



Calculation Policy 2022

Division

Teaching for Mastery Calculation Policy

The aims of the policy

Mastery is for all children, and the aim of this policy is to ensure children leave Springwell Park with a secure understanding of the four operations and can confidently use both mental and written strategies in a range of contexts. It aims to ensure consistent strategies, model and images are used across our school to embed and deepen children's learning and understanding of mathematical concepts so children can:

- Become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils have conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems.
- **Reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.
- **Solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

How should this policy be used?

This policy is to support the teaching and planning of mathematics. This policy set out the progression of strategies and written methods children will be taught to develop their understanding of the four operations. Strategies set out in a Concrete, Pictorial and Abstract (CPA) approach to develop children's deep understanding and mastery of mathematical concepts. Children can use concrete objects to help them make sense of the concept or problem; this could be anything from real or plastic fruit, to straws, counters or cubes. This is then developed through the use of images, models and children's own pictorial representations before moving on to the abstract mathematics. Children will travel along the continuum again and again, often revisiting previous stages when a concept is extended. It is also worth noting that if a child has moved on from concrete to pictorial, it does not mean that the concrete cannot be used alongside the pictorial. Or if a child is working in the abstract, 'proving' something or 'working out' could involve use of the concrete or pictorial therefore building on prior learning. Then as children become more independent, they will be able to and encouraged to select strategies which are most efficient for the activity.

The strategies are separated into the 4 operations for easy reference. However, it is expected that addition and subtraction, and multiplication and division will be taught after each other to ensure that children are making connections and seeing relationships in their mathematics.

Children should be moved through the strategies at a pace appropriate to their age-related expectations as defined in the EYFS and National Curriculum. Teaching of the strategies rely on good levels of number sense, fluency and ability to reason mathematically. Children need to be supported to gain depth of understanding within the strategy through the CPA approach and not learn strategies as a procedure.

Division

Nursery and Reception

By the end of Reception, children are expected to understand the concept of halving and sharing. Before this can be introduced, children need to have a secure knowledge of counting backwards, number facts and subtraction in order to halve and share. Children are then introduced to the concept of halving and sharing through practical games and activities. They act out 'halving and sharing' through activities such as sharing food for their Teddy Bear's Picnic, sharing resources equally to play a game. This is reinforced by opportunities provided in the outdoor area for the children to halve and share out objects such as building blocks, twigs etc.



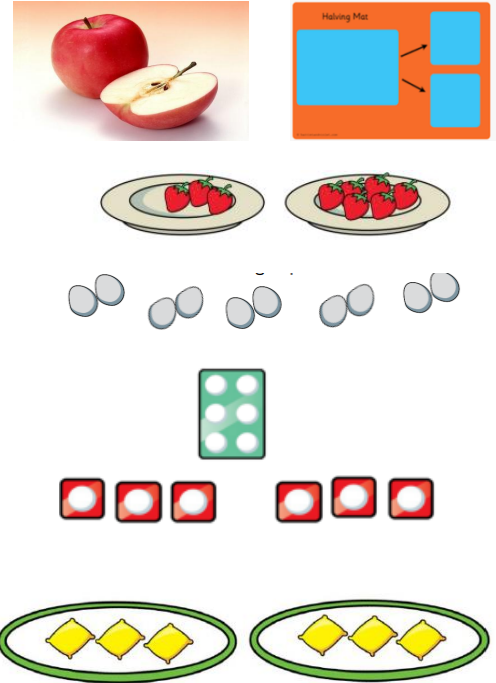
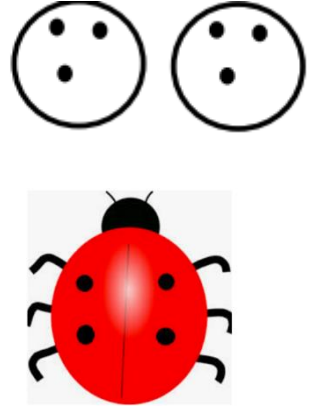
EYFS

ELG Number Children at the expected level of development will:

Have a deep understanding of number to 10, including the composition of each number, subitise (recognise quantities without counting) up to 5, automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts

ELG Numerical Patterns Children at the expected level of development will:

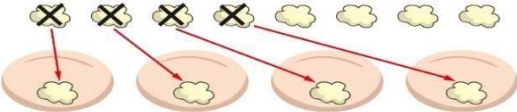

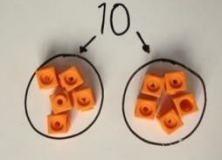
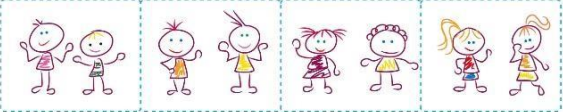


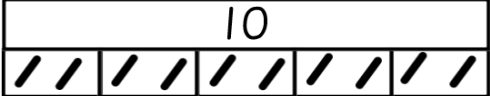

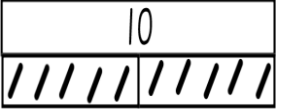
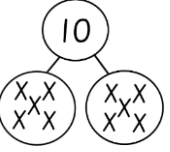
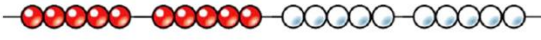
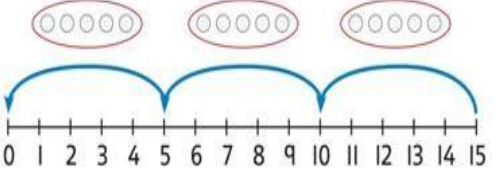
Verbally count beyond 20, recognising the pattern of the counting system, compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity, explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed

	Concrete	Pictorial	Abstract
<p data-bbox="114 225 479 261">Sharing and Grouping</p> <p data-bbox="76 352 517 483">The children will probably already have some experience of sharing and will be quick to point out when items are not shared fairly.</p> <p data-bbox="76 488 517 890">During snack time or group activities, encourage them to check that the items are shared equally and that everyone has the same. The children should also be given opportunities to recognise and make equal groups. For example can you put 3 crackers on each plate or plant 2 flowers into each pot. What groups do they notice on a bead string?</p> <p data-bbox="76 927 517 1126">The children will notice that sometimes there are items left over when they share or group. Encourage them to come up with their own suggestions for how to resolve this.</p>			<p data-bbox="1727 288 2024 336">Half of 6 is 3</p> <p data-bbox="1727 408 2024 456">Half of 4 is 2</p>

Year 1

Pupils should be taught to:




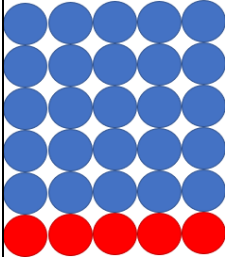
- solve one-step problems involving division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher

	Concrete	Pictorial	Abstract
<p>Division as sharing</p> <p>Children solve problems by sharing amounts into equal groups.</p> <p>In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record division formally.</p>	<p>8 shared between 4.</p>   <p>I have 10 cubes, can you share them equally in 2 groups?</p> 	<p>Sketch or draw to represent sharing into equal parts. This may be related to fractions.</p> <p>8 shared between 4</p>  <p>8 shared between 2</p> 	<p>Children to use STEM sentences to explain the process of sharing into equal parts.</p> <p>10 shared into 2 equal groups gives 5 in each group.</p> <p>If I share 24 sweets with my friend, we will get 12 sweets each.</p>
<p>Division as grouping</p>	<p>Make equal groups from a whole and find how many equal groups of a certain size can be made.</p>  <p>There are 10 children altogether. There are 2 in each group. There are 5 groups.</p> 	<p>Represent a whole and work out how many equal groups</p>    	<p>Children may relate this to counting back in steps of 2, 5 or 10.</p> 

Year 2

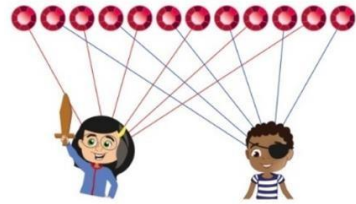
Pupils should be taught to:

- recall and use division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for division within the multiplication tables and write them using the division (\div) and equals (=) signs
- solve problems involving division, using materials, arrays, repeated addition, mental methods, and division facts, including problems in contexts

	Concrete	Pictorial	Abstract																				
Recall and use facts for 2, 5 and 10	<p>Count objects in groups (2, 5 and 10)</p>   	<p>Use images to show facts of 2, 5 and 10</p>  <table border="1" data-bbox="1167 884 1545 1023"> <tr> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>2</td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p>20</p> <table border="1" data-bbox="1128 1134 1594 1256"> <tr> <td colspan="5" style="text-align: center;">}</td> </tr> <tr> <td>?</td> <td>?</td> <td>?</td> <td>?</td> <td>?</td> </tr> </table>	2	2	2	2	2	2					}					?	?	?	?	?	<p> $2 \times 5 =$ use facts to show inverse $5 \times 2 = 10$ $10 \div 2 = 5$ $10 \div 5 = 2$ 2 is a factor of 10 5 is a factor of 10 10 is a multiple of 2 and 5 </p>
2	2	2	2	2																			
2																							
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?	?	?	?	?																			

Sharing equally

Start with a whole and share into equal parts, one at a time.



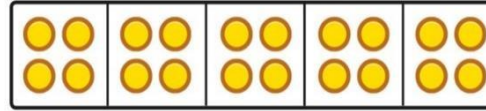
Understand how this relates to grouping. To share equally between 3 people, take a group of 3 and give them 1 at a time.



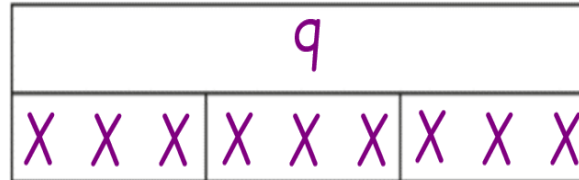
15



Use bar models to represent objects shared into equal parts.



20 shared into 5 equal parts.
There are 4 in each part.

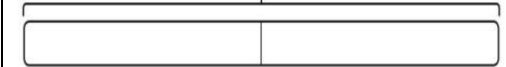


9 shared into 3 equal parts.
There are 3 in each part.

Draw bar models to support understanding of the division.



18

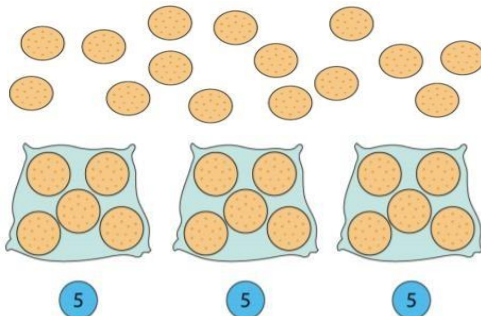


$$18 \div 2 = 9$$

Grouping equally

Children solve problems by grouping and counting the number of groups. Grouping encourages children to count in multiples and links to repeated subtraction on a number line. They

Understand how to make groups from a whole.



Use grouping to link to the written division statements.

$$12 \div 3 = 4$$



$$12 \div 4 = 3$$



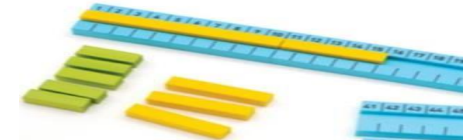
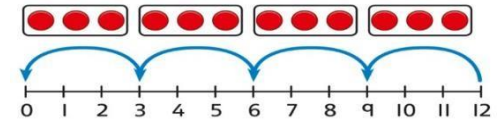
$$12 \div 6 = 2$$



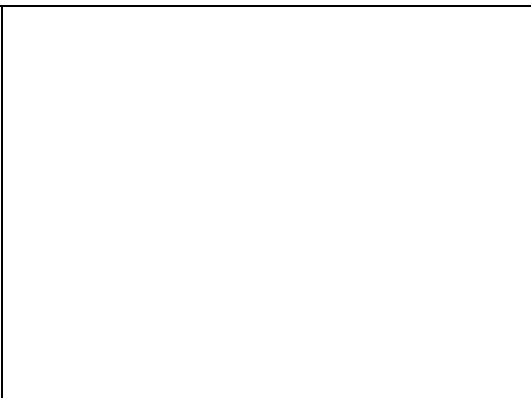
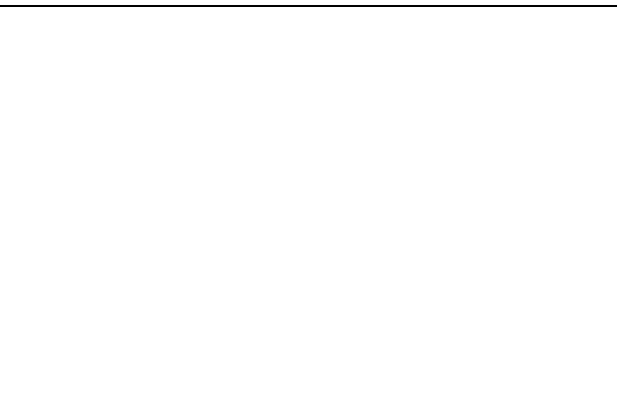
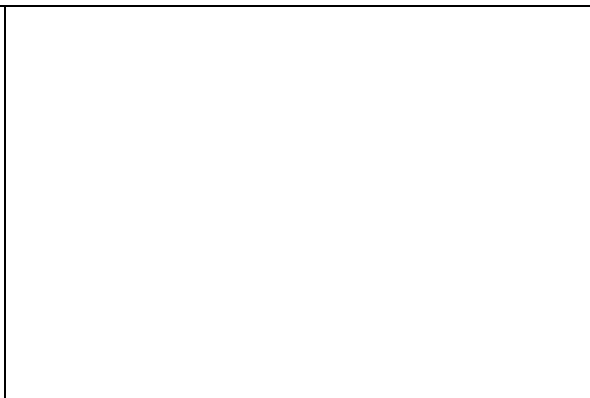
$$12 \div 2 = 6$$



Understand the link between division and repeated subtraction.

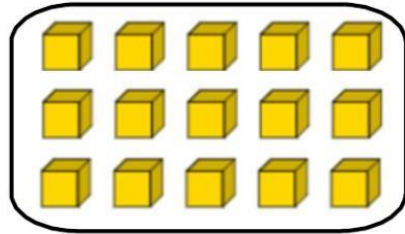


can use concrete representations in fixed groups such as number shapes which helps to show the link between multiplication and division.



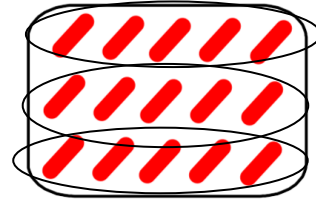
Division as arrays

Link division to multiplication by creating arrays.

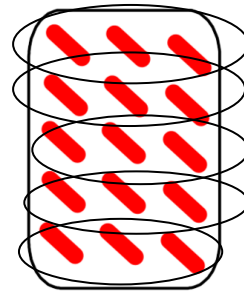


I can see...
15 divided into 3 groups is 5
15 shared between 5 is 3

Draw representations of arrays.



15 divided by groups of 5 = 3
15 divided into 3 equal parts = 5



15 divided into groups of 3 = 5
15 divided into 5 equal parts = 3

Use inverse and fact families to find linking number sentences.

$$20 \div 10 = 2 \quad 2 \times 10 = 20$$

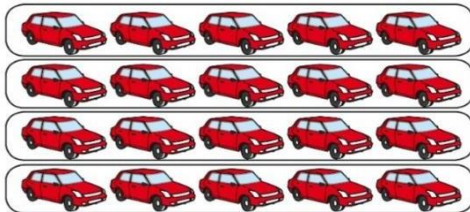
$$20 \div 2 = 10 \quad 10 \times 2 = 20$$

$$2 = 20 \div 10 \quad 20 = 2 \times 10$$

$$10 = 20 \div 2 \quad 20 = 10 \times 2$$

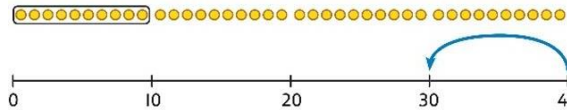
Use known times tables to solve divisions.

Understand the relationship between multiplication and division.



4 groups of 5 cars are 20 cars in total.
20 divided by 4 is 5.

Link equal grouping with repeated subtraction and known times-table facts to support division.



40 divided by 4 is 10.

Relate times-table knowledge directly to division.

$$1 \times 10 = 10$$

$$2 \times 10 = 20$$

$$3 \times 10 = 30$$

$$4 \times 10 = 40$$

$$5 \times 10 = 50$$

$$6 \times 10 = 60$$

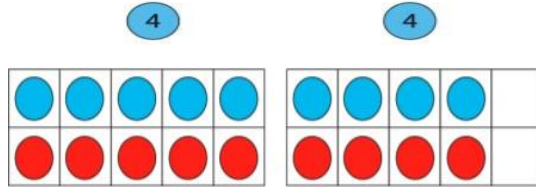
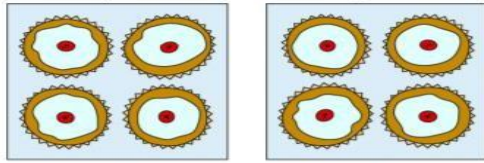
$$7 \times 10 = 70$$

$$8 \times 10 = 80$$

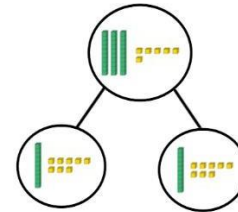
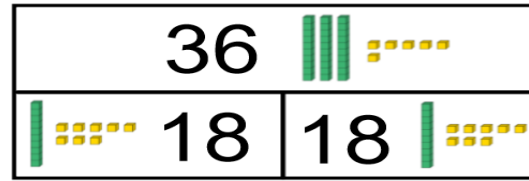
I know that 3 groups of 10 makes 30, so I know that 30 divided by 10 is 3.

Halving

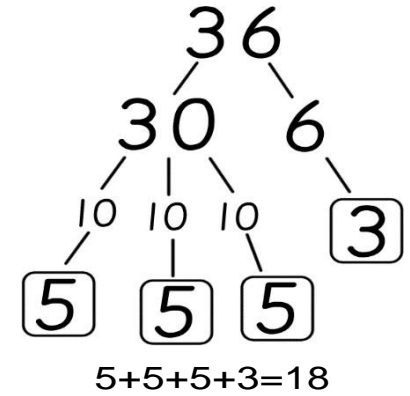
Use manipulatives to show relationship between halving and dividing by 2.



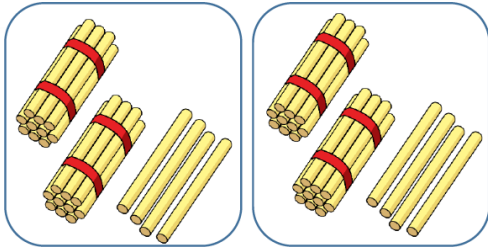
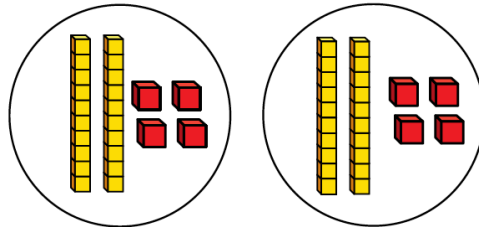
Use images including bar models and part whole models.



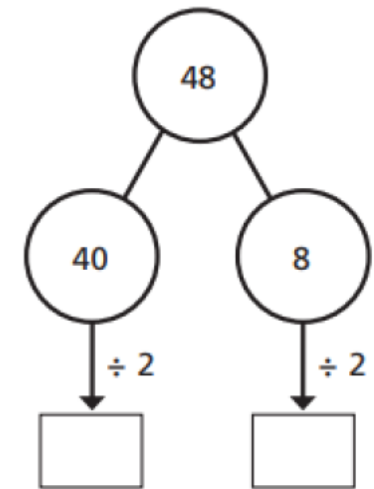
Partition 2-digit numbers to half.



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



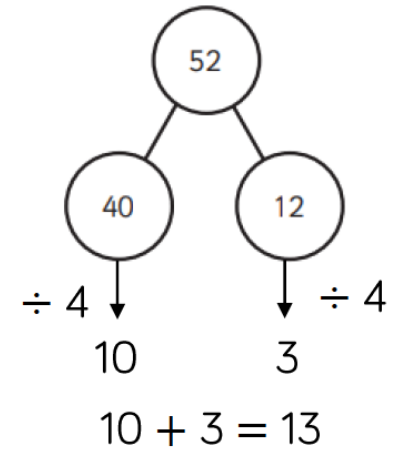
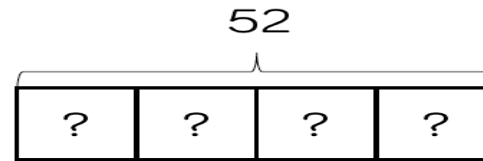
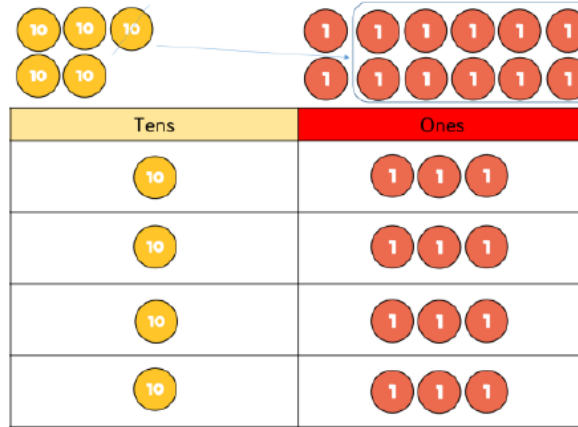
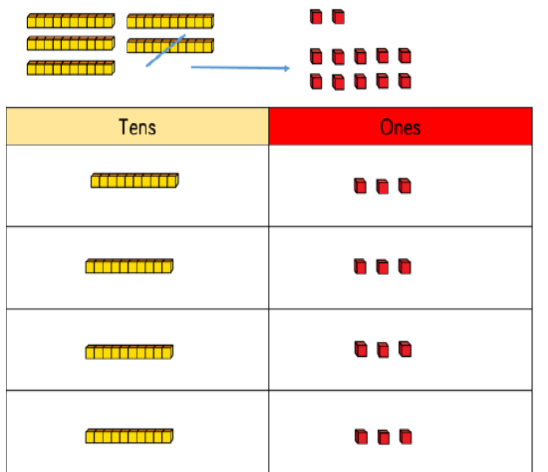
Tens	Ones
10 10	1 1 1 1
10 10	1 1 1 1



$$48 \div 2 = 24$$

Divide 2 digits by 1 digit (sharing with 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.


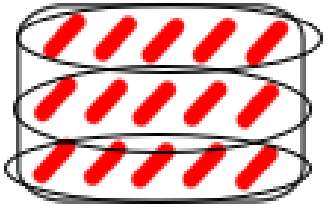
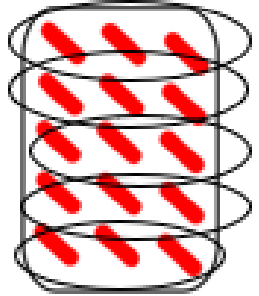


$52 \div 4 = 13$

Year 3

Pupils should be taught to:

- recall and use division facts for the 3, 4 and 8 multiplication tables
- write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- solve problems, including missing number problems, involving division, including positive integer scaling problems and correspondence problems in which objects are connected to objects

	Concrete	Pictorial	Abstract
Recall and use facts for 3, 4 and 8	Count objects in groups (3, 4 and 8) 	 <p>15 divided by groups of 5 = 3 15 divided into 3 equal parts = 5 $1/3$ of 15 = 5</p>  <p>15 divided into groups of 3 = 5 15 divided into 5 equal parts = 3 $1/5$ of 15 = 3</p>	$3 \times 4 =$ use facts to show inverse $4 \times 3 = 12$ $12 \div 4 = 3$ $12 \div 3 = 4$ 3 is a factor of 12 4 is a factor of 12 12 is a multiple of 3 and 4

Use images to show facts of 3, 4 and 8



3	3	3	3	3
3	3	3		

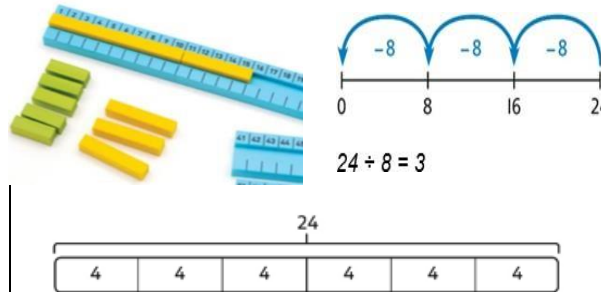
Using times-
tables
knowledge to
divide

Use knowledge of known times-
tables to calculate divisions.



24 divided into groups of 8.
There are 3 groups of 8.

Use arrays, bars and number lines
to support division.



Use inverse and fact families
to find linking number
sentences.

$$5 \times 9 = 45 \quad 45 \div 9 = 5$$

$$9 \times 5 = 45 \quad 45 \div 5 = 9$$

$$45 = 9 \times 5 \quad 5 = 45 \div 9$$

$$45 = 5 \times 9 \quad 9 = 45 \div 5$$

Understanding
remainders

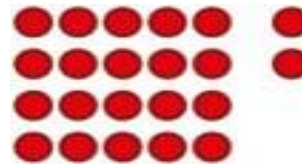
Use equipment to understand
that a remainder occurs when a
set of objects cannot be divided
equally any further.



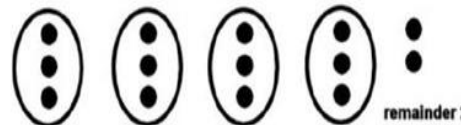
There are 13 sticks in total.
There are 3 groups of 4, with 1 remainder.



Use images to explain remainders.



$$22 \div 5 = 4 \text{ remainder } 2$$



Understand that the
remainder is what cannot be
shared equally from a set.

$$22 \div 5 = ?$$

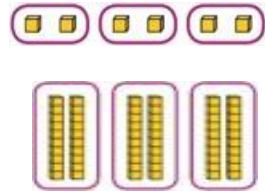
5	5	5	5		
					2

$$29 \div 8 = 3 \text{ REMAINDER } 5$$

↑ ↑ ↑ ↑
dividend divisor quotient remainder

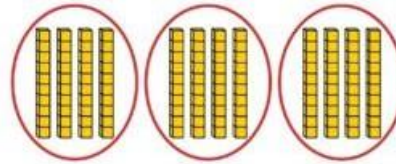
Using known facts to divide multiples of 10

Use place value equipment to understand how to divide by unitising



Show 6 ones divided by 3 and 6 tens divided by 3. What is the same / different?

Divide multiples of 10 by unitising.



12 tens shared into 3 equal groups.
4 tens in each group.

Divide multiples of 10 by a single digit using known times-tables.

$$180 \div 3 = ?$$

180 is 18 tens.

18 divided by 3 is 6.

18 tens divided by 3 is 6 tens.

$$18 \div 3 = 6$$

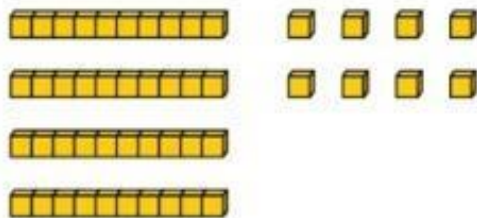
$$180 \div 3 = 60$$

2-digit number divided by 1- digit number

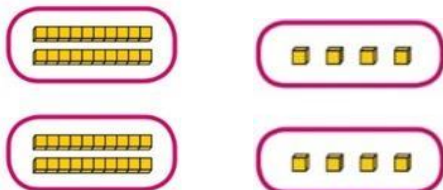
When dividing numbers involving an exchange, children can use Base 10 and place value counters to exchange one ten for ten ones. Children should start with the equipment outside the place value grid before sharing the tens and ones equally between the rows. Flexible partitioning in a part-whole model supports this method.

Children explore dividing 2-digit numbers by using place value equipment.

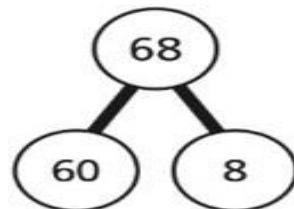
$$48 \div 2$$



Divide the tens and then the ones

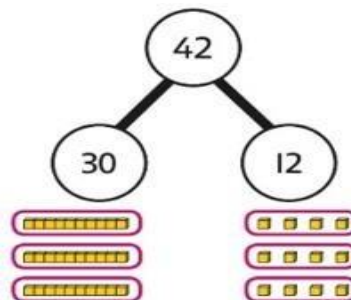


Children explore how to partition a number into 10s and 1s to divide where appropriate.



$$\begin{aligned} 60 \div 2 &= 30 \\ 8 \div 2 &= 4 \\ 30 + 4 &= 34 \\ 68 \div 2 &= 34 \end{aligned}$$

Use the divisor and knowledge of times tables to partition appropriately.



$$42 = 30 + 12$$

$$42 \div 3 = 14$$

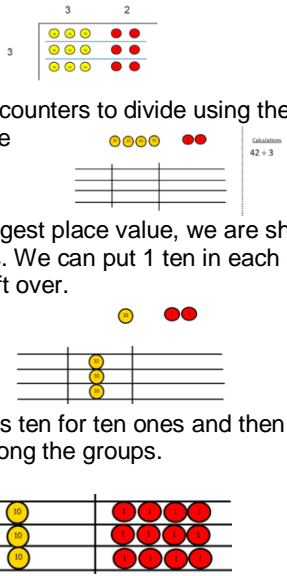
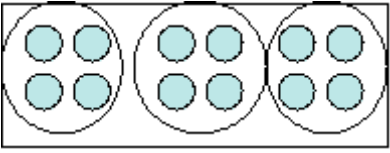


Children use the chunking method alongside manipulatives.

$$\begin{array}{r} 3 \overline{) 27} \\ \underline{15} \\ 12 \\ \underline{12} \\ 0 \end{array}$$

$1 \times 3 = 3$
 $2 \times 3 = 6$
 $5 \times 3 = 15$
 $10 \times 3 = 30$
 $20 \times 3 = 60$

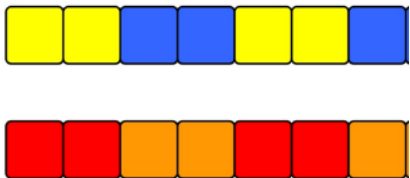
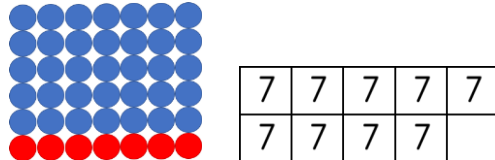
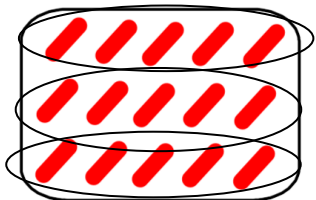
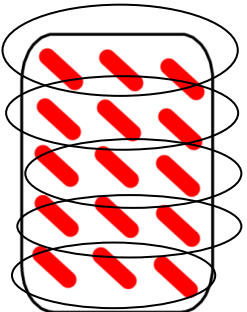
$$5 + 4 = 9$$

$$27 \div 3 = 9$$

	<p style="text-align: center;">Tens Ones</p>  <p>Use place value counters to divide using the bus stop method alongside</p> <p>$42 \div 3 =$</p> <p>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.</p> <p>We exchange this ten for ten ones and then share the ones equally among the groups.</p> <p>We look how much in 1 group so the answer is 14.</p>	<p>Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.</p>  <p>Encourage them to move towards counting in multiples to divide more efficiently.</p> <p>$12 \div 4 =$ " 4 8 12" (3 times)</p>	<p>Begin with divisions that divide equally with no remainder.</p> $\begin{array}{r} 1 \quad 2 \\ 4 \overline{) 4 \quad 8} \end{array}$ <p>Move onto divisions with a remainder.</p> $\begin{array}{r} 1 \quad 2 \quad r \quad 1 \\ 4 \overline{) 4 \quad 9} \end{array}$
<p>2-digit number divided by 1-digit number, with remainders</p> <p>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 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.</p>	<p>Use place value equipment to understand the concept of remainder.</p> <p>Make 29 from place value equipment. Share it into 2 equal groups.</p>  <p>There are two groups of 14 and 1 remainder.</p>	<p>Use place value equipment to understand the concept of remainder in division.</p> <p>$29 \div 2 = ?$</p>  <p>$29 \div 2 = 14$ remainder 1</p>	<p>Partition to divide, understanding the remainder in context.</p> <p>67 children try to make 5 equal lines.</p> <p>$67 = 50 + 17$ $50 \div 5 = 10$</p> <p>$17 \div 5 = 3$ remainder 2 $67 \div 5 = 13$ remainder 2</p> <p>There are 13 children in each line and 2 children left out.</p>

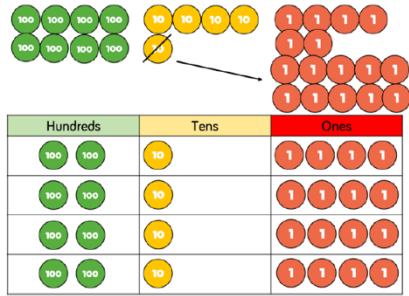
Pupils should be taught to:

- recall division facts for multiplication tables up to 12×12
- use place value, known and derived facts to divide mentally
- recognise and use factor pairs and commutativity in mental calculations
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by 1 digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects

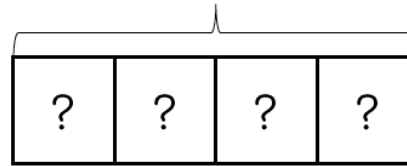
	Concrete	Pictorial	Abstract
<p>Recall and use facts for all numbers 12x12</p>	<p>Count objects in groups (7, 9, 11 and 12)</p> 	<p>Use images to show facts of 7, 9, 11 and 12</p>  <p>Draw representations of arrays.</p>  <p>15 divided by groups of 5 = 3 15 divided into 3 equal parts = 5 $\frac{1}{3}$ of 15 = 5</p> 	<p>7 X 6 = use facts to show inverse $6 \times 7 = 42$ $42 \div 6 = 7$ $42 \div 7 = 6$ 6 is a factor of 42 7 is a factor of 42 42 is a multiple of 6 and 7</p>

15 divided into groups of 3 = 5
 15 divided into 5 equal parts = 3
 $1/5$ of 15 = 3

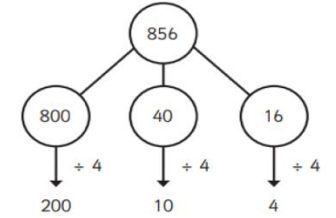
Division $TO \div O$



844



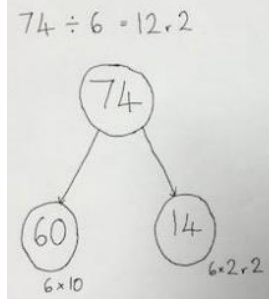
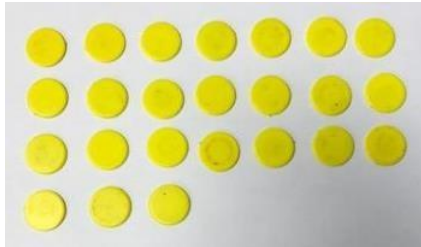
$844 \div 4 = 122$



Division $TO \div O$

Including remainders

$24 \div 7 = 3 \text{ r } 3$

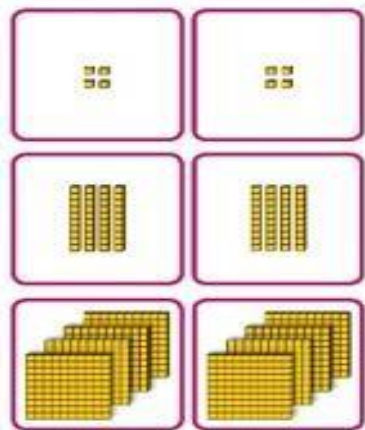


$43 \div 7 = 6 \text{ r }$

$\div 9 = 5 \text{ r } 2$

**Dividing
multiples of 10
and 100 by a
single digit**

Use place value equipment to understand how to use unitising to divide.

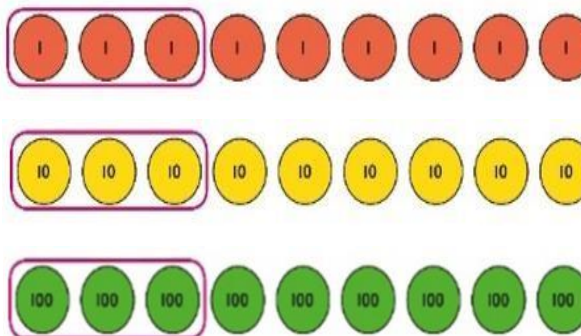


8 ones divided into 2
equal groups
4 ones in each group

8 tens divided into 2
equal groups
4 tens in each group

8 hundred divided into 2
equal groups
4 hundred in each group

Represent divisions using place value equipment.



$$9 \div 3 = 3$$

$$90 \div 3 = 30$$

$$900 \div 3 = 300$$

Use known facts to divide 10s and 100s by a single digit.

$$15 \div 3 = 5$$

$$150 \div 3 = 50$$

$$1500 \div 3 = 500$$

$$30 \div 5 = 6$$

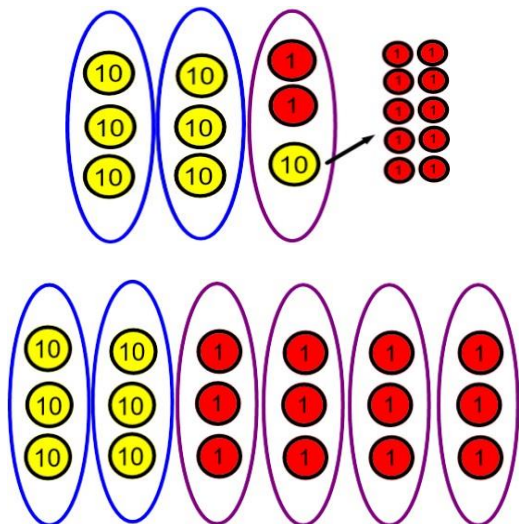
$$300 \div 5 = 60$$

$$3000 \div 5 = 600$$

Dividing 2-digit and 3-digit numbers by a single digit

Children use place value equipment to partition the dividend.

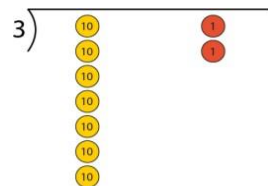
$$72 \div 3$$



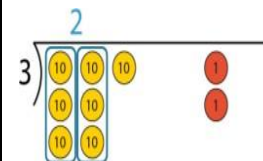
Use place value equipment to support the short method (bus stop) for division.

$$72 \div 3 = 24$$

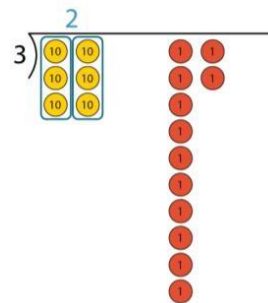
Step 1



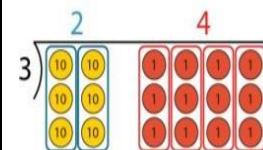
Step 2



Step 3



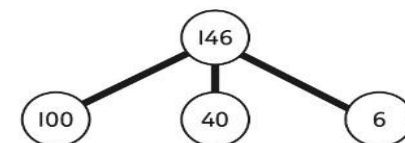
Step 4



Use times table knowledge to support the short method (bus stop) for division.

$$\begin{array}{r} 24 \\ 3 \overline{) 72} \end{array}$$

$142 \div 2 = ?$



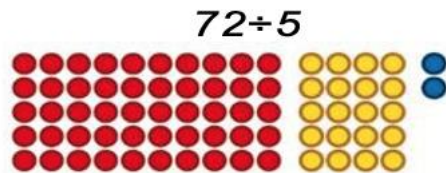
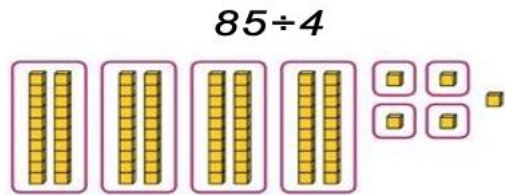
$100 \div 2 = \square$ $40 \div 2 = \square$ $6 \div 2 = \square$

$$\begin{array}{r} 153 \\ 4 \overline{) 612} \end{array}$$

Understanding remainders

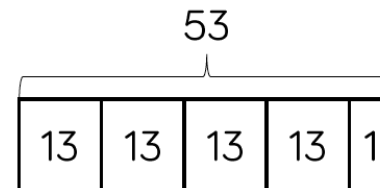
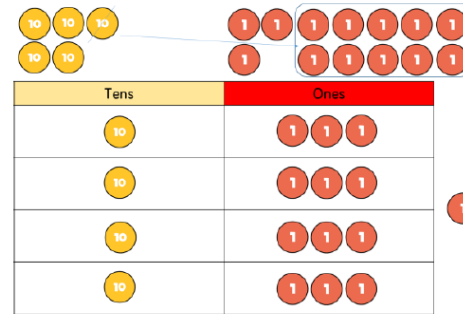
When dividing numbers with remainders, children can use Base 10 and place value counters to exchange one ten for ten ones. Starting with the equipment outside the place value grid will highlight remainders, as they will be left outside the grid once the equal groups have been made. Flexible partitioning in a part-whole model supports this method.

Use equipment to represent the remainder as the part that cannot be shared equally.

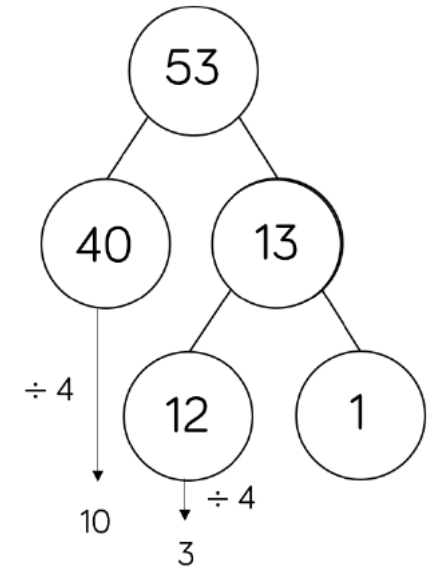


As above showing remainders clearly.

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



Use times table knowledge to support the short method (bus stop) for division.



$$\begin{array}{r} 2 \text{ } 4 \text{ r} 1 \\ 3 \overline{) 73} \end{array}$$

Answers can also be represented as fractions.

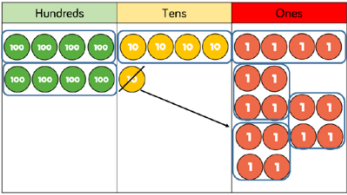
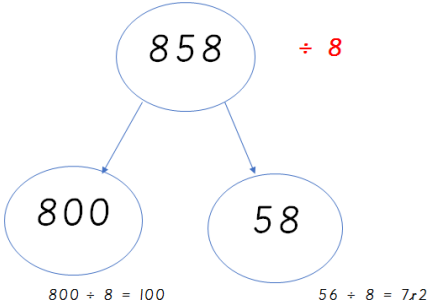
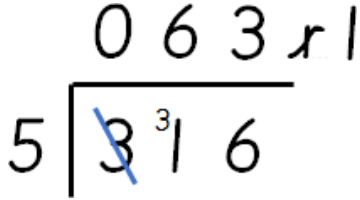
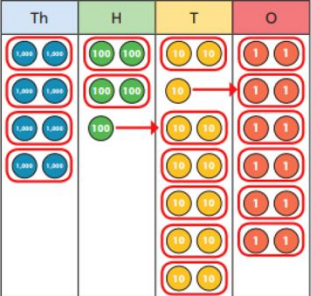
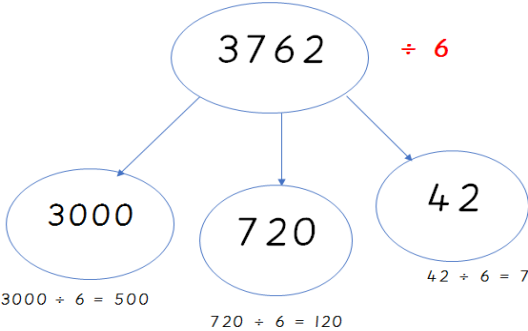
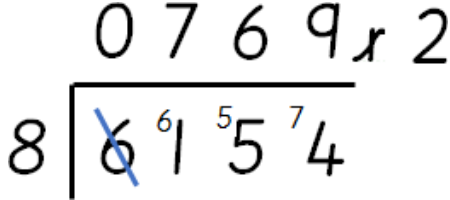
$$73 \div 3 = 24 \frac{1}{3}$$

$$\begin{array}{r} 1 \text{ } 1 \text{ } 4 \\ 4 \overline{) 4516} \end{array}$$

Year 5

Pupils should be taught to:

- divide numbers mentally, drawing upon known facts
- divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- divide whole numbers and those involving decimals by 10, 100 and 1,000
- solve problems involving division, including using their knowledge of factors and multiples, squares and cubes
- solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equal sign
- solve problems involving division, including scaling by simple fractions and problems involving simple rates

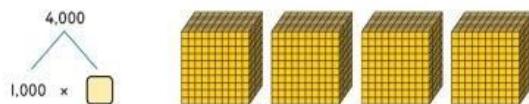
	Concrete	Pictorial	Abstract
Divide 3digit ÷ 1digit	<p>$856 \div 4 = 214$</p> 	<p>$858 \div 8 = 107 \text{ r } 2$</p>  <p>$800 \div 8 = 100$ $56 \div 8 = 7 \text{ r } 2$</p>	<p>$316 \div 5 = 63 \text{ r } 1$</p> 
Divide 4digit ÷ 1digit	<p>$8,532 \div 2 = 4,266$</p> 	<p>$3762 \div 6 = 627$</p>  <p>$3000 \div 6 = 500$ $720 \div 6 = 120$ $42 \div 6 = 7$</p>	<p>$6154 \div 8 = 769 \text{ r } 2$</p> 

Dividing whole numbers by 10, 100 and 1,000

Use place value equipment to support unitising for division.

$$4,000 \div 1,000$$

$$4,000 \div 1,000$$



4,000 is 4 thousands.

$$4 \times 1,000 = 4,000$$

$$\text{So, } 4,000 \div 1,000 = 4$$

Use a bar model to support dividing by unitising.

$$380 \div 10 = 38$$

Understand how and why the digits change on a place value grid when dividing by 10, 100 or 1,000.

$$3,200 \div 100 = ?$$

Th	H	T	O
3	2	0	0

3,200 is 3 thousand and 2 hundred.

$$200 \div 100 = 2$$

$$3,000 \div 100 = 30$$

$$3,200 \div 100 = 32$$

So, the digits will move two places to the right.

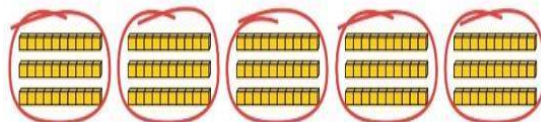
Dividing by multiples of 10, 100 and 1,000

Use place value equipment to represent known facts and unitising.

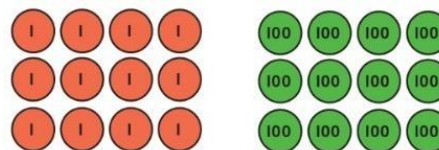
$$15 \div 3 = 5$$



$$150 \div 30 = 5$$



Represent related facts with place value equipment when dividing by unitising.



12 ones divided into groups of 4.

There are 3 groups.

12 hundred divided into groups of 4 hundred.

There are 3 groups.

$$1200 \div 400 = 3$$

1,000s	100s	10s	1s	0.1s	0.01s
1					
	1				
		1			
			1		
				1	
					1

Reason from known facts, based on understanding of unitising. Use knowledge of the inverse relationship to check.

$$3,000 \div 5 = 600$$

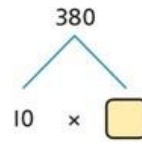
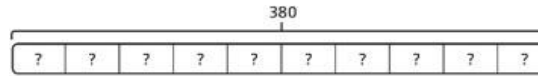
$$3,000 \div 50 = 60$$

$$3,000 \div 500 = 6$$

$$5 \times 600 = 3,000$$

$$50 \times 60 = 3,000$$

$$500 \times 6 = 3,000$$



380 is 38 tens.

$$38 \times 10 = 380$$

$$10 \times 38 = 380$$

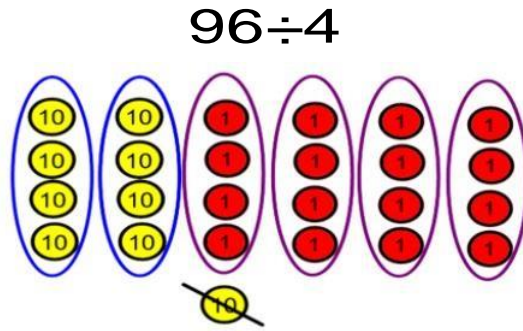
So, $380 \div 10 = 38$

Dividing up to four digits by a single digit using short division

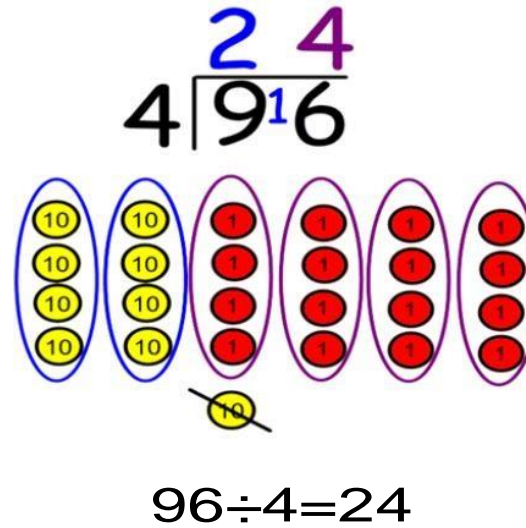
When using the short division method, children use grouping. Starting with the largest place value, they group by the divisor.

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?' Remainders can also be seen as they are left ungrouped.

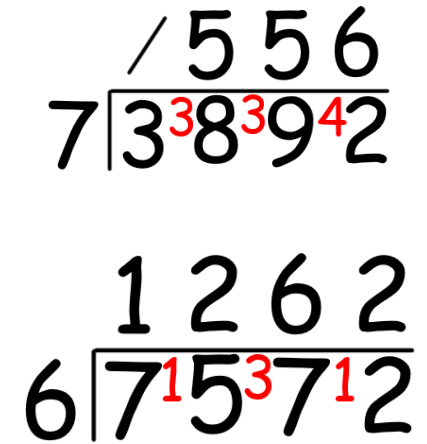
As year 4. Use place value equipment with increasingly large numbers.



As year 4. Use short with increasingly large numbers.



Use short method (bus stop) for up to 4 digit numbers divided by a single digit.



Use multiplication to check.

Understanding remainders

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

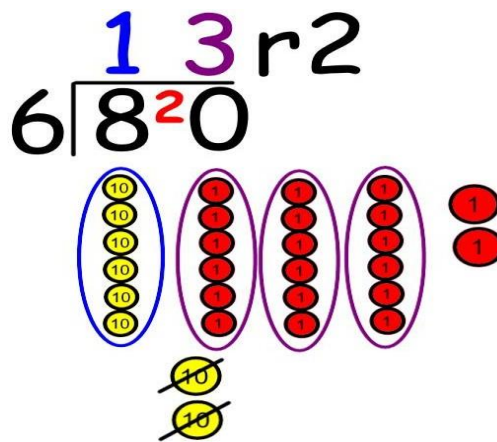
Use equipment to represent the remainder as the part that cannot be shared equally.

80 cakes divided into trays of 6.



They make 13 groups of 6, with 2 remaining.

As above. Use short method (bus stop) showing remainders clearly.



Use short method (bus stop) showing remainders in various ways.

With r $6 \overline{) 820}^{13r2}$

Fraction $6 \overline{) 820}^{13\frac{2}{6}} (13\frac{1}{3})$

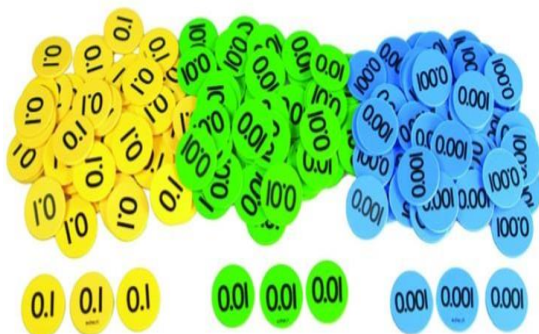
Decimal $6 \overline{) 820.020}^{13.33}$

**Dividing
decimals by 10,
100 and 1,000**

Understand division by 10 using exchange. Explore using place value equipment.

2 ones are 20 tenths.

20 tenths divided by 10 is 2 tenths.



Represent division using exchange on a place value grid.

0	•	Tth	Hth
1	•	0	0

0	•	Tth	Hth
0	•	10	0

0	•	Tth	Hth
0	•	1	5

1.5 is 1 one and 5 tenths.
This is equivalent to 10 tenths and 50 hundredths.
10 tenths divided by 10 is 1 tenth.
50 hundredths divided by 10 is 5 hundredths.
1.5 divided by 10 is 1 tenth and 5 hundredths.
 $1.5 \div 10 = 0.15$

Understand the movement of digits on a place value grid.

$$0.85 \div 10 = 0.085$$

0	•	Tth	Hth	Thth
0	•	8	5	
0	•	0	8	5

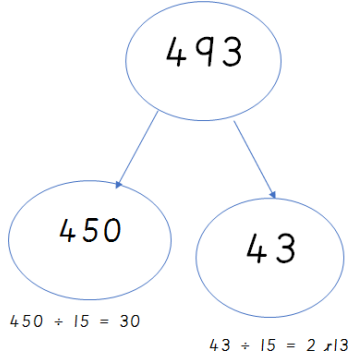
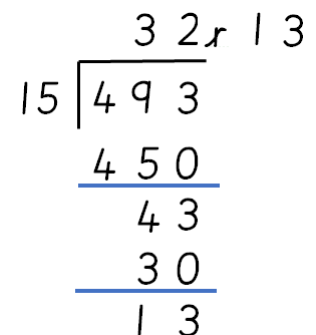
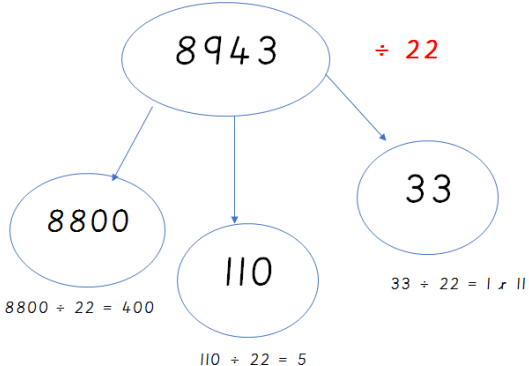
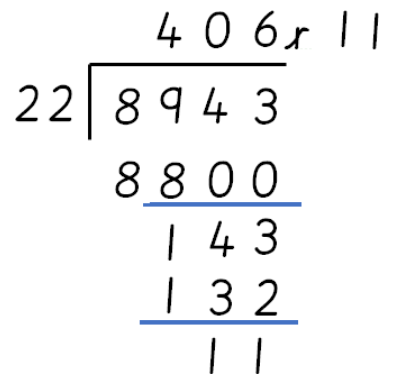
$$8.5 \div 100 = 0.085$$

0	•	Tth	Hth	Thth
8	•	5		
0	•	0	8	5

Year 6

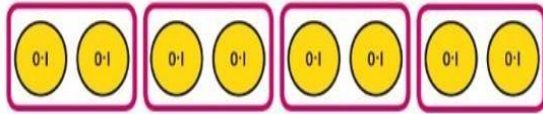
Pupils should be taught to:

- divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- perform mental calculations, including with mixed operations and large numbers
- use their knowledge of the order of operations to carry out calculations involving the 4 operations
- solve problems involving division

Division of 3digit ÷ 2digit	$493 \div 15 = 32 \text{ r } 13$ 	$493 \div 15 = 32 \text{ r } 13$ 
Division of 4digit ÷ 2digit	$8943 \div 22 = 406 \text{ r } 11$ 	$8943 \div 22 = 406 \text{ r } 11$ 

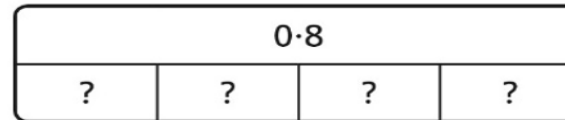
Dividing decimals

Use place value equipment to explore division of decimals.



8 tenths divided into 4 groups.
2 tenths in each group.

Use a bar model to represent divisions.



$$4 \times 2 = 8$$

$$8 \div 4 = 2$$

So...

$$4 \times 0.2 = 0.8$$

$$0.8 \div 4 = 0.2$$

Use short division (bus stop) to divide decimals with up to 2 decimal places.

$$8 \overline{) 4.24} = 0.53$$

Using short division

When children begin to divide up to 4- digits by 2- 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.

		0	3	6
	12	4	4 3	7 2

$$432 \div 12 = 36$$

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

	0	4	8	9
15	7	7 3	13 3	13 5

15	30	45	60	75	90	105	120	135	150
----	----	----	----	----	----	-----	-----	-----	-----

Using long division without remainders

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

- (x30) $12 \times 1 = 12$
- $12 \times 2 = 24$
- $12 \times 3 = 36$
- $12 \times 4 = 48$
- $12 \times 5 = 60$
- (x6) $12 \times 6 = 72$
- $12 \times 7 = 84$
- $12 \times 8 = 96$
- $12 \times 9 = 108$
- $12 \times 10 = 120$

$$432 \div 12 = 36$$

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

	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

- (x400) $1 \times 15 = 15$
- $2 \times 15 = 30$
- $3 \times 15 = 45$
- (x80) $4 \times 15 = 60$
- $5 \times 15 = 75$
- (x9) $10 \times 15 = 150$

Using long division with remainders

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

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

			2	4	$\frac{4}{5}$
1	5	3	7	2	
	-	3	0	0	
			7	2	
	-		6	0	
			1	2	

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

$1 \times 15 = 15$

$2 \times 15 = 30$

$3 \times 15 = 45$

$4 \times 15 = 60$

$5 \times 15 = 75$

$10 \times 15 = 150$

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

Using long division

Use a formal written method for long division to divide by a 2-digit number.

Chunking

$$\begin{array}{r}
 29 \\
 13 \overline{) 377} \\
 \underline{- 260} \quad (20 \times 13) \\
 17 \\
 \underline{- 65} \quad (5 \times 13) \\
 52 \\
 \underline{- 52} \quad (4 \times 13) \\
 0
 \end{array}$$

$1 \times 13 = 13$
 $2 \times 13 = 26$
 $5 \times 13 = 65$
 $10 \times 13 = 130$
 $20 \times 13 = 260$

$$20 + 5 + 4 = 29$$

Standard written method

$$\begin{array}{r}
 29 \\
 13 \overline{) 377} \\
 \underline{- 26} \\
 17 \\
 \underline{- 17} \\
 0
 \end{array}$$

$1 \times 13 = 13$
 $2 \times 13 = 26$
 $5 \times 13 = 65$
 $10 \times 13 = 130$
 $20 \times 13 = 260$

$$\begin{array}{r}
 13 \times \\
 9 \\
 \hline
 117 \\
 2
 \end{array}$$

$$560 \div 24 = 23 \text{ r}8 \quad 432 \div 15 = 28 \text{ r}12$$

$ \begin{array}{r} 23 \text{ r}8 \\ 24 \overline{) 560} \\ \underline{48} \\ 80 \\ \underline{72} \\ 8 \end{array} $	$ \begin{array}{r} 28 \text{ r}12 \\ 15 \overline{) 432} \\ \underline{300} \\ 132 \\ \underline{120} \\ 12 \end{array} $	$ \begin{array}{r} 28.8 \\ 15 \overline{) 432.0} \\ \underline{30} \\ 132 \\ \underline{120} \\ 120 \\ \underline{120} \\ 0 \end{array} $ <p>(12 ÷ 15 = 0.8) remainder as a decimal</p>	$ \begin{array}{r} 28 \frac{4}{5} \\ 15 \overline{) 432} \\ \underline{30} \\ 132 \\ \underline{120} \\ 12 \end{array} $ <p>(0.8 = $\frac{4}{5}$) remainder as a fraction</p>
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