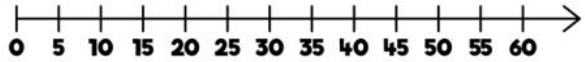
Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

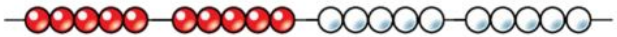
Look for patterns in the two times table using concrete resources. Notice how all the numbers are even and there is a pattern in the ones.

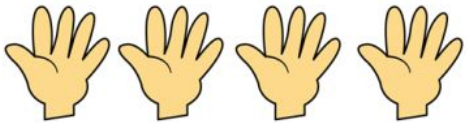
Year 2

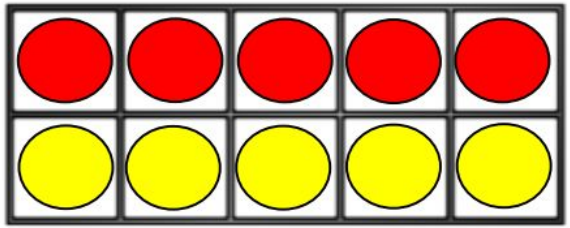
Skill: 5 Times Tables



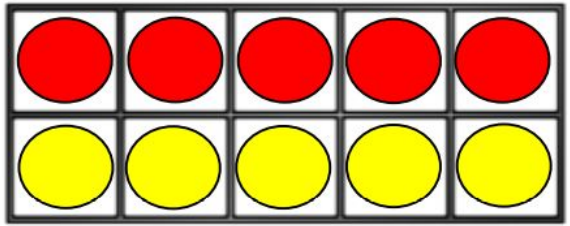








1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

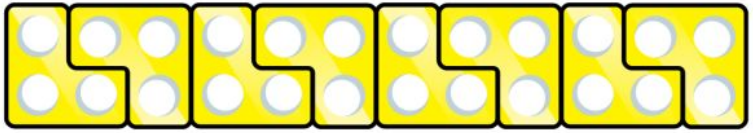


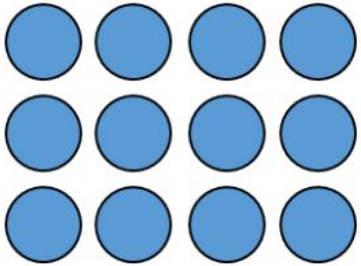
Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Look for patterns in the five times table using concrete resources. Notice the pattern in the ones.

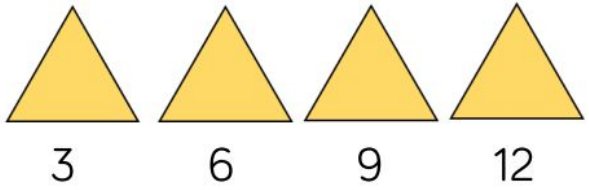
Year 3

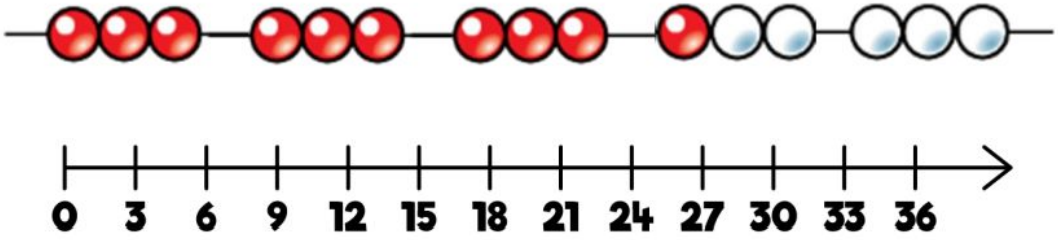
Skill: 3 Times Tables





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



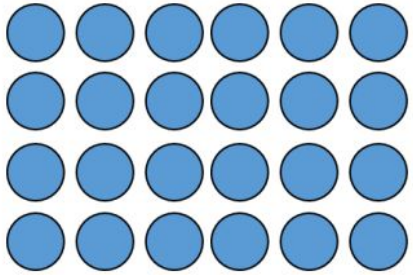


Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

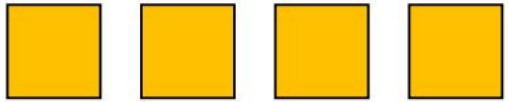
Look for patterns in the three times table using concrete resources. Notice the pattern in the ones using the hundred square.

Year 3

Skill: 4 Times Tables

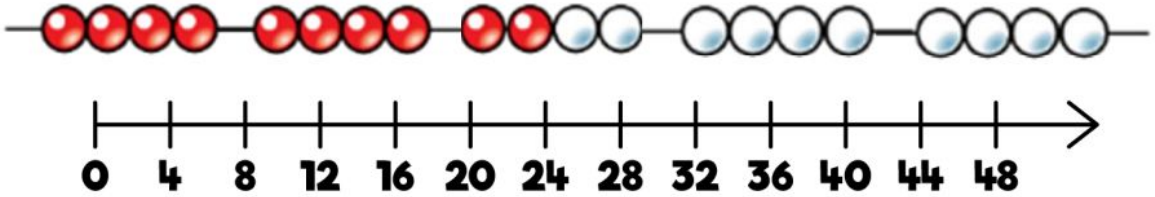


1	2	3	(4)	5	6	7	(8)	9	10
11	(12)	13	14	15	(16)	17	18	19	(20)
21	22	23	(24)	25	26	27	(28)	29	30
31	(32)	33	34	35	(36)	37	38	39	(40)
41	42	43	(44)	45	46	47	(48)	49	50



4 8 12 16

4	8	12	16	20
24	28	32	36	40
44	48	52	56	60

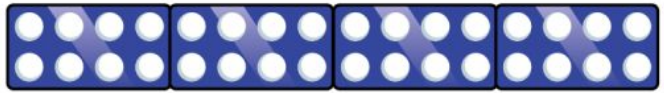


Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Look for patterns in the four times table using concrete resources. Notice how all the numbers are even and there is a pattern in the ones.

Year 3

Skill: 8 Times Tables



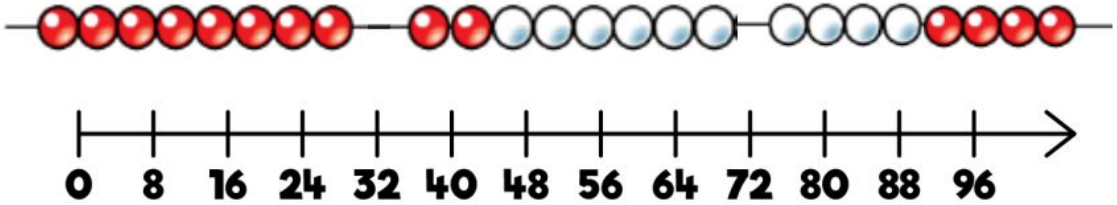
8 16 24 32

8	16	24	32	40
48	56	64	72	80

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

Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Look for patterns in the eight times table using concrete resources. Notice how all the numbers are even and there is a pattern in the ones.



Year 4

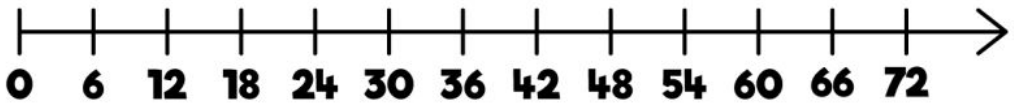
Skill: 6 Times Tables

6	12	18	24	30
36	42	48	54	60
66	72	78	84	90

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

Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Look for patterns in the six times table using concrete resources. Notice how all the numbers are even and there is a pattern in the ones.



Year 4

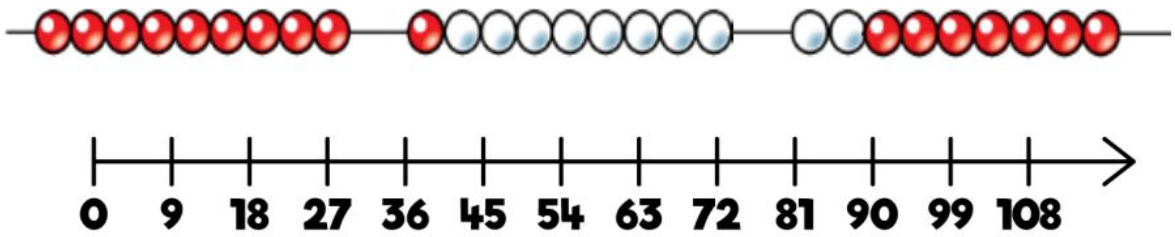
Skill: 9 Times Tables

9	18	27	36	45
54	63	72	81	90

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

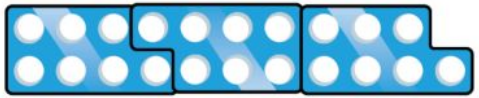
Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Look for patterns, notice how the digits always add up to 9. E.g. 18 (1+8=9) and 54 (5+4=9).



Year 4

Skill: 7 Times Tables

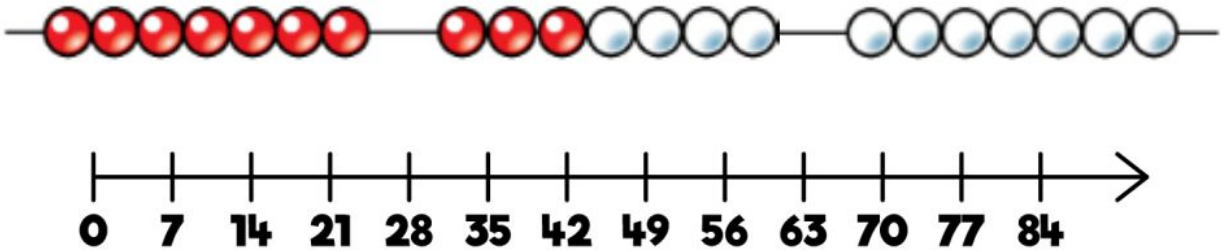


7	14	21	28	35
42	49	56	63	70

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

Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

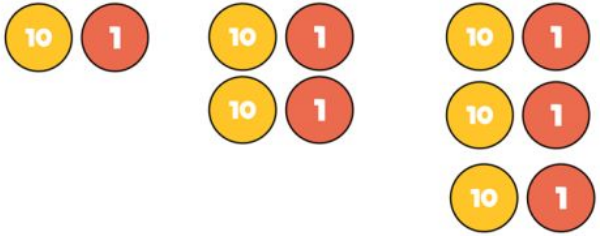
The seven times table can be trickier to learn due to a lack of pattern in the numbers.



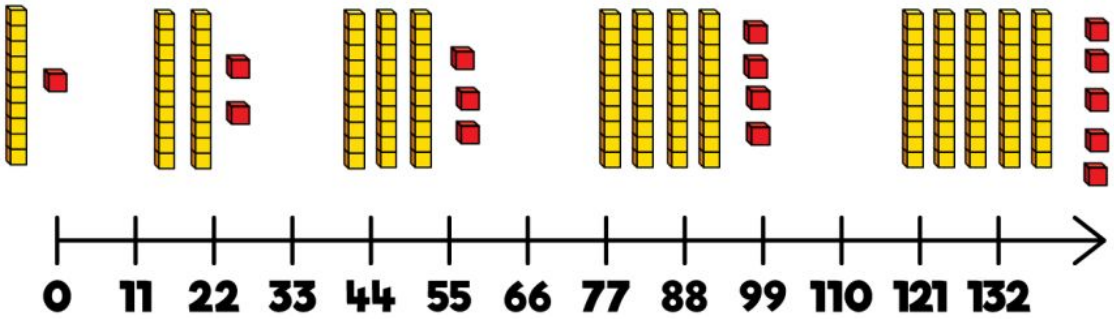
Year 4

Skill: 11 Times Tables

11	22	33	44	55	66
77	88	99	110	121	132



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



Encourage daily counting in multiples, supported by a number line or a hundred square. Look for patterns in the 11 times table, using manipulatives to support.

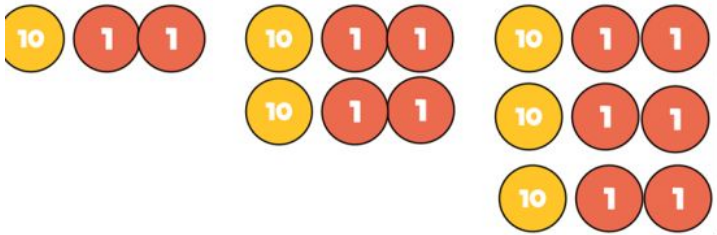
Notice the patterns in the tens and ones using the hundred square. Does this pattern continue for 11 x 12 and 12 x 12?

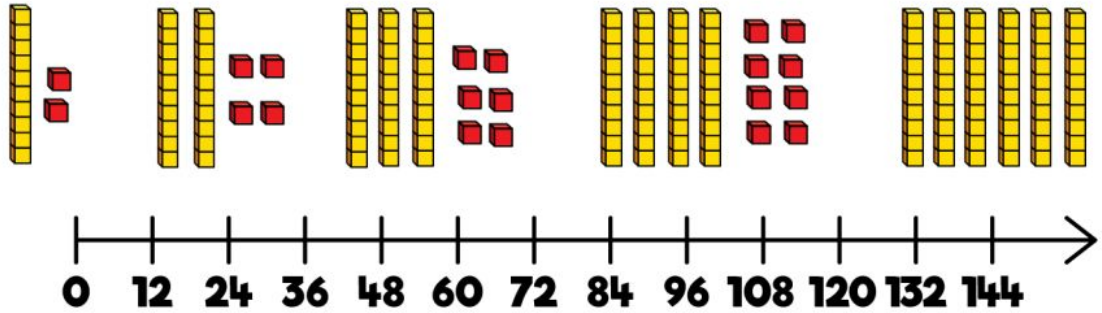
Year 4

Skill: 12 Times Tables

12	24	36	48	60
72	84	96	108	120
132	144			

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





Encourage daily counting in multiples, supported by a number line or a hundred square. Look for patterns in the 12 times table, using manipulatives to support.

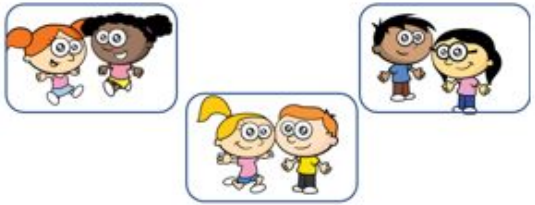
Year 3

Skill: Understanding division through sharing/grouping.

Children can use sharing and grouping to understand division and the link between multiplication and division.

$$6 \div 3 = 2$$

Shared into 3 equal teams

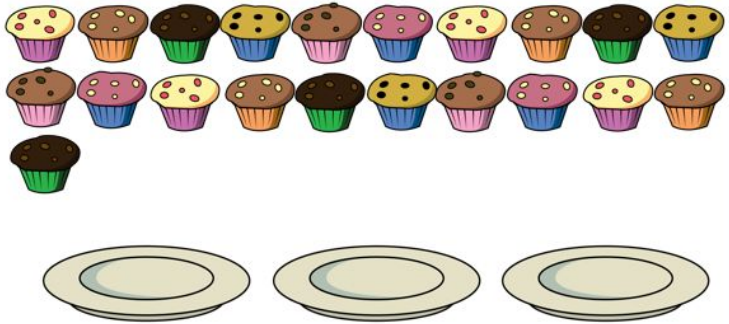


There are **2** children in each team.

Grouped into teams of 3

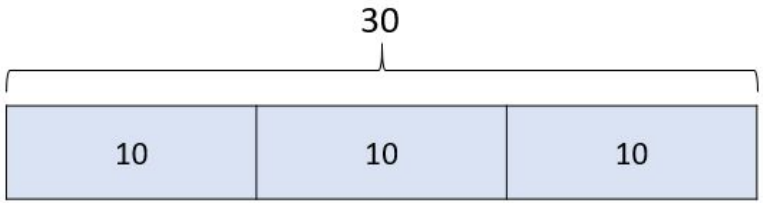
There are **2** groups of 3 children.

They are shared equally between 3 plates.



There will be 7 cakes on each plate.
$21 \div 3 = 7$

Which bar model shows 30 ÷ 3?



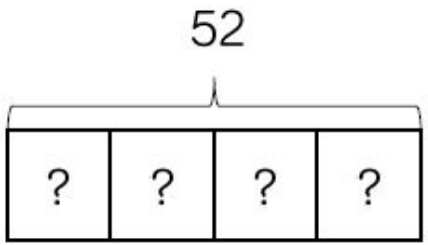
30 divided into 3 equal parts

Year 3/4

Skill: Divide 2 digits by 1-digit

Without remainders

$$52 \div 4 = 13$$

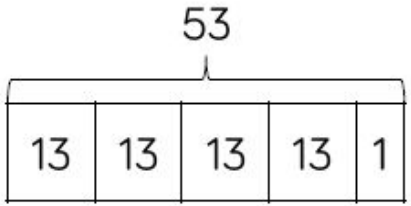


When dividing numbers involving an exchange, children can use concrete resources to exchange one ten for ten ones.

Starting with the equipment outside the place value grid will highlight remainders, as they will be left outside the grid once the equal groups have been made.

With remainders

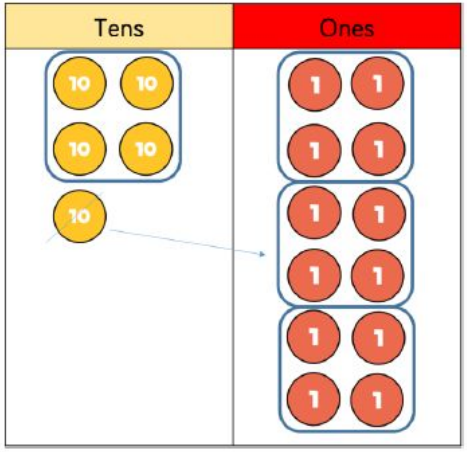
$$53 \div 4 = 13\ r1$$



Year 4/5

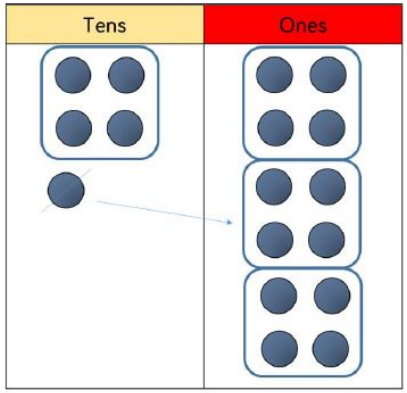
Skill: Divide 2 digits by 1-digit (without remainders)

$$52 \div 4 = 13$$



Children can draw plain counters on a place value grid and group[them through a pictorial method.

When using the short division method, children use grouping. Starting with the largest place value, they group by the divisor.



Language is important here. Children should consider ‘How many groups of 4 tens can we make?’ and ‘How many groups of 4 ones can we make?’

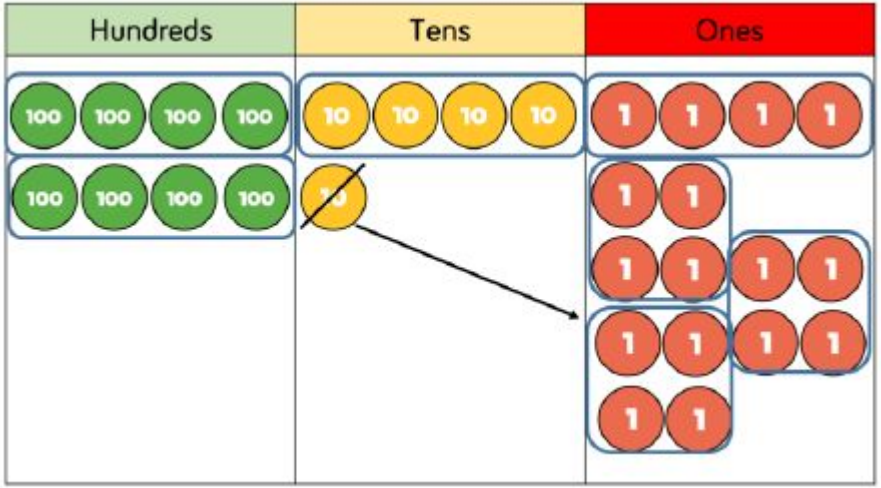
Encourage children to use the short division method when calculator alongside concrete or pictorial representations..

Written Method

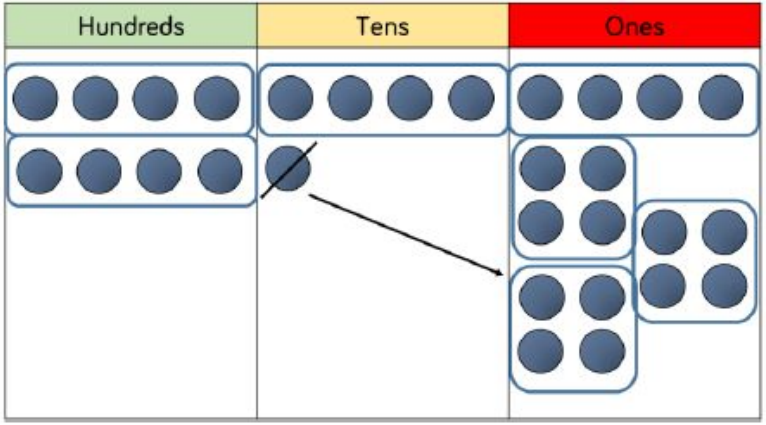
Year 5

Skill: Divide 3-digits by 1 digit

$$856 \div 4 = 214$$



Children can continue to use grouping to support their understanding of short division when dividing a 3-digit number by a 1 digit number.



Children can draw plain counters on a place value grid and group[them through a pictorial method.

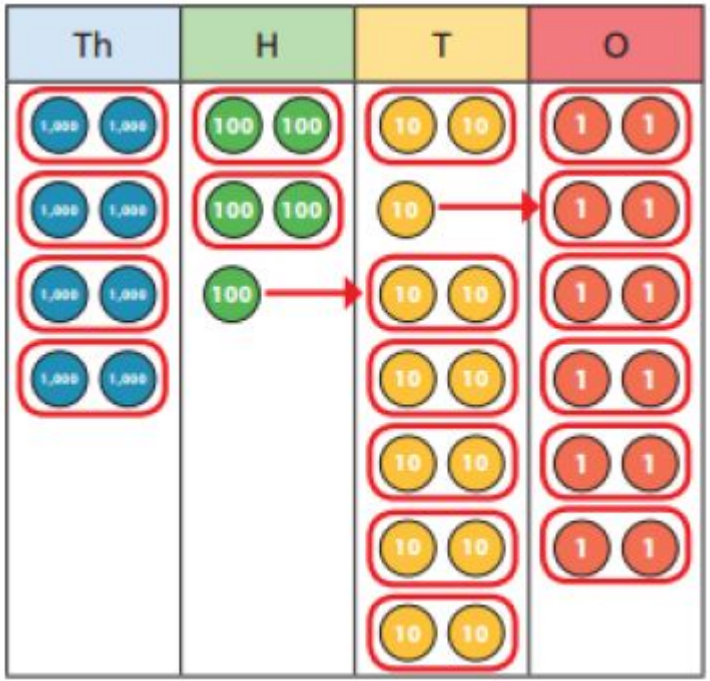
Written Method

		2	1	4
	4	8	5	$^{1}6$

Year 5

Skill: Divide 3-digits by 1 digit

$$8{,}532 \div 2 = 4{,}266$$



Place value counters or plain counters can be used on a place value grid to support children to divide 4 digit by 1 digit. Children can also draw their own counters and group them through a more pictorial method.

Written Method

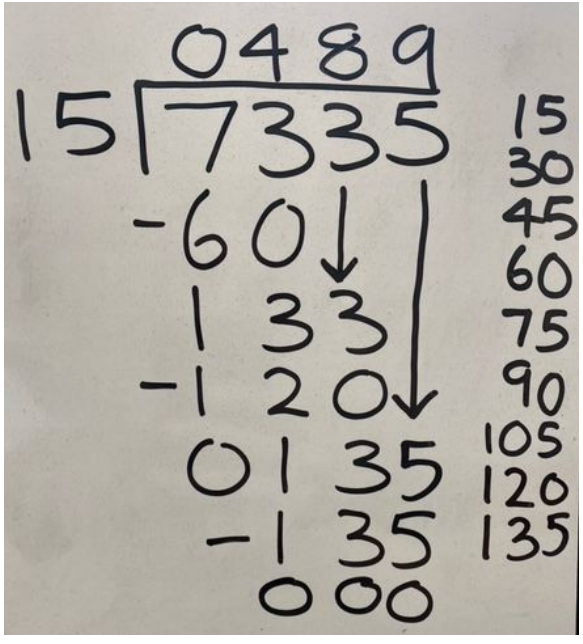
	4	2	6	6
2	8	5	$^{1}3$	$^{1}2$

Children should be encouraged to move aware from concrete and pictorial when dividing numbers with multiple exchanges.

Year 6

Skill: Divide multi digits by 2 digits (long division)

$7{,}335 \div 15 = 489$



Children can write out multiples to support their calculations with large remainders.

Children can decide how they want to calculate their multiplication at the side of their long division calculation.

$372 \div 15 = 24\ r12$