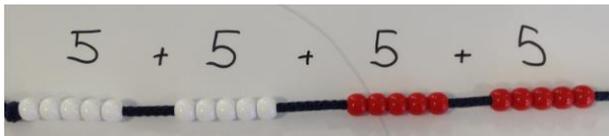


This is the calculation policy for the Ingrow and Long Lee Federation which lists the progression through division and multiplication. YR, Y1 and Y2 are mostly working mentally (which means using concrete resources to build conceptual understanding of the operations). The signs and number sentences for division and multiplication are introduced throughout year 2. During year 4 and 5 the formal written methods for multiplication and division are introduced as the children are working with numbers which demand this. Mental mathematics runs throughout with the children being trained to study the numbers before they start to decide on the most efficient method for working it out. The words in normal font are taken from the NC programme of study. The words in italics are guidance put together by the school to support teachers with the delivery of the policy.

Stage	division	multiplication
1	<p>They solve problems using doubling, halving and sharing.</p> 	
2	<p>Through grouping and sharing small quantities, pupils should begin to understand multiplication and division; doubling numbers and quantities, and finding simple fractions of objects, numbers and quantities.</p> 	
	<p>Solve one-step problems involving division, calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. <i>(No expectation for recording formally at this stage.)</i></p> <p>Share these pencils equally between Asif and Ben. How many pencils will each of them get?</p>  <p>How many children can have two squares each from this chocolate bar?</p> 	<p>Solve one-step problems involving multiplication, calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. <i>(No expectation for recording formally at this stage.)</i></p> <p>Count the eggs in this egg box.</p>  <p>Count these pairs of socks. How many pairs are there? How many socks are there altogether?</p> 

3

Pupils solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts. (ensure that division is 'grouping' for calculating and 'sharing' by 2 is only used during halving activities)



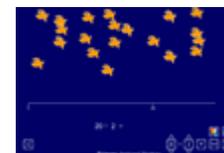
Array ITP:



half of 14 is 7 (in each half):



Grouping ITP:



Half of 50 is 25 (in each half):

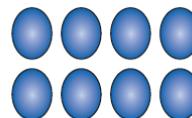


Calculate mathematical statements for division within the multiplication tables of 2, 5 and 10, writing them using the division (\div) and equals (=) signs
(How many groups/sets/lots of two do we use to make fourteen?)...
'Fourteen divided by two is seven': $14 \div 2 = 7$
(How many groups/sets/lots of five do we use to make forty-five?)...
'Forty-five divided by five is nine': $45 \div 5 = 9$

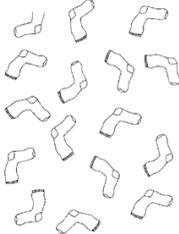
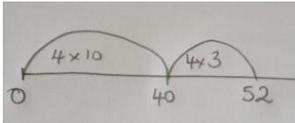
This is NOT 'sharing' – it is organising the dividend into GROUPS of the divisor.

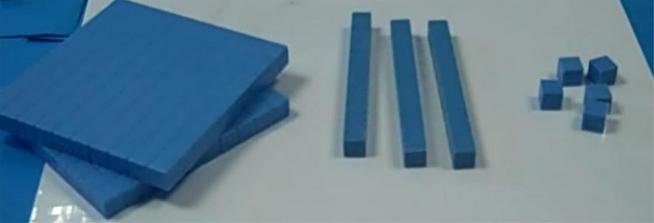
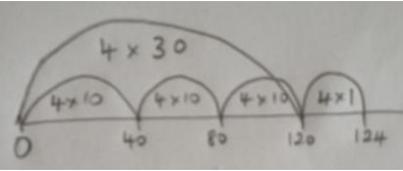
Using the concept of grouping to support with learning tables facts:

Calculate mathematical statements for multiplication within the multiplication tables 2, 5, and 10, writing them using the multiplication (\times) and equals (=) signs
When using an array read it from left to right, so this image is 'Two, four times' or '2+2+2+2' or 'Two times by four' or 'Two multiplied by four':



$$2 \times 4 = 8$$

	<p>How many pairs of socks are there?</p>  <p>There are other questions that may demand the use of sharing such as 'halving and halving again' as with this:</p> <p>Four children share these shells. They each get the same number of shells.</p>  <p>How many shells does each child get?</p>	<p>'Two times by seven is fourteen': $2 \times 7 = 14$ 'Five multiplied by nine is forty-five': $5 \times 9 = 45$</p> <p>And in contexts:</p> <p>'How many two pence pieces do you need to make 20p?'</p> <p>There are 10 crayons in each box.</p>  <p>How many crayons are there altogether?</p>
4	<p>Pupils <i>begin</i> to develop reliable written methods for multiplication and division, starting with calculations of two-digit numbers by one-digit numbers (<i>which can be done mentally – i.e. keeping track of counting in groups using multiples as well as using known facts</i>) and progressing to the efficient written methods of short multiplication and division (<i>using the times tables of 2, 3, 4, 5, 8 and 10</i>). Laying the number sentences out in a formal arrangement, even if the solution is found mentally, supports with beginning to read them.</p>	
	Divide two-digit numbers by a one-digit number	Multiply two-digit numbers by a one-digit number
E.G.s for written	<p>$52 \div 4$ (this could be used as an example of how to begin to lay out the formal method as it is just beyond the tables' facts) By partitioning it can be done as:</p> <p>$4 \times 10 = 40$ $4 \times 3 = 12$</p>  <p>Or on a number line as:</p>	<p>24×3 (this could be done with partitioning the number such as with the grid method drawn over an array) By partitioning it can be done as:</p> <p>$20 \times 3 = 60$ $4 \times 3 = 12$ <u>72</u></p>
E.G.s for mental	<p>$24 \div 4$ (as this can be done mentally using known facts but could be laid out in the short division format to promote familiarity; continue to use arrays to understand the concept) 'I know that $4 \times 6 = 24$ so then $24 \div 4 = 6$'</p>	<p>5×4 (as this can be done mentally using known facts; continue to use arrays to understand the concept) 3×10 (as this can be done mentally by using the learned effect of multiplying by ten – NOT 'adding a zero' - the number becomes ten times bigger)</p>

5	<p>Pupils should practise to become fluent in the efficient written method of short multiplication for multiplying using multi-digit numbers, and short division with exact answers when dividing by a one-digit number (with all 12 times tables facts)</p> <p>Practising partitioning numbers in different ways, in response to investigating in the context of a variety of divisors, supports children with understanding division i.e. 'Make the number 235 with base 10 resources. Now move the resources around to make different numbers that are equally divisible by 5.' After exploration the children can begin to record such as: $200+30+5$; $100+100+20+15$; $100+100+10+10+5$; etc. 'Now move the same amount around into multiples of 4. What do you notice?' $100+100+20+12$ with 3 left over etc.</p> 	
	<p>Divide two-digit and three-digit numbers by a one-digit number (as preparation for using formal written layout)</p> <p>$124 \div 4 = 31$ using a number line method:</p> <p>$4 \times 30 = 120$ $4 \times 1 = 4$</p> 	<p>Multiply two-digit and three-digit numbers by a one-digit number (moving to using formal written layout)</p> <p>346×4 using a place value method with jottings:</p> <p>$300 \times 4 = 1200$ $40 \times 4 = 160$ $6 \times 4 = 24$ <u>1384</u></p> <p>Moving to short multiplication:</p> $\begin{array}{r} 346 \\ \times 4 \\ \hline 1384 \\ 12 \end{array}$
E.G.s for written	<p>Calculate $56 \div 4$ $456 \div 4$</p> <p>Write in the missing digit. The answer does not have a remainder.</p> $\begin{array}{r} 26 \\ 3 \square 8 \end{array}$	<p>Calculate 58×6</p> <p>Write in the missing digit.</p> $\begin{array}{r} 5 \square \\ \times 8 \\ \hline 456 \end{array}$
E.G.s for mental	<p>$242 \div 2$ (this can be done by halving) $55 \div 5$ (this can be done using known facts) Divide three hundred and ninety by ten.</p>	<p>97×100 (this can be done using knowledge of what happens to a number when multiplied by 10, 100, etc.) 33×2 (this can be done by doubling)</p>

6	<p>Pupils practise and extend their use of the formal written methods of short multiplication and short division. They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations.</p> <p>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.</p> <p><i>In order to become familiar with the short division layout begin with numbers that do not have remainders moving to calculating with numbers that do:</i></p>	<p>Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers.</p> <p><i>Short multiplication that requires 'carrying' (multiplying by a single digit number):</i></p>
<p><i>E.G.s for written</i></p>	<p>Step 1</p> $\begin{array}{r} 32 \\ 3 \overline{)96} \end{array}$ <p>no remainders:</p> <p>Step 2</p> $\begin{array}{r} 18 \\ 4 \overline{)72} \end{array}$ $\begin{array}{r} 218 \\ 4 \overline{)872} \end{array}$ <p>one remainder:</p> <p>Step 3</p> $\begin{array}{r} 0663r5 \\ 8 \overline{)5309} \end{array}$ <p>more than one remainder:</p>	$\begin{array}{r} 327 \\ \times \quad 4 \\ \hline 1308 \\ \\ \\ \end{array}$ $\begin{array}{r} 3652 \\ \times \quad 8 \\ \hline 29216 \\ \\ \\ \end{array}$
<p><i>E.G.s for mental</i></p>	<p>Write in the missing number: $3400 \div \square = 100$ <i>(use their knowledge of place value)</i></p> <p>Divide nought point nine by one hundred. <i>(move the digits two places to the right)</i></p>	<p>What is twenty-one multiplied by nine? <i>(multiply nine by 10 and subtract one group of nine)</i></p> <p>A fruit pie costs fifty-five pence. What is the cost of three fruit pies? <i>(count up three multiples of fifty, jot answer, count up three multiples of five and combine – or use knowledge of 5 times table in the context of place value)</i></p>

7 Pupils practise multiplication and division for larger numbers, using the formal written methods of short and long multiplication, and short and long division.

E.G.s for written

Calculate $924 \div 22$

Calculate $37.2 \div 8$

Write in the missing digit: $\square 92 \div 14 = 28$

Write in the missing digit. The answer does not have a remainder.

$$\begin{array}{r} 26 \\ 3 \overline{) \square 8} \end{array}$$

A packet contains 1.5 kilograms of guinea pig food. Remi feeds her guinea pig 30 grams of food each day.

How many days does the packet of food last?

Calculate 509×24

Calculate 4.65×9

Write in the missing digits: $323 \times \square 7 = 1518\square$

17 multiplied by itself gives a 3-digit answer.

$$\begin{array}{|c|c|} \hline 1 & 7 \\ \hline \end{array} \times \begin{array}{|c|c|} \hline 1 & 7 \\ \hline \end{array} = \begin{array}{|c|c|c|} \hline 2 & 8 & 9 \\ \hline \end{array}$$

What is the smallest 2-digit number that can be multiplied by itself to give a 4-digit answer?

$$\begin{array}{|c|c|} \hline \square & \square \\ \hline \end{array} \times \begin{array}{|c|c|} \hline \square & \square \\ \hline \end{array} = \begin{array}{|c|c|c|c|} \hline \square & \square & \square & \square \\ \hline \end{array}$$

I pay £16.20 to travel to work each week. I work for 45 weeks each year. How much do I pay to travel to work each year?

E.G.s for mental

Divide thirty-one point five by ten

Ten times a number is eighty-six. What is the number?

Circle the best estimate of the answer to

$$72.34 \div 8.91$$

6 7 8 9 10 11

What is nought point eight multiplied by six?

What must you multiply nought point seven by to get two point one?

A bag of four oranges costs thirty seven pence. How much do twelve oranges cost? (*understanding how to use knowledge of related multiplication tables i.e. here the 12 times table is three times the four times table so to solve this you just need to multiply 37 by 3.*)

formal written method

Short division

$98 \div 7$ becomes

$$\begin{array}{r} 14 \\ 7 \overline{) 98} \end{array}$$

Answer: 14

$432 \div 5$ becomes

$$\begin{array}{r} 86 \text{ r}2 \\ 5 \overline{) 432} \end{array}$$

Answer: 86 remainder 2

$496 \div 11$ becomes

$$\begin{array}{r} 45 \text{ r}1 \\ 11 \overline{) 496} \end{array}$$

Answer: $45 \frac{1}{11}$

Short multiplication

24×6 becomes

$$\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \\ 2 \\ \hline \end{array}$$

Answer: 144

342×7 becomes

$$\begin{array}{r} 342 \\ \times 7 \\ \hline 2394 \\ 21 \\ \hline \end{array}$$

Answer: 2394

2741×6 becomes

$$\begin{array}{r} 2741 \\ \times 6 \\ \hline 16446 \\ 42 \\ \hline \end{array}$$

Answer: 16446

Long division

432 ÷ 15 becomes

$$\begin{array}{r}
 28 \text{ r } 12 \\
 15 \overline{) 432} \\
 \underline{30 } \\
 132 \\
 \underline{120} \\
 12
 \end{array}$$

Answer: 28 remainder 12

432 ÷ 15 becomes

$$\begin{array}{r}
 28 \\
 15 \overline{) 432} \\
 \underline{30 } \quad 15 \times 20 \\
 132 \\
 \underline{120} \quad 15 \times 8 \\
 12
 \end{array}$$

$$\frac{12}{15} = \frac{4}{5}$$

Answer: $28 \frac{4}{5}$

432 ÷ 15 becomes

$$\begin{array}{r}
 28.8 \\
 15 \overline{) 432.0} \\
 \underline{30 } \quad \downarrow \\
 132 \\
 \underline{120} \quad \downarrow \\
 120 \\
 \underline{120} \\
 0
 \end{array}$$

Answer: 28.8

Long multiplication

24 × 16 becomes

$$\begin{array}{r}
 24 \\
 \times 16 \\
 \hline
 240 \\
 144 \\
 \hline
 384
 \end{array}$$

Answer: 384

124 × 26 becomes

$$\begin{array}{r}
 124 \\
 \times 26 \\
 \hline
 2480 \\
 744 \\
 \hline
 3224
 \end{array}$$

Answer: 3224

124 × 26 becomes

$$\begin{array}{r}
 124 \\
 \times 26 \\
 \hline
 744 \\
 2480 \\
 \hline
 3224
 \end{array}$$

Answer: 3224