



Ashfield Primary School – division calculation policy

Our aim is for children to use mental methods when appropriate but for calculations that they cannot solve in their heads, we aim to teach children to use an appropriate written method which they can use accurately and confidently. These stages show how to build up to a compact, efficient method of division which they can use accurately. Division should be taught alongside its inverse, multiplication. **Please see the attached appendix for further examples of concrete, pictorial and abstract methods**



	Year group
<p>Pre-requisites:</p> <ul style="list-style-type: none"> - Uses some number names and number language accurately. - Recites numbers in order to 10. <p>Knows that numbers identify how many objects are in a set.</p> <ul style="list-style-type: none"> - Beginning to represent numbers using fingers, marks on paper or pictures. - Compare sets and say when they have the same number. <p>Key vocabulary: Compare half, halve, pair, count out, share out, left, left over, how much? How many? total Pattern, puzzle, answer, right, wrong, count, sort, group, set, match, same, different, list, What could we try next? How did you work it out?</p>	<p>Reception</p> <p>Solve problems including halving and sharing.</p> <p>Opportunities to develop division skills begin in Foundation Stage 1, when talk about sharing during snack and provision activities will take place. Opportunities continue in Foundation Stage 2 (FS2) through provision, e.g. understanding what a half looks like.</p> <p>Children should be given the chance to join in with a variety of counting songs, rhymes and practical activities.</p> <p>In practical activities and through sharing, children should begin to solve problems involving halving and sharing.</p> <p>'Can you share these strawberries between two people?'</p> <p>'Half of the strawberries for you and half of the strawberries for me.'</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>

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Pre-requisites:

- count reliably with numbers from 1 – 20 and place them in order
- say 1 more or less than a given number
- count on or back to find answers
- have practical experience of sharing and halving

Key vocabulary:

Odd, even, count, count in 2s, 5s, 10s, how many times?, half, halve, share, share equally, group in pairs, group in threes etc, equal groups of, divide, divided by, left, left over

Year 1

Count in 2s, 5s and 10s

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

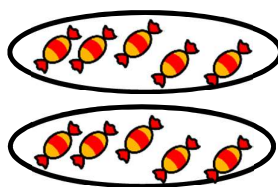
Children should start with practical sharing using a variety of equipment and objects and should be taught to share objects into equal groups in a variety of different situations.

e.g. 'Share these six cars equally between two children. How many cars will each child have?'

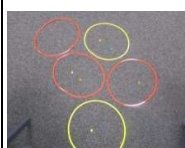
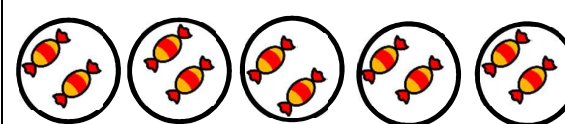


Children should have plenty of opportunity to use objects, equipment and pictorial representations to solve problems involving BOTH grouping and sharing.

e.g. **group** these 10 sweets into 5s (How many groups of 5 in 10?)



e.g. **share** these 10 sweets equally between 5 people.



Children do not need to record the division calculation at this stage.

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Pre-requisites:

- count in 2s, 5s and 10s
- have experience of repeated subtraction
- understand how to count equal groups of 2, 5 and 10 using objects and pictorial representations
- understand that division is the inverse of multiplication.

Key vocabulary:

Odd, even, count, count in 2s, 5s, 10s, how many times?, half, halve, share, share equally, group in pairs, group in threes etc, equal groups of, divide, divided by, left, left over

Year 2

Recall and use multiplication and division facts for 2, 5 and 10 x tables.

Calculate mathematical statements for division using division (\div) and equals (=) signs.

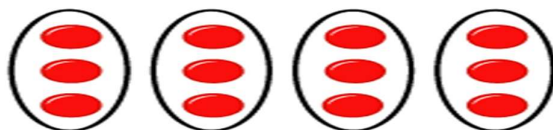
Solve problems involving division using materials, repeated subtraction, mental methods and multiplication and division facts.

Children should be introduced to using arrays for division at the same time as using them for multiplication. They should continue to learn the difference between grouping and sharing as two ways to solve division calculations. Children should use concrete objects first, then move onto pictorial representations. Children should be taught to record division statements using the \div and = signs at this stage. (Children should not use remainders at this stage.)

Sharing



$$30 \div 10 = 3$$
$$30 \div 3 = 10$$

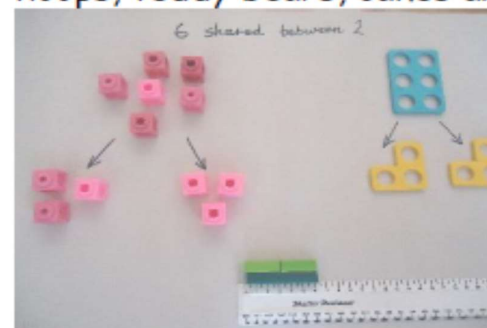


$$12 \div 3 = 4$$

'30 crayons shared equally between three pots.'
(Sharing)

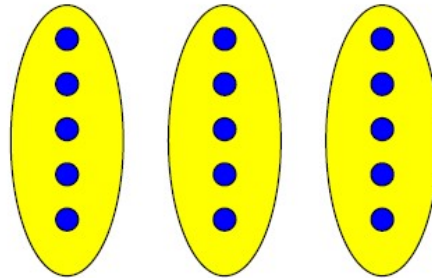
'We have 30 crayons and put ten crayons in each pot.
How many pots do we need?' (Grouping)

6 shared between 2 (other concrete objects can also be used e.g. children and hoops, teddy bears, cakes and plates)



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Grouping



'How many groups of 5?'

'15 shared equally between 3 people'

is...?'

'15 divided by 3 equals 5'

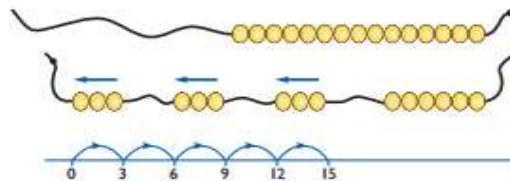
$$15 \div 5 = 3$$

$$15 \div 3 = 5$$

Grouping using a numberline

Group from zero in jumps of the divisor to find out 'how many groups of 3 are there in 15?.'

$$15 \div 3 = 5$$



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Using arrays to support division:



$$15 \div 5 = 3$$

$$15 \div 3 = 5$$

How many groups of 3?

How many groups of 5?

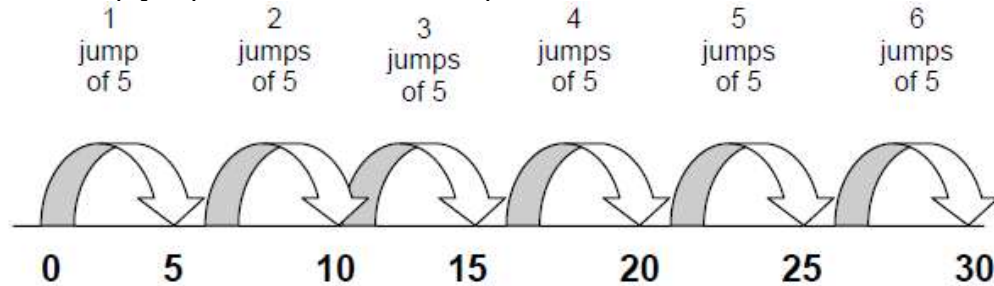
15 shared between 3 people is...?

15 shared between 5 people is...?

When children are ready, use an empty number line to count forwards:

$$30 \div 5 = 6$$

How many jumps of five make thirty?'

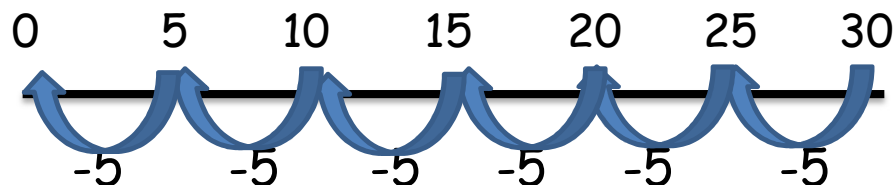


Also jump back to make the link with repeated subtraction:

$$30 \div 5 = 6$$

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How many groups of five?

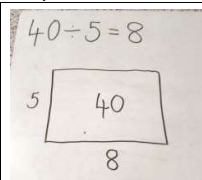


Children should link their work on division using grouping (using arrays) to a number line using practical apparatus.

e.g. $40 \div 5 = 8$ (Phrase this as, 'How many 5s in 40?')



Children should be taught to use grouping to calculate. They should use practical equipment such as Numicon or Cuisenaire.

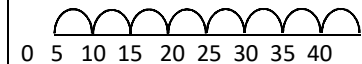


rearrange it into an array.

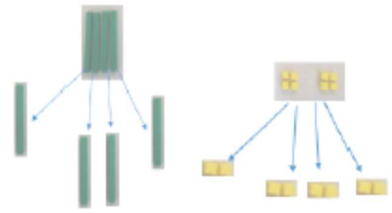
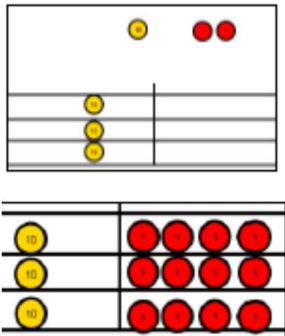
Children can then take the Cuisenaire from the blue (Numicon) rod track and

Children can then be taught how to show this using an empty number line.

$$5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 40$$

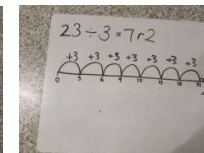
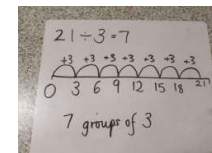


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<p>Pre-requisites:</p> <ul style="list-style-type: none"> - count in 2s, 3s, and 5s - understand repeated subtraction is a form of division - recall multiplication and division facts for the 2, 5 and 10x tables. - calculate mathematical statements for division and use the '\div' sign accurately - understand that multiplication of two numbers can be done in any order (commutative) but division cannot. <p>Key vocabulary:</p> <p>As above</p> <p>product, multiple of four, eight, fifty and one hundred, scale up</p>	<p>Year 3</p> <p>Recall and use multiplication and division facts for the 3, 4 and 8x tables (and continue to practise the 2, 5 and 10x tables).</p> <p>Calculate mathematical statements for division using the x tables that they already know, including for a two-digit number divided by a one-digit number, progressing to formal written methods.</p> <p>Children should continue to use practical equipment, concrete resources, pictures, diagrams, arrays and number lines to calculate using the multiples that they already know (x2, 5x and 10x from Year 2, and move onto 3x, 4x and 8x). Children should be introduced to the idea of remainders if capable.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div data-bbox="598 779 1165 1185" style="width: 45%;"> <p>2d divided by 1d using base 10 (no remainders) SHARING</p> <p>$48 \div 4 = 12$</p>  <p>Start with the tens.</p> </div> <div data-bbox="1228 755 1879 1185" style="width: 45%;"> <p>Sharing using place value counters.</p> <p>$42 \div 3 = 14$</p>  <div style="border-left: 3px double black; padding-left: 10px; margin-left: 10px;"> <p>1. Make 42. Share the 4 tens between 3. Can we make an exchange with the extra 10?</p> <p>Exchange the ten for 10 ones and share out 12 ones</p> </div> </div> </div> <p>Children should be reminded of their work using empty number lines to calculate. Their work should be linked to previous work on grouping. Children should be taught that it is easier to begin calculating from 0 (than from 21) as it is easier for children this age to count forwards than backwards in the number to be divided by (3).</p>

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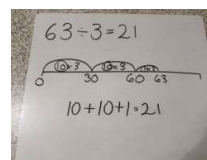
e.g. $21 \div 3 = 7$ 'How many 3s in 21?' or 'How many groups of 3 in 21?'
Children should also be shown examples including remainders.



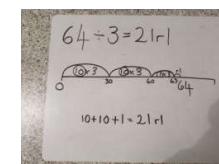
Children should learn to divide any two-digit number by the times tables that they know and are familiar counting with and should not just divide numbers up to the 12th multiple (e.g. when using the 3 times table children should learn to divide numbers beyond 36 (the 12th multiple) and could be asked to calculate statements like $42 \div 3 =$ (with a remainder) and $44 \div 3 =$ (with a remainder).

For larger numbers, it would be inefficient to count in single multiples so bigger jumps are groups along a number line are needed using know facts. Children should be taught to find 5 or 10 times the number to be divided by in order to move faster and more efficiently along the number line.

e.g. $63 \div 3 =$ (without remainder)

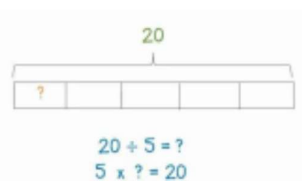


e.g. $64 \div 3 =$ (with a remainder)



Using the bar model.

Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group.

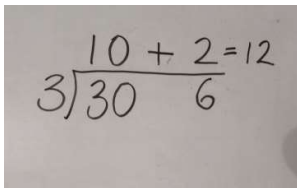
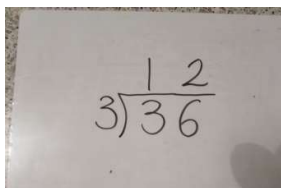
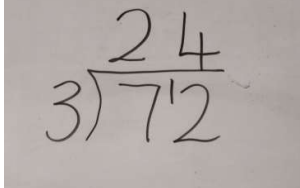
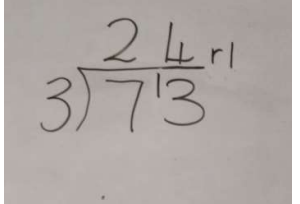
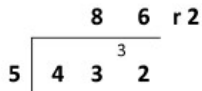


NB: If children are ready in Year 3, they can be shown formal short division as outlined below in Year 4.

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<p>Pre-requisites:</p> <ul style="list-style-type: none">- count in 3s, 4s and 8s- have experience of dividing a two-digit number by a one-digit number using formal written methods- understand the value of each digit they are dividing with <p>Key vocabulary:</p> <p>As above</p> <p>Division facts (up to 12×12), inverse, derive</p>	<p><u>Year 4</u></p> <p>Recall multiplication and division facts up to 12×12.</p> <p>Divide two and three-digit numbers by a one-digit number using formal written layout.</p> <p>Division using partitioning (two digits divided by one digit):</p> <p>$65 \div 5 = 13$</p> <p>$65 = 50 + 15$ Partition 65 into 50 and 15</p> <p>$50 \div 5 = 10$</p> <p>$15 \div 5 = 3$</p> <p>$10 + 3 = 13$</p> <p>$98 \div 7 = 14$</p> <p>$98 = 70 + 28$ Partition 98 into 70 and 28</p> <p>$70 \div 7 = 10$</p> <p>$28 \div 7 = 4$</p> <p>$10 + 4 = 14$</p> <p>NB Children will need to practise partitioning in a variety of ways.</p>
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	<p>Introduce children (if not already done in Year 3) to the formal layout (bus stop method) using the multiplication tables that they already know. Children should be shown the expanded method alongside the compact method to reinforce the place value of each digit they are calculating with. e.g. $36 \div 3 = 12$ 'How many 3s are there in 36?'</p>	 
	<p>Children should move onto examples where the number in the tens column wouldn't produce an exact multiple and part of the number needs to be exchanged to the ones column. e.g. $72 \div 3 =$ 'How many 3s in 72?'</p>	 <p>Children use their knowledge of the x3 table to find 'How many 3s in 70?' This gives 20 3s with 10 3s remaining. Now ask, 'How many 3s in 12?'</p>
	<p>Children should also be shown how to calculate with remainders, continuing to use the formal written layout.</p>	 <p>Children follow the instructions as above, then ask themselves, 'How many 3s in 13?' Children use their knowledge of number facts to know that there are 4 3s in 13, with 1 left over.</p>
	<p>Children should also learn how to calculate with three-digit numbers, including those calculations involving remainders.</p>	<p>This is shown as r1.</p> <p>$432 \div 5$ becomes</p>  <p>Answer: 86 remainder 2</p>

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Pre-requisites:

- count in 6s, 7s and 9s
- be able to divide a two or three-digit number by a one-digit number using formal written methods

Key vocabulary:

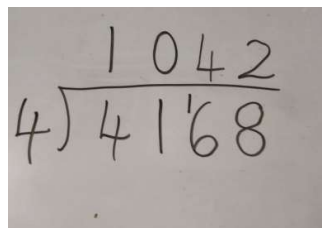
As above

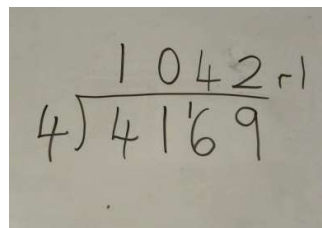
Factor pairs, composite numbers, prime number, prime factors, square number, cubed number, formal written method, order of operations, common factors, common multiples

Year 5

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.

Children should continue to use short division to divide a one-digit number by up to a four-digit number, including those examples involving remainders.


$$\begin{array}{r} 1042 \\ 4 \overline{) 4168} \\ \underline{4} \\ 16 \\ \underline{16} \\ 8 \\ \underline{8} \\ 0 \end{array}$$


$$\begin{array}{r} 1042 \text{ r} 2 \\ 4 \overline{) 4168} \\ \underline{4} \\ 16 \\ \underline{16} \\ 8 \\ \underline{8} \\ 0 \end{array}$$

Year 6

Divide numbers up to 4 digits by a two-digit number using the formal written method of long division where appropriate, interpreting remainders according to the context. The children will progress through the following steps. The children will then find their own preferred method of working.

Dividing using factors

Step 1: work out the factors of the divisor.

Step 2: divide the dividend by one of the factors

Step 3: divide the quotient (answer) by the other factor

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Division using chunking - the coin method - no remainder

Handwritten calculation for $144 \div 16 = 9$ using the coin method. The calculation shows the following steps:

$$\begin{array}{r} 9 \\ 16 \overline{) 144} \\ \underline{- 80} \quad (5) \\ 64 \\ \underline{- 32} \quad (2) \\ 32 \\ \underline{- 32} \quad (2) \\ 0 \end{array}$$

Next to the calculation is a table titled "MULTIPLES USING COINS":

MULTIPLES USING COINS	USING
1	16
2	32
5	80
10	160
20	320

Use the coins that we use to work out multiples

Division using chunking - the coin method - with remainder

Handwritten calculation for $432 \div 15 = 28 \text{ r } 12$ using the coin method. The calculation shows the following steps:

$$\begin{array}{r} 28 \text{ r } 12 \\ 15 \overline{) 432} \\ \underline{- 300} \quad (20) \\ 132 \\ \underline{- 75} \quad (5) \\ 57 \\ \underline{- 30} \quad (2) \\ 27 \\ \underline{- 15} \quad (1) \\ 12 \end{array}$$

Next to the calculation is a table titled "MULTIPLES USING COINS":

MULTIPLES USING COINS	USING
1	15
2	30
5	75
10	150
20	300
50	750

Can also be written as:
 $28 \frac{12}{15}$

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Division using the formal method - expressing the remainder as a decimal

Handwritten long division of 432 by 15, showing the remainder as a decimal. The calculation is as follows:

$$\begin{array}{r} 28.8 \\ 15 \overline{) 432.00} \\ \underline{-30} \\ 132 \\ \underline{-120} \\ 12.0 \\ \underline{12.0} \\ 0 \end{array}$$

Red arrows indicate the placement of the decimal point in the quotient (28.8) and the decimal point in the dividend (432.00).

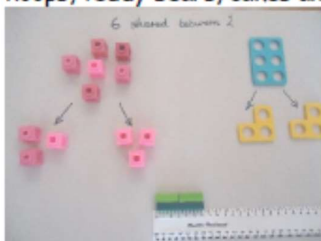

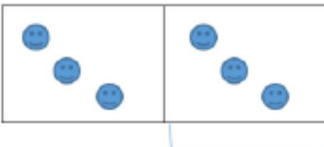
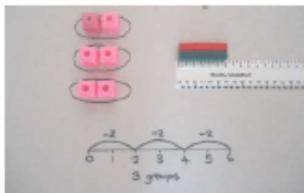
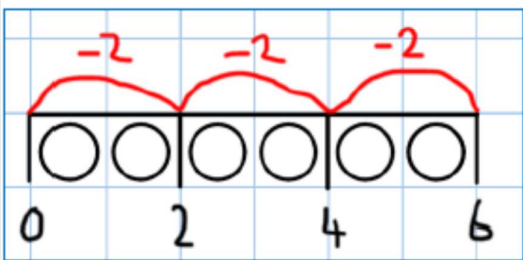
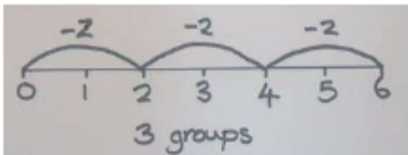
Division using the bus stop method - expressing the remainder as a decimal to 2 decimal places

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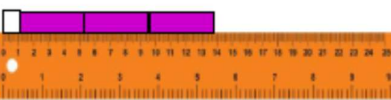
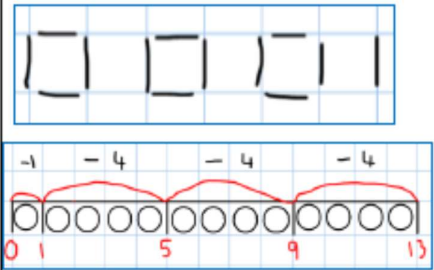

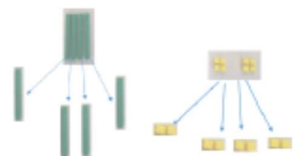
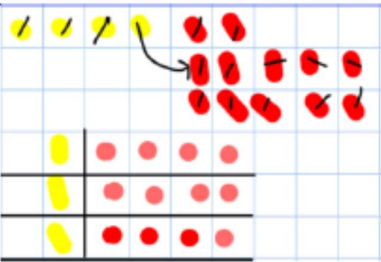
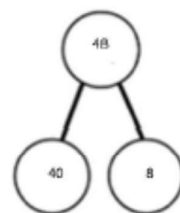
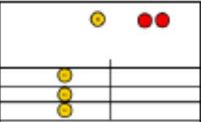
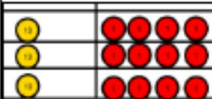
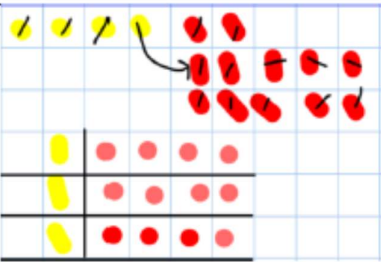
$$\begin{array}{r} 286.78 \\ 23 \overline{) 6596.00} \end{array}$$

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Appendix : Examples of concrete, pictorial and abstract

Concrete	Pictorial	Abstract		
<p>6 shared between 2 (other concrete objects can also be used e.g. children and hoops, teddy bears, cakes and plates)</p> 	 <p>This can also be done in a bar so all 4 operations have a similar structure:</p> 	<p>$6 \div 2 = 3$</p> <p>What's the calculation?</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 10px 20px;">3</td><td style="padding: 10px 20px;">3</td></tr> </table>	3	3
3	3			
<p>Understand division as repeated grouping and subtracting $6 \div 2$</p> 		<p>Abstract number line</p> 		
<p>2d ÷ 1d with remainders $13 \div 4 = 3 \text{ remainder } 1$</p>	<p>Children to have chance to represent the resources they use in a pictorial way e.g. see below:</p>	<p>$13 \div 4 = 3 \text{ remainder } 1$</p> <p>Children to count their times tables facts in their heads</p>		

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<p>Use of lollipop sticks to form wholes</p>  <p>Use of Cuisenaire rods and rulers (using repeated subtraction)</p> 		
<p>2d divided by 1d using base 10 (no remainders) SHARING</p> <p>$48 \div 4 = 12$</p>  <p>Start with the tens.</p>	<p>Children to represent the base 10 and sharing pictorially.</p> 	<p>$48 \div 4$</p> <p>4 tens $\div 4 = 1$ ten 8 ones $\div 4 = 2$ ones</p> <p>$10 + 2 = 12$</p> 
<p>Sharing using place value counters.</p> <p>$42 \div 3 = 14$</p>  <p>1. Make 42. Share the 4 tens between 3. Can we make an exchange with the extra 10?</p>  <p>Exchange the ten for 10 ones and share out 12 ones</p>		<p>$42 \div 3$</p> <p>$42 = 30 + 12$</p> <p>$30 \div 3 = 10$</p> <p>$12 \div 3 = 4$</p> <p>$10 + 4 = 14$</p>

Ashfield Primary School – division calculation policy

<p>Use of the 'bus stop method' using grouping and counters. Key language for grouping- how many groups of X can we make with X hundreds'- <i>this can also be done using sharing!</i></p> <p>$615 \div 5$</p> <div style="display: flex; align-items: center;"> <table border="1" style="border-collapse: collapse; text-align: center; width: 80px;"> <tr><th>H</th><th>T</th><th>O</th></tr> <tr><td>6</td><td>1</td><td>5</td></tr> </table> <div style="margin-left: 10px;">Step 1: make 615</div> </div> <div style="display: flex; align-items: center; margin-top: 10px;"> <table border="1" style="border-collapse: collapse; text-align: center; width: 80px;"> <tr><th>H</th><th>T</th><th>O</th></tr> <tr><td>6</td><td>1</td><td>5</td></tr> </table> <div style="margin-left: 10px;">Step 2: Circle your groups of 5</div> </div> <div style="display: flex; align-items: center; margin-top: 10px;"> <table border="1" style="border-collapse: collapse; text-align: center; width: 80px;"> <tr><th>H</th><th>T</th><th>O</th></tr> <tr><td>6</td><td>1</td><td>5</td></tr> </table> <div style="margin-left: 10px;">Step 3: Exchange 1H for 10T and circle groups of 5</div> </div> <div style="display: flex; align-items: center; margin-top: 10px;"> <table border="1" style="border-collapse: collapse; text-align: center; width: 80px;"> <tr><th>H</th><th>T</th><th>O</th></tr> <tr><td>6</td><td>1</td><td>5</td></tr> </table> <div style="margin-left: 10px;">Step 4: exchange 1T for 10ones and circles groups of 5</div> </div>	H	T	O	6	1	5	H	T	O	6	1	5	H	T	O	6	1	5	H	T	O	6	1	5	<p>This can easily be represented pictorially, till the children no longer to do it.</p> <p>It can also be done to decimal places if you have a remainder!</p>	<div style="font-size: 2em; margin-bottom: 10px;"> $\begin{array}{r} 123 \\ 5 \overline{) 615} \end{array}$ </div>
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<h3 style="margin: 0;">Fluency variation, different ways to ask children to solve $615 \div 5$:</h3>																										
<p>Using the part whole model below, how can you divide 615 by 5 without using the 'bus stop' method?</p> <div style="text-align: center; margin-top: 20px;"> </div>	<p>I have £615 and share it equally between 5 bank accounts. How much will be in each account?</p> <p>615 pupils need to be put into 5 groups. How many will be in each group?</p>	<div style="text-align: center; margin-bottom: 10px;"> $5 \overline{) 615}$ </div> <p>$615 \div 5 =$</p> <p> $= 615 \div 5$</p> <p>How many 5's go into 615?</p>																								
<p>What's the calculation? What's the answer?</p> <div style="text-align: center; margin-top: 10px;"> <table border="1" style="border-collapse: collapse; text-align: center; width: 150px;"> <tr><th>H</th><th>T</th><th>O</th></tr> <tr><td>6</td><td>1</td><td>5</td></tr> </table> </div>			H	T	O	6	1	5																		
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