



St Peter's C of E Junior School

Maths Calculation Policy

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To be reviewed: October 2024	Written by: H Roberts

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Rationale:

At St Peter's Junior School, we follow the White Rose Programmes of Learning. In doing so, it ensures continuity and progression from the Key Stage 1 curriculum taught at the feeder infant school. In addition, it provides consistency of teaching and learning for our pupils, ensures full coverage of the curriculum objectives and allows for knowledge and skills to be built upon in readiness for transitioning to the next stage of their education.

We have developed this Calculation Policy in line with White Rose and have included Year 2 representations and models, recognising the importance of our teachers understanding prior teaching and learning to secure good progression.

In this Calculation Policy, we will cover addition, subtraction, multiplication, and division. Each section of this policy will state the skill being developed, the representation and model used to teach the skill and examples to illustrate progress.

ADDITION

Year	Skill	Representation and model
2	Add 3 1-digit numbers	Part-whole model
		Bar model
		Ten frames (within 20
		Number shapes
2	Add 1 and 2-digit numbers to 100	Part-whole model
		Bar model
		Number lines (labelled and blank)
		Hundred squares
2	Add 2 2-digit numbers	Part-whole model
		Bar model
		Number lines (blank)
		Base 10
		Place value counters
		Column addition
3	Add with up to 3-digits (Year 3)	Part-whole model
		Bar model
		Base 10
		Place value counters
		Column addition
4	Add with up to 4-digits (Year 4)	Part-whole model
		Bar model
		Base 10
		Place value counters
		Column addition
5	Add with more than 4-digits	Part-whole model
		Bar model
		Place value counters
		Column addition
5	Add with up to 3 decimal places	Part-whole model
		Bar model
		Place value counters
		Column addition

Addition Year 2 and 3

Add 3 1-digit numbers - Year 2

When adding 3 1-digit numbers, children should be encouraged to look for number bonds to 10 or doubles to add the number more efficiently.

This supports children in their understanding of commutativity.

Manipulatives that highlight number bonds to 10 are effective when adding 3 1-digit numbers.

Add 1 and 2-digit numbers to 100 – Year 2/3

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.

Add 2 2-digit numbers – Year 2/3

At this stage encourage children to use the formal column method when calculating alongside straws, base 10 or place value counters. As a number becomes 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.

Addition Year 3 and 4

Add with up to 3-digits and 4-digits

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.

Addition Year 5

Add with more than 4-digits YEAR 5

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.

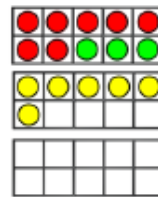
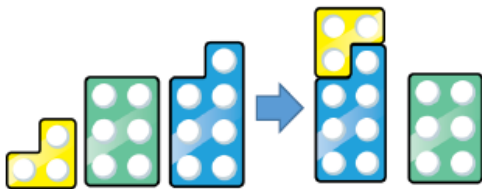
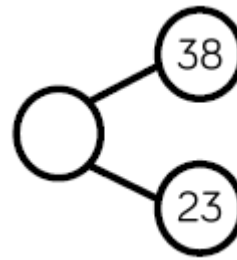
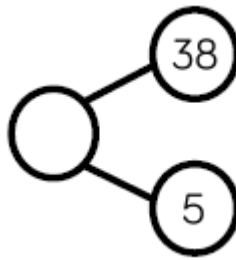
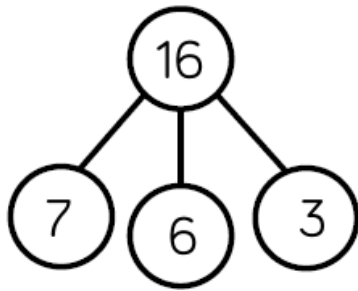
At this stage, children should be encouraged to work in the abstract, using the column method to add larger numbers efficiently.

Add with up to 3 decimal places YEAR 5

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

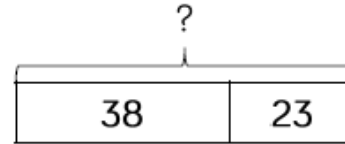
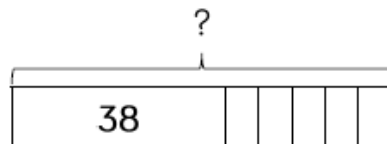
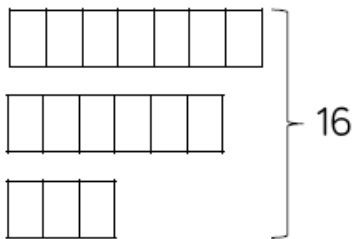
Ensure children have experience of adding decimals with a variety of decimal places. This includes putting this into context when adding money and other measures.

Progress on a page across Year 2



$$7 + 6 + 3 = 16$$

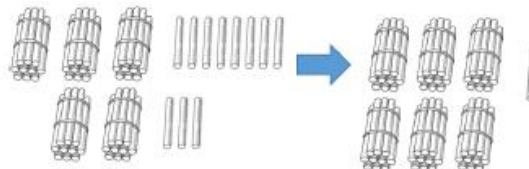
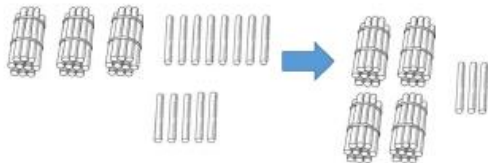
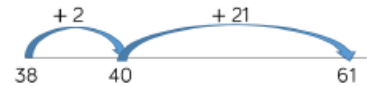
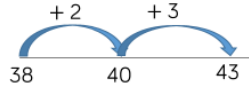
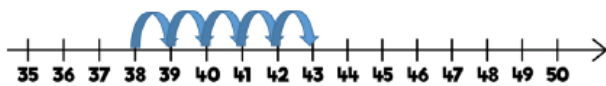
10



$$7 + 6 + 3 = 16$$

$$38 + 5 = 43$$

$$38 + 23 = 61$$

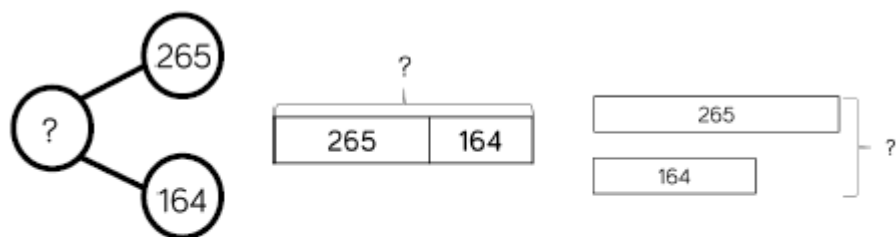


Tens	Ones

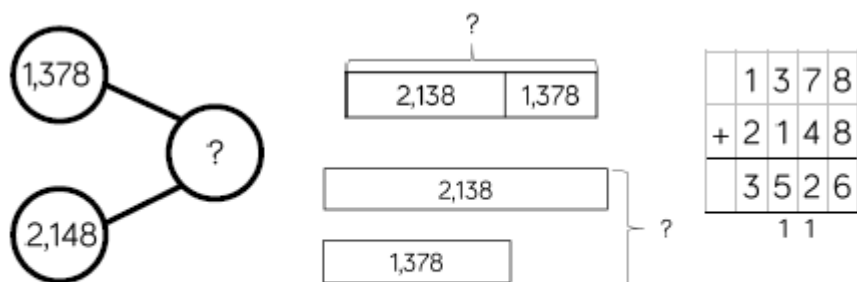
$$\begin{array}{r} 38 \\ + 23 \\ \hline 61 \\ 1 \end{array}$$

Tens	Ones
10 10 10	1 1 1 1
10 10	1 1 1 1
10	1 1 1

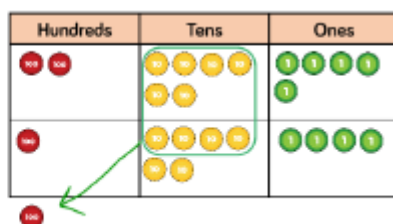
Progress on a page across Year 3 and 4



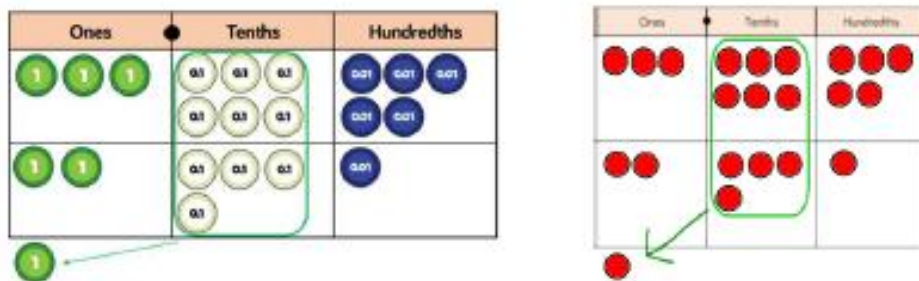
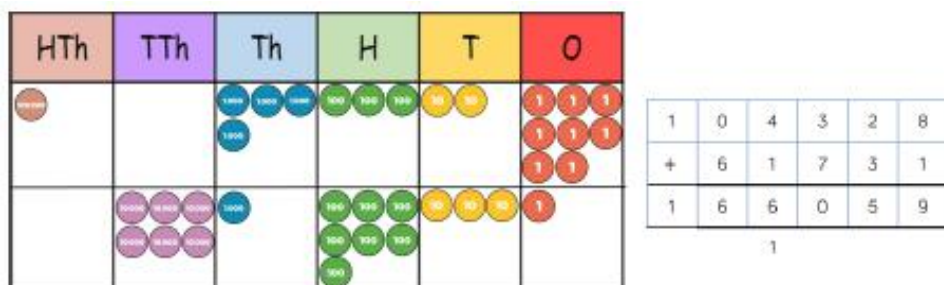
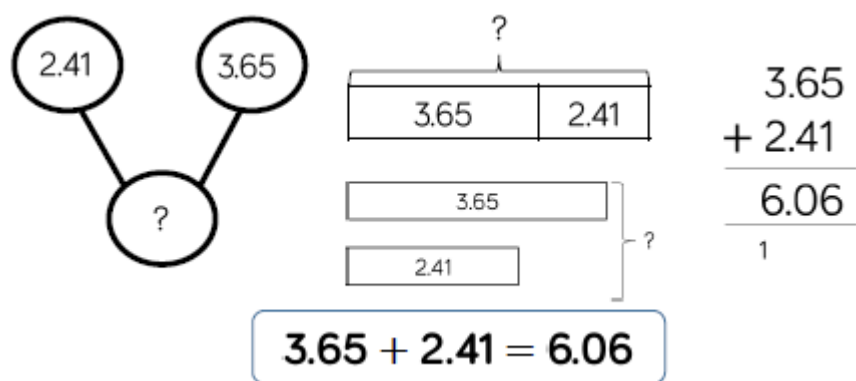
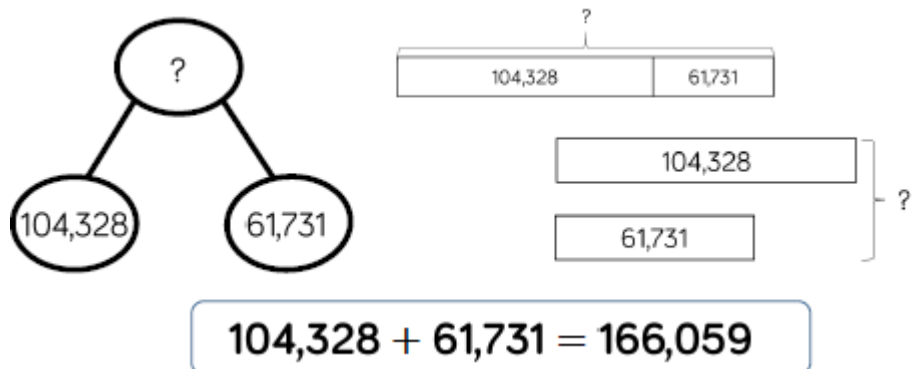
$$265 + 164 = 429$$



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



Progress on a page across Year 5



There is an expectation that by the time children are in Year 6 they are proficient in adding, so whilst it is recommended it is revisited there are no further skills that require teaching.

SUBTRACTION

Year	Skill	Representation and model
2	Subtract 1 and 2-digit numbers to 100	Part-whole model
		Bar model
		Number lines (labelled and blank)
		Straws
		Hundred squares
2	Subtract two 2-digit numbers	Part-whole model
		Bar model
		Number lines (blank)
		Base 10
		Place value counters
3	Subtract with up to 3-digits (Year 3)	Column addition
		Part-whole model
		Bar model
		Base 10
		Place value counters
4	Subtract with up to 4-digits (Year 4)	Column addition
		Part-whole model
		Bar model
		Base 10
		Place value counters
5	Subtract with more than 4-digits	Column addition
		Part-whole model
		Bar model
		Place value counters
5	Subtract with up to 3 decimal places	Column addition
		Part-whole model
		Bar model
		Place value counters

Subtraction Year 2

Subtract 1 and 2-digit numbers to 100 – Year 2

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, straw 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.

Subtraction Year 3 and Year 4

Subtract with up to 3-digits and 4-digits

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.

Subtraction Year 5

Subtract with more than 4-digits

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

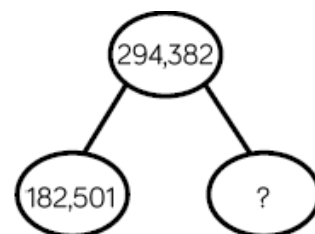
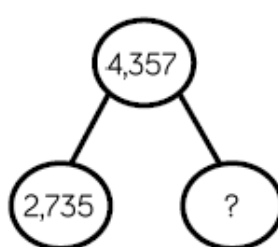
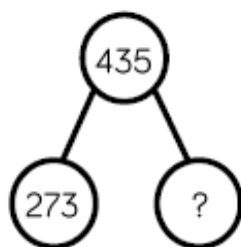
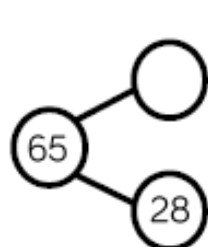
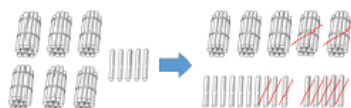
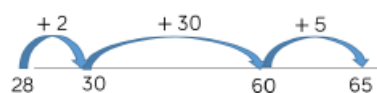
At this stage, children should be encouraged to work in the abstract, using the column method to subtract larger numbers efficiently.

Subtract with up to 3 decimal places

Place value counters or plain counters on a place value grid are the most effective manipulatives 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 adding money and other measures.

Progress on a page Year 2 to Year 5

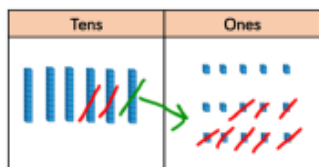
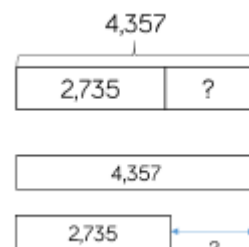
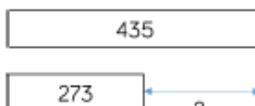
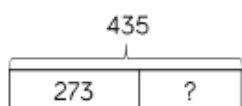
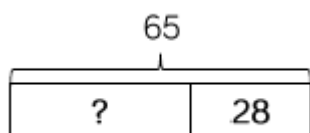


$$65 - 28 = 37$$

$$435 - 273 = 262$$

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

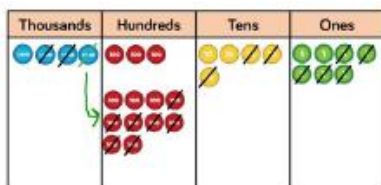
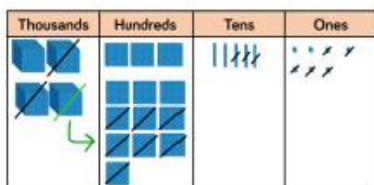
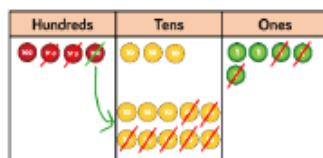
$$294,382 - 182,501 = 111,881$$



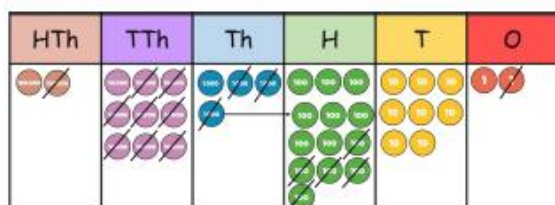
$$\begin{array}{r} 65 \\ - 28 \\ \hline 37 \end{array}$$



$$\begin{array}{r} 435 \\ - 273 \\ \hline 262 \end{array}$$



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



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

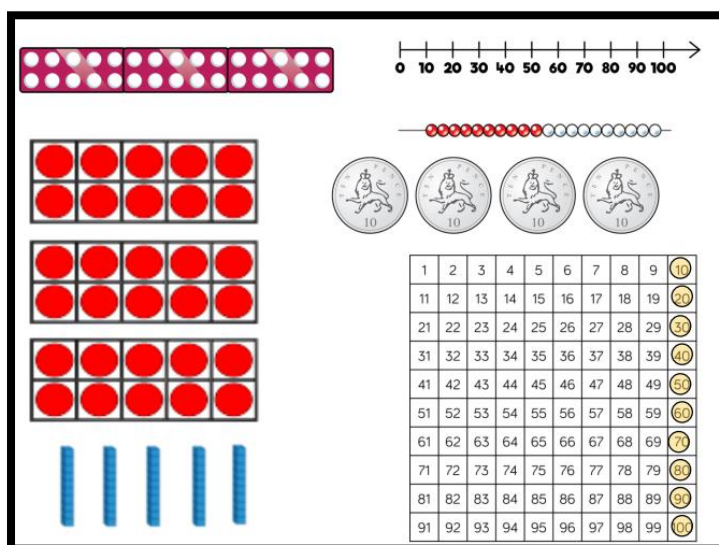
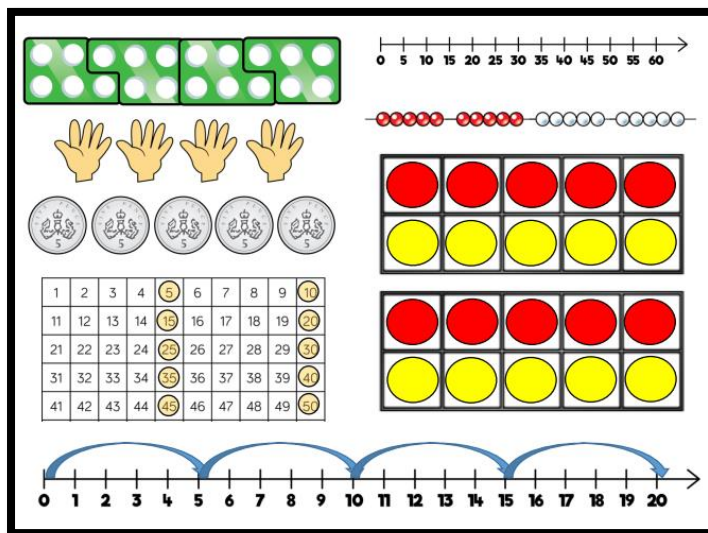
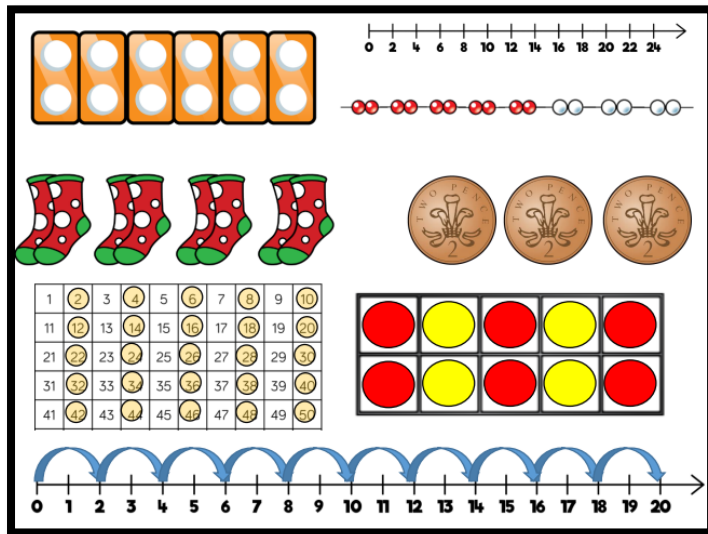
TIMES TABLES

Year	Skill	Representation and model
2	Recall and use multiplication and division facts for the 2-times table	Bar model
		Number shapes
	Recall and use multiplication and division facts for the 5-times table	Counters
		Money
		Ten frames
	Recall and use multiplication and division facts for the 10-times table	Bead strings
		Number lines
		Everyday objects
		Base 10 (10 x tables)
3	Recall and use multiplication and division facts for the 3-times table	Hundred square
		Number shapes
	Recall and use multiplication and division facts for the 4-times table	Counters
		Bead strings
	Recall and use multiplication and division facts for the 8-times table	Number lines
		Everyday objects
4	Recall and use multiplication and division facts for the 6-times table	Hundred square
	Recall and use multiplication and division facts for the 7-times table	Number shapes
	Recall and use multiplication and division facts for the 9-times table	Bead strings
	Recall and use multiplication and division facts for the 11-times table	Number lines
	Recall and use multiplication and division facts for the 12-times table	Base 10 (11 and 12 x table)
		Place value counters (11 and 12 x table)

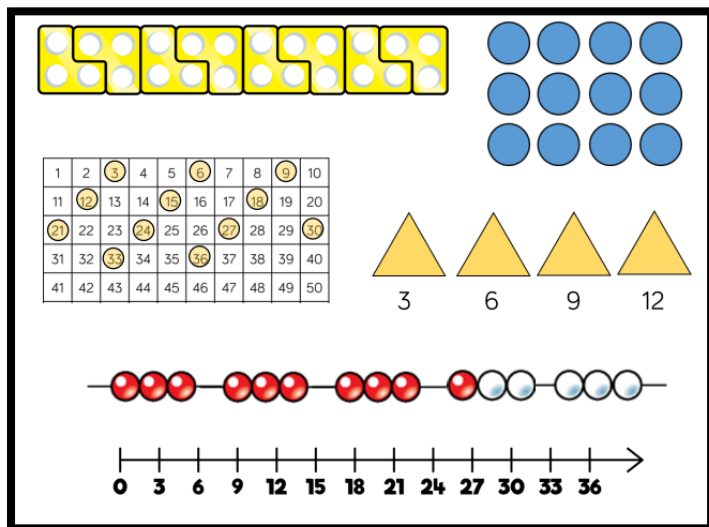
2, 5 and 10 times table – Year 2

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

Look for patterns in the times table, using concrete manipulatives to support.



3, 4 and 8 times table – Year 3

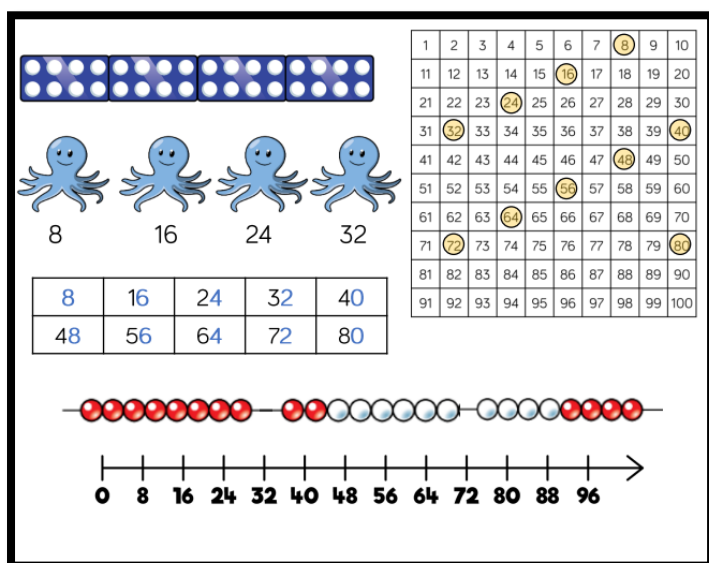
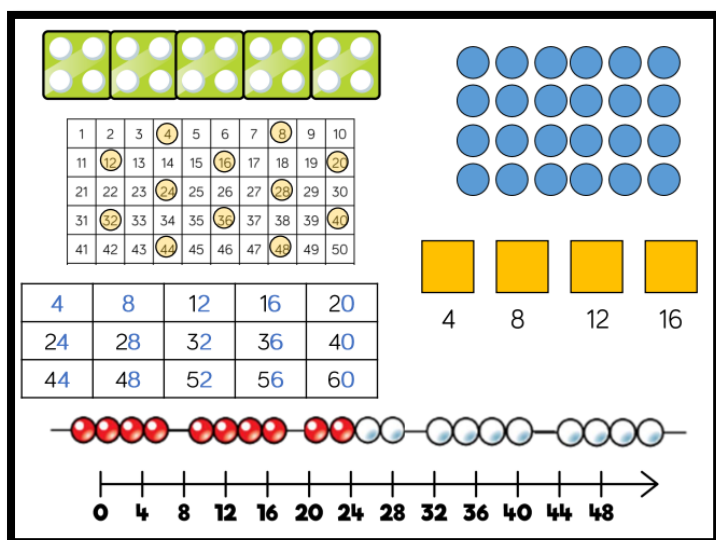


Encourage daily counting in multiples, this can be supported using a number line or hundred squared.

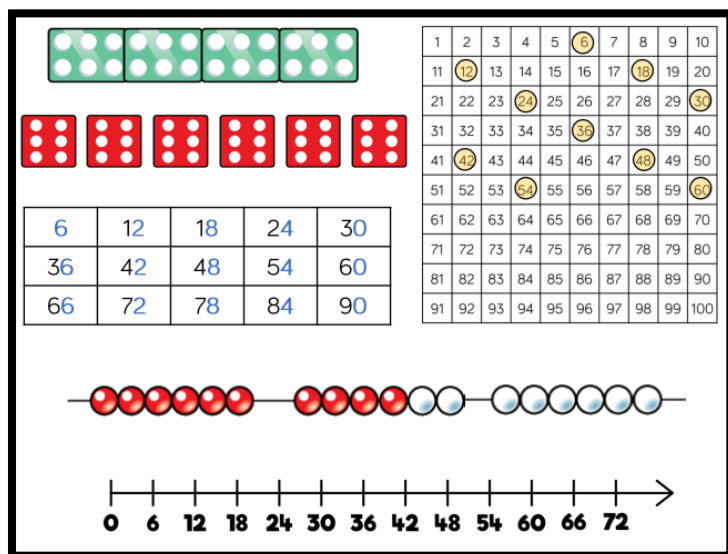
Look for patterns in the times table, using concrete manipulatives to support.

Make links between the 2 and 4 times table, seeing how each multiple is double the twos.

Look for patterns in the eight times table, make links to the 4 times table, seeing how each multiple is double the fours.



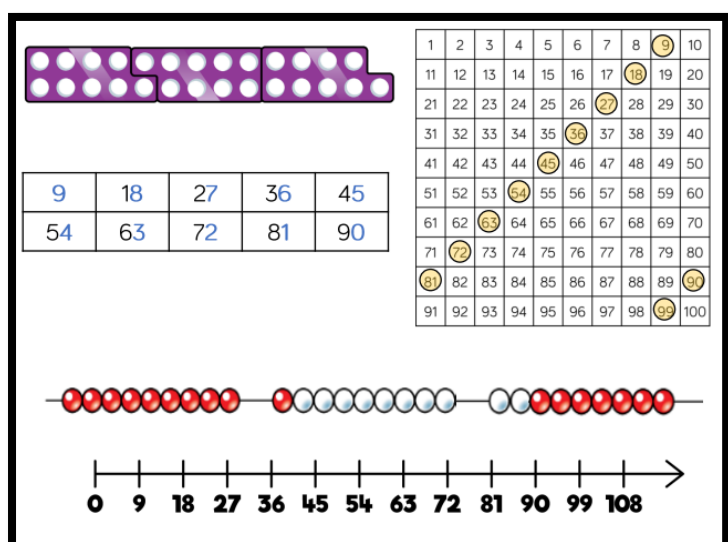
6, 9 and 7 times table - Year 4



Encourage daily counting in multiples. This can be supported using a number line or hundred squared.

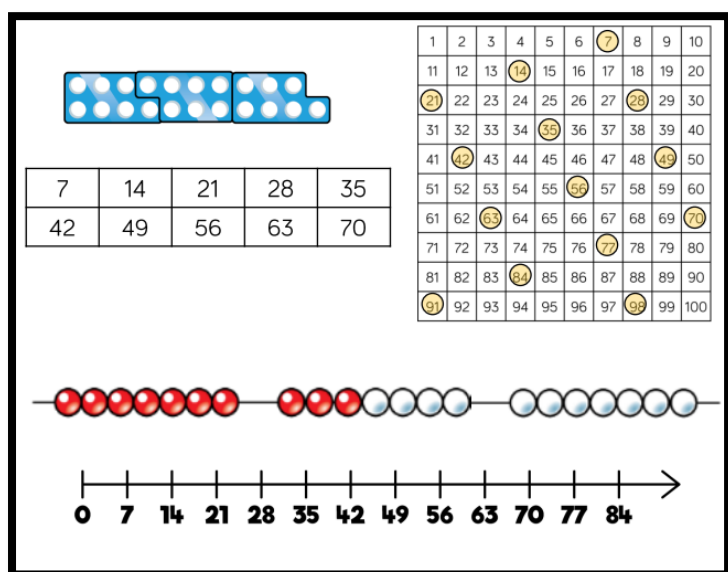
Look for patterns in the times table, using concrete manipulatives to support.

Make links to the 3 times table, seeing how each multiple is double the threes in the 6 times table.

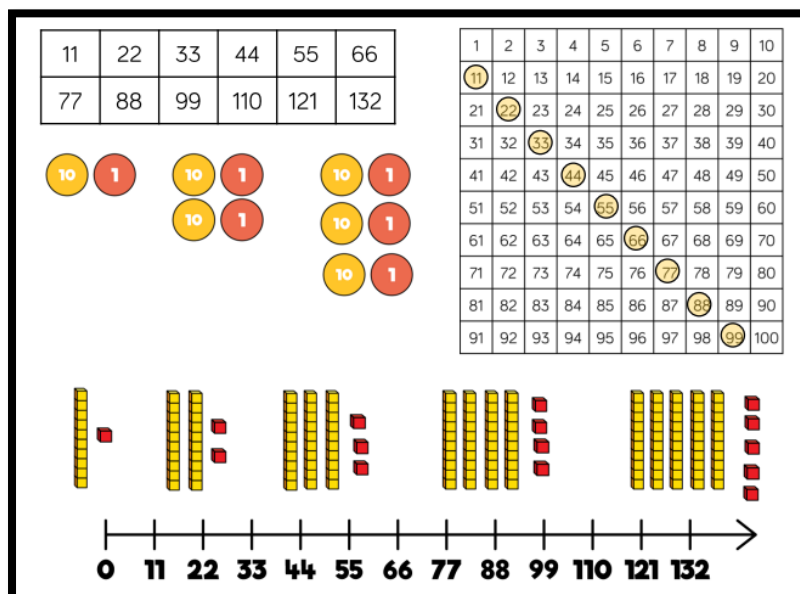


Look for patterns in the nine times table, notice the pattern in the tens and ones using a hundred square to support as well as noting the odd, even pattern within the multiples.

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



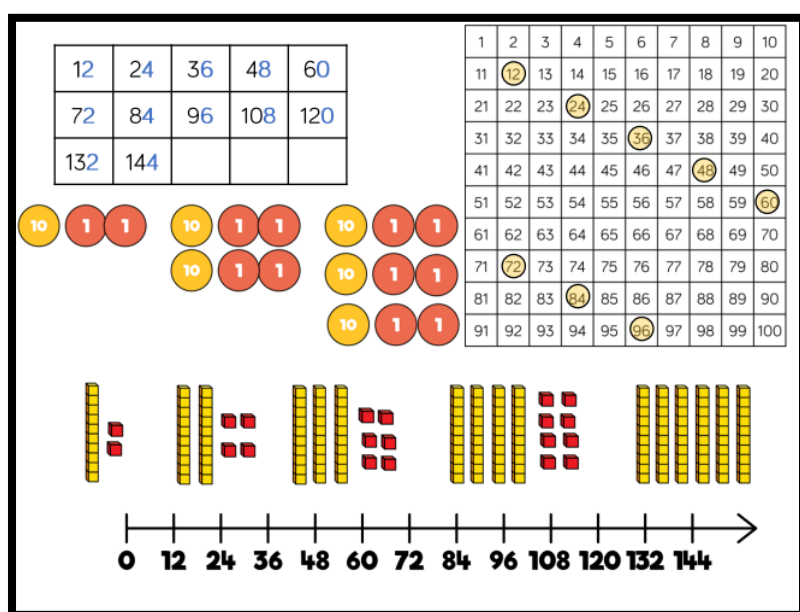
11 and 12 times table - Year 4



Encourage daily counting in multiples. This can be supported using a number line or hundred squared.

Notice the pattern in the eleven times table, in the tens and ones using the hundred square to support. Also consider the pattern after crossing the 100.

Make links to the 6 times table, when learning the 12 times table, seeing how each multiple is double the sixes.



MULTIPLICATION

Year	Skill	Representation and model
1/2	Solve one-step problems with multiplication	Bar model
		Number shapes
		Counters
		Ten frames
		Bead strings
		Number lines
3/4	Multiply 2-digit by 1-digit numbers	Place value counters
		Base 10
		Short written method
		Expanded written method
4	Multiply 3-digit by 1-digit numbers	Place value counters
		Base 10
		Short written method
5	Multiply 4-digit by 1-digit numbers	Place value counters
		Short written method
5	Multiply 2-digit by 2-digit numbers	Place value counters
		Base 10
		Short written method
		Grid method
5	Multiply 2-digit by 3-digit numbers	Place value counters
		Short written method
		Grid method
5/6	Multiply 2-digit by 4-digit numbers	Formal written method

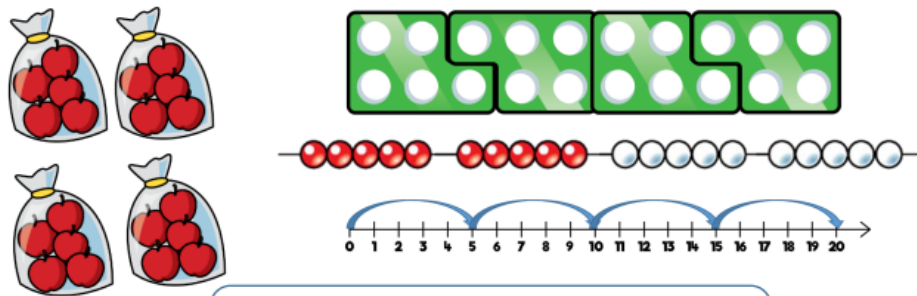
Multiplication Year 1 and 2

Solve 1-step problems using multiplication

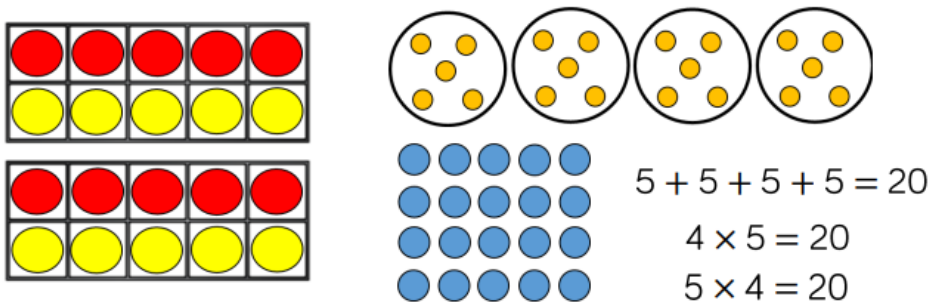
Children represent multiplication as repeated addition in many different ways.

In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record multiplication formally.

In Year 2, children are introduced to the multiplication symbol.



One bag holds 5 apples.
How many apples do 4 bags hold?



Multiplication Year 3/4

Multiply 2-digit numbers by 1-digit numbers

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

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

	H	T	O	
x		3	4	
			5	
	1	7	0	
	1	2		

The place value counted should be used to support the understanding of the methods rather than supporting the multiplication, as children should use the times table knowledge.

Multiply 3-digit numbers by 1-digit numbers

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.

Multiplication Year 5

Multiply 4-digit numbers by 1-digit numbers

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.

Multiply 2-digit numbers by 2-digit numbers

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.

Multiply 3-digit numbers by 2-digit numbers

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.

Multiplication Year 5/6

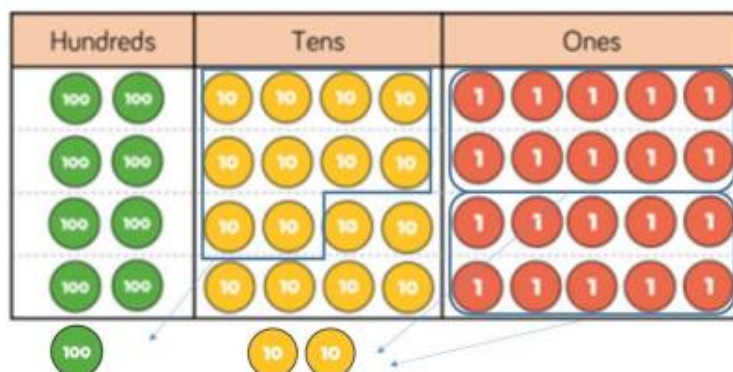
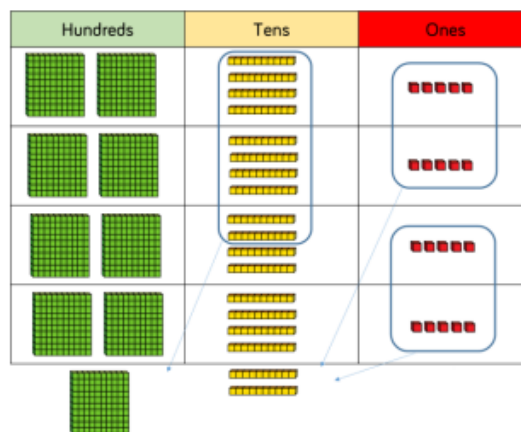
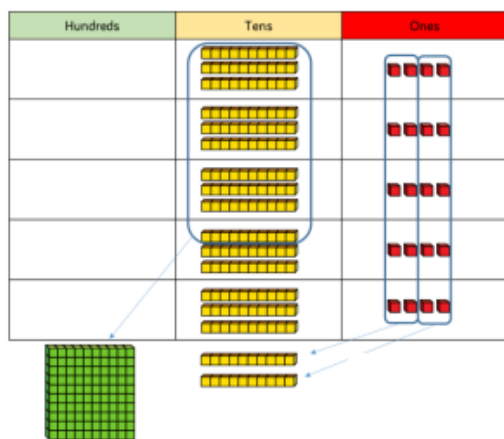
Multiply 4-digit numbers by 2-digit numbers

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

If they are still struggling with times tables, provided 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.

Progress on a page across Year 3, 4 and 5

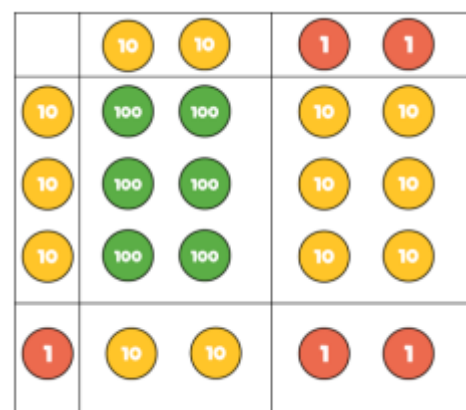


$$34 \times 5 = 170$$

$$245 \times 4 = 980$$



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



$$22 \times 31 = 682$$

	H	T	O	
		3	4	
x			5	
	1	7	0	
	1	2		

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

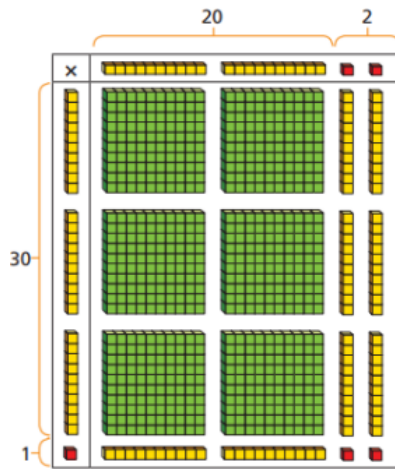
	Th	H	T	O
	1	8	2	6
x				3
	5	4	7	8
	2		1	

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

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

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

x	20	2
30	600	60
1	20	2



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

DIVISION

Year	Skill	Representation and model
1/2	Solve one-step problems with division (sharing and grouping) Divide 2-digit by 1-digit numbers (sharing no exchange)	Bar model
		Real life objects
		Counters
		Arrays
		Bead strings
		Number lines
3/4	Divide 2-digits by 1-digit (sharing with exchange) Divide 2-digits by 1-digit numbers (sharing with remainders)	Place value counters
		Base 10
		Straws
		Bar model
		Part-whole model
4	Divide 3-digits by 1-digit (sharing with exchange)	Base 10
		Bar model
		Place value counters
		Part-whole model
4/5	Divide 2-digits by 1-digit (grouping)	Place value counters
		Place value grid
		Counters
		Written short division
5	Divide 3-digits by 1-digit (grouping) Divide 4-digits by 1-digit (grouping)	Place value counters
		Place value grid
		Counters
		Written short division
6	Divide multi-digits by 2-digits (short division)	Written short division
		Written long division
	Divide multi-digits by 2-digits (long division)	List of multiples

Division in Year 1 and 2

Solve 1-step problems using multiplication (sharing and grouping)

Children solve problems by sharing amounts in two equal groups.

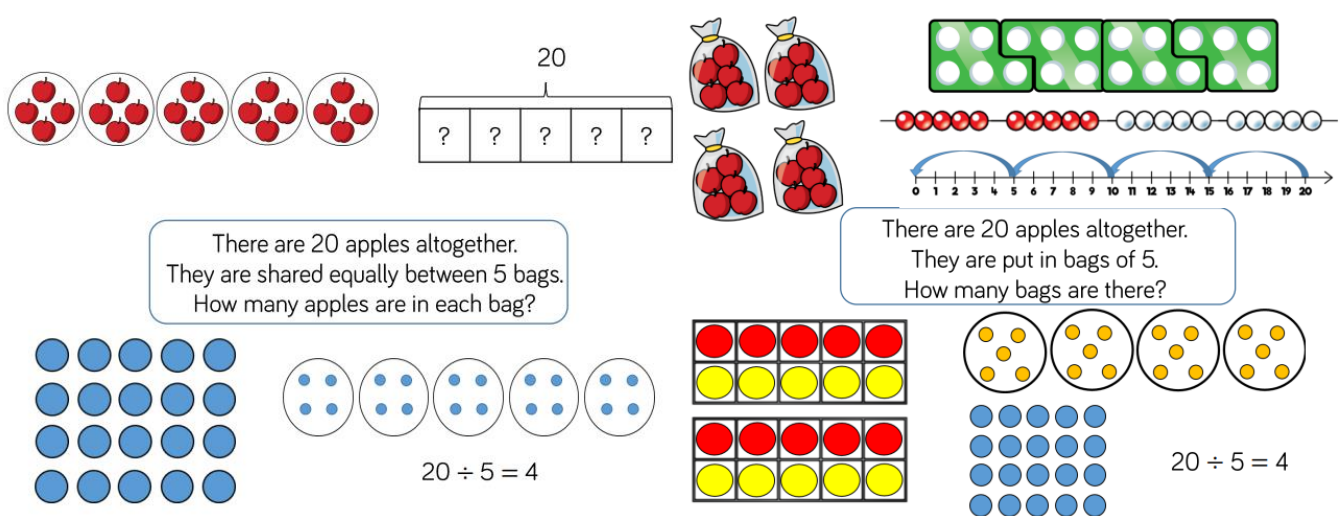
In year one, children use concrete and pictorial representations to solve problems. They are not expected to record division formally.

In year 2, children are introduced to the division symbol.

Children solve problems by grouping and counting the number of groups.

Groupings encourage children to count in multiples and links to repeated subtraction on a number line.

They can use concrete representations in fixed groups such as number shapes which helps to show the link between multiplication and division.



Divide 2-digits by 1-digit (sharing with no exchange)

When dividing larger numbers, children can use manipulatives that allow them to partition into tens and ones.

Straws, Base 10 and place value counters can all be used to share numbers into equal groups.

Part whole models can provide children with a clear written method that matches the concrete representation.

Division in Year 3

Divide 2-digits by 1-digit (sharing with exchange)

When dividing numbers involving an exchange, children can use Base 10 and place value counters to exchange one ten for ten ones.

Children should start with the equipment outside the place value grid before sharing the tens and ones equally between the rows.

Flexible partitioning in a part-whole model supports this method.

Divide 2-digits by 1-digit (sharing with remainders)

When dividing numbers with remainders, children can use Base 10 and place value counters to exchange one ten for ten ones.

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

Flexible partitioning in a part-whole model supports this method.

Division in Year 4

Divide 3-digits by 1-digit (sharing)

Children can continue to use place value counters to share 3-digit numbers into equal groups.

Children should start with the equipment outside the place value grid before sharing the hundreds tens and ones equally between the rows.

This method can also help highlight remainders.

Flexible partitioning and a part-whole model supports this method.

Division in Year 4/5

Divide 2-digits by 1-digit (grouping)

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 four tens can we make?' and 'How many groups of four ones can we make?'

Remainders can also be seen as they are left ungrouped.

Division in Year 5

Divide 3-digits by 1-digit (grouping)

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

Place value counters or plain counters can be used on a place value grid to support this understanding. Children can also draw their own counters and group them through a more pictorial method.

Divide 4-digits by 1-digit (grouping)

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

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

Division Year 6

Divide multi digits by 2-digits (short division)

When children begin to divide up to four digits by two digits, written methods become the most accurate as concrete and pictorial representations become less effective.

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

Children will also solve problems with remainders where the quotient can be rounded as appropriate.

Divide multi digits by 2-digits (long division)

Children can also divide by 2-digit numbers using long division.

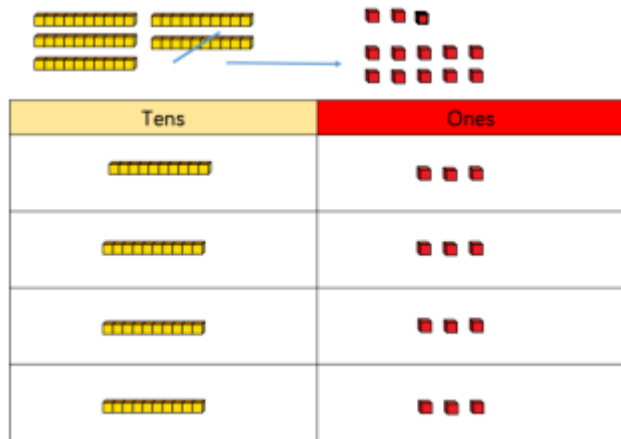
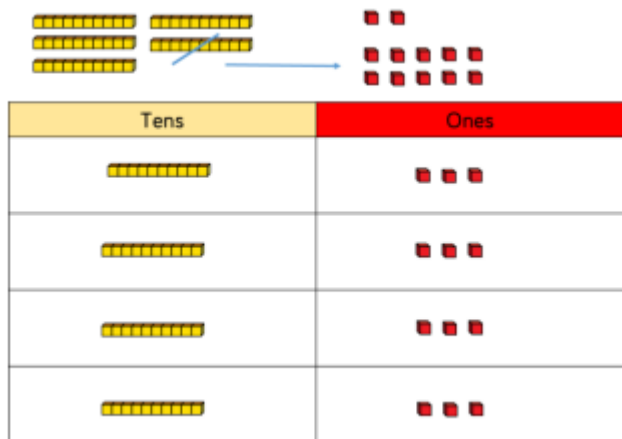
Children can write out multiples to support their calculations with larger remainders.

Children will also solve problems with remainders where the quotient can be rounded as appropriate.

When a remainder is left at the end of a calculation, children can either leave it as a remainder or convert it into a fraction. This will depend on the context of the question.

Children can also answer questions where the quotient needs to be rounded according to the context.

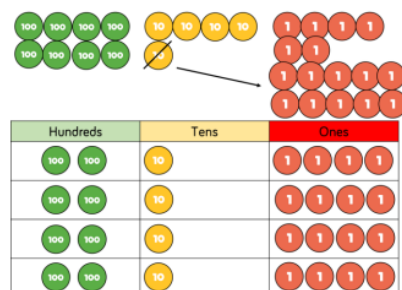
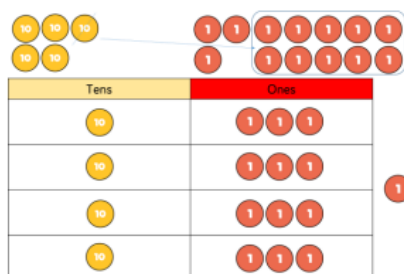
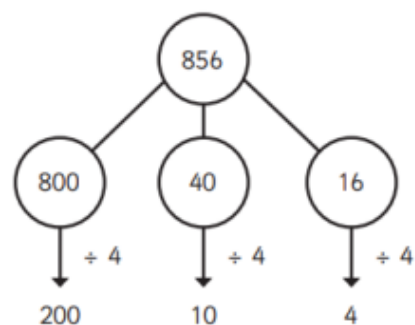
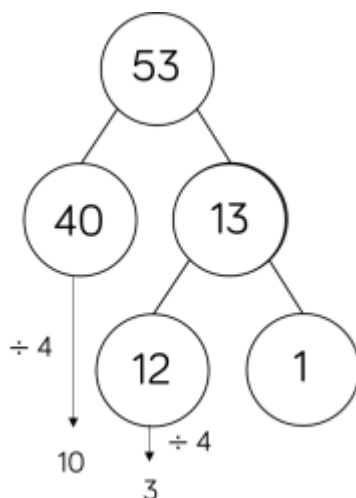
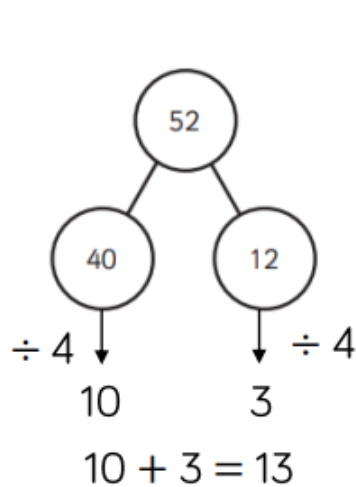
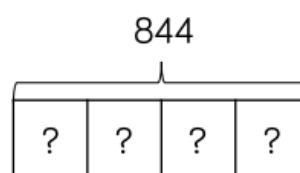
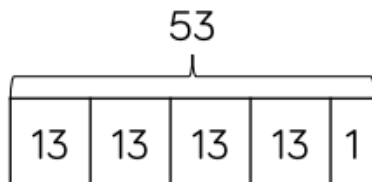
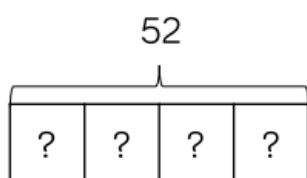
Progress on a page across Year 3 and 4



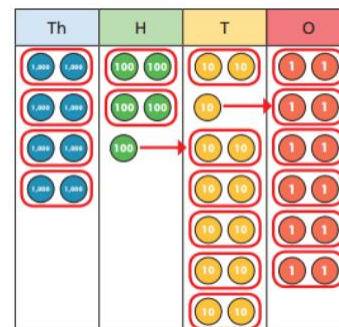
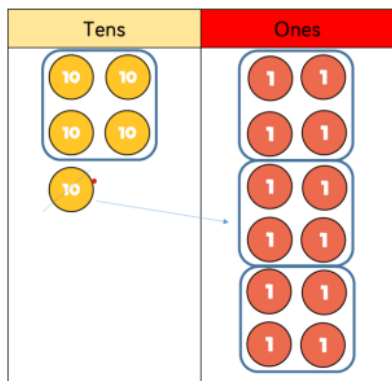
$$52 \div 4 = 13$$

$$53 \div 4 = 13 \text{ r}1$$

$$844 \div 4 = 211$$



Progress on a page across Year 5 and 6



$$52 \div 4 = 13$$

$$856 \div 4 = 214$$

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

		2	1	4
	4	8	5	16

	4	2	6	6
2	8	5	13	12

		0	3	6
	12	4	43	72

	0	4	8	9
15	7	73	133	135

		0	3	6
1	2	4	3	2
	-	3	6	0
			7	2
	-		7	2
				0

- 12 × 1 = 12
- 12 × 2 = 24
- 12 × 3 = 36
- 12 × 4 = 48
- 12 × 5 = 60
- 12 × 6 = 72
- 12 × 7 = 84
- 12 × 8 = 96
- 12 × 9 = 108
- 12 × 10 = 120

		0	4	8	9
15	7	3	3	5	
-	6	0	0	0	
	1	3	3	5	
-	1	2	0	0	
		1	3	5	
-		1	3	5	
				0	

- 1 × 15 = 15
- 2 × 15 = 30
- 3 × 15 = 45
- 4 × 15 = 60
- 5 × 15 = 75
- 10 × 15 = 150

$$432 \div 12 = 36$$

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

$$372 \div 15 = 24 \text{ r}12$$

			2	4	r	1	2
1	5	3	7	2			
	-	3	0	0			
			7	2			
	-		6	0			
			1	2			

- 1 × 15 = 15
- 2 × 15 = 30
- 3 × 15 = 45
- 4 × 15 = 60
- 5 × 15 = 75
- 10 × 15 = 150

			2	4	⁴ / ₅
1	5	3	7	2	
	-	3	0	0	
			7	2	
	-		6	0	
			1	2	

$$372 \div 15 = 24 \frac{4}{5}$$

Glossary

Addend – a number to be added to another.

Aggregation – combining two or more quantities or measures to find a total.

Array – An ordered collection of counters, cubes or other item in rows and columns.

Augmentation – increasing a quantity or measure by another quantity.

Commutative - numbers can be added in any order.

Complement – in addition, a number and its complement make a total e.g. 300 is the complement to 700 to make 1,000.

Difference – the numerical difference between two numbers is found by comparing the quantity in each group.

Dividend – In division, the number that is divided.

Divisor – In division, the number by which another is divided.

Exchange - change a number or expression for another of an equal value.

Factor – A number that multiplies with another to make a product.

Minuend – a quantity or number from which another is subtracted.

Multiplicand – In multiplication, a number to be multiplied by another.

Partitioning – splitting a number into its component parts.

Product – The result of multiplying one number by another.

Quotient – The result of a division.

Reduction – subtraction as a take away.

Remainder – The amount left over after a division when the divisor is not a factor of the dividend.

Scaling – Enlarging or reducing a number by a given amount, called the scale factor.

Subitise – instantly recognise the number of objects in a small group without needing to count.

Subtrahend – a number to be subtracted from another.

Sum – the result of an addition.

Total – the aggregate or the sum found by addition.