Liscard Primary School Calculation Policy

Multiplication and Division

	MULTIPLICATION & DIVISION FACTS					
EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Count to 20 and beyond in 1s and begin to spot patterns	count in multiples of twos, fives and tens (copied from Number and Place Value)	count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward (copied from Number and Place Value)	count from 0 in multiples of 4, 8, 50 and 100 (copied from Number and Place Value)	count in multiples of 6, 7, 9, 25 and 1 000 (copied from Number and Place Value)	count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 (copied from Number and Place Value)	
Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.		recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers	recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables	recall multiplication and division facts for multiplication tables up to 12 × 12		
	MENTAL CALCULATION					
			write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using	use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers	multiply and divide numbers mentally drawing upon known facts **Partitioning** 407 × 4	perform mental calculations, including with mixed operations and large numbers **Partitioning** **5.7 × 6**

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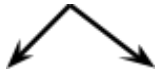
Multiplication and Division

			mental and progressing to formal written methods (grid method) (appears also in Written Methods)	Multiplying by 10 and 100 e.g. 24 x 100 **Th H T U** . . 2 4 2 4 0 0	407 × 2 400 × 4 = 1600 0 × 4 = 0 7 × 4 = 28 1600 + 28 = 1628 **Rounding and adjusting** £3.99 × 6 £4 × 6 = £24 £24.00 – £0.06 = £23.94 28 × 19 28 × 10 × 2 = 560 560 – 28 = 532 **Division as grouping drawing on known facts** 196 ÷ 6 = 32r4 325 ÷ 3= 108r1  180 16 (6 x 30) (6 × 2 + 4)	**5 × 6 = 30** **0.7 × 6 = 4.2** **30 + 4.2 = 34.2** **5.3 × 19** **5.3 × 10 × 2 = 106** **106 – 5.3 = 100.7**
		show that multiplication of two numbers can be done in any order	4 × 6 = 24 Use arrays and number lines to count in multiples	recognise and use factor pairs and commutativity in mental calculations	multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	*associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375)*

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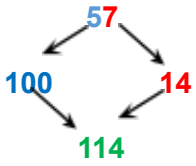
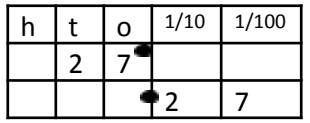
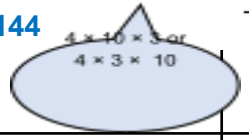
Multiplication and Division

		(commutative) and division of one number by another cannot Introduce the idea of chunking by grouping (repeated subtraction) and not just sharing	Use empty number lines to demonstrate the idea of counting on in multiples of the divisor Develop the idea of chunking by grouping (repeated subtraction) and not just sharing **Using partitioning to multiply and divide** **57 × 2 = 114** **50 × 2 7 × 2** **100 + 14 =114**  **Scaling** Making a 5cm line 4 times longer *5cm × 4 = 20cm* 	(appears also in Properties of Numbers)	 	*for a simple fraction (e.g. $^{3}/_{8}$)* (copied from Fractions)
	WRITTEN CALCULATION					

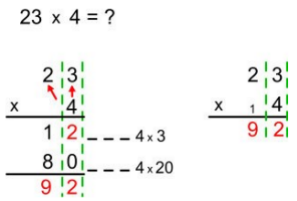
Liscard Primary School Calculation Policy

Multiplication and Division

<table>
<tr><th>EYFS</th><th>Year 1</th><th>Year 2</th><th>Year 3</th><th>Year 4</th><th>Year 5</th><th>Year 6</th></tr>
<tr>
<td></td>
<td></td>
<td>calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs</td>
<td>write and calculate mathematical statements for multiplication and 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 (appears also in Mental Methods)
<table>
<tr><td>X</td><td>40</td><td>8</td></tr>
<tr><td>3</td><td>120</td><td>24</td></tr>
</table>
120 + 24 = 144

48 × 3 = 144
 

</td>
<td>multiply two-digit and three-digit numbers by a one-digit number using formal written layout (grid method moving to short multiplication)

Stepping stone to formal written method
 

</td>
<td>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</td>
<td>multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Do not use formal columnar method except with children who can demonstrate they are ready. (see models and images part of policy for guidance of process using manipulatives) See SLT first.</td>
<td></td>
<td>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
Division leading to formal division
578 ÷ 7
8 2 r 4</td>
<td>divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate for the context divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and</td>
</tr>
</table>

Liscard Primary School Calculation Policy

Multiplication and Division

					7 5 7 8 5 6 0 1 8 1 4 4 Formal (short) division 638 ÷ 8 7 9 r 4 8 | 6 $_{6}$3 $_{7}$8 6725 ÷ 7 0 9 6 0 r5 7 | 6 $_{6}$7 $_{4}$2 5	interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
						use written division methods in cases where the answer has up to two decimal places (copied from Fractions (including decimals))
	PROPERTIES OF NUMBERS: MULTIPLES,FACTORS,PRIMES,SQUARE AND CUBE NUMBERS					
EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6

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Multiplication and Division

				recognise and use factor pairs and commutativity in mental calculations (repeated)	identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers establish whether a number up to 100 is prime and recall prime numbers up to 19	identify common factors, common multiples and prime numbers *use common factors to simplify fractions; use common multiples to express fractions in the same denomination* (copied from Fractions)
					recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})	*calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm^3) and cubic metres (m^3), and extending to other units such as mm^3 and km^3* (copied from Measures)

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Multiplication and Division

ORDER OF OPERATIONS					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
					use their knowledge of the order of operations to carry out calculations involving the four operations
INVERSE OPERATIONS, ESTIMATING AND CHECKING ANSWERS					
		estimate the answer to a calculation and use inverse operations to check answers (copied from Addition and Subtraction)	*estimate and use inverse operations to check answers to a calculation* (copied from Addition and Subtraction)		use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy

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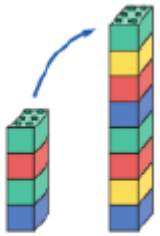
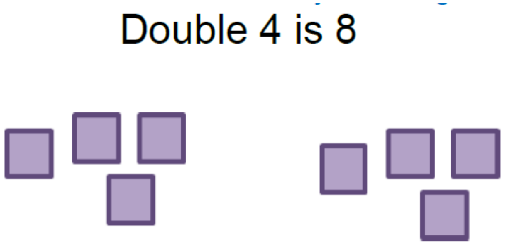
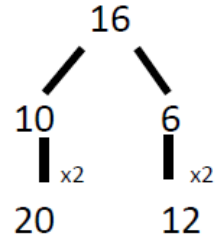
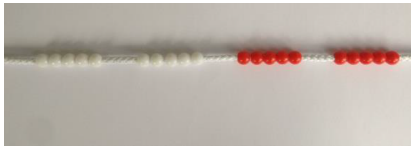
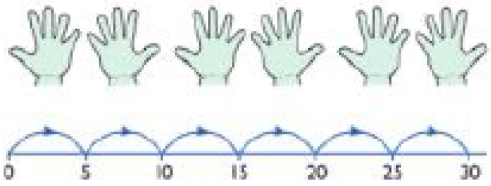
Multiplication and Division

<table>
<tr><th></th><th colspan="6">PROBLEM SOLVING</th></tr>
<tr><th>EYFS</th><th>Year 1</th><th>Year 2</th><th>Year 3</th><th>Year 4</th><th>Year 5</th><th>Year 6</th></tr>
<tr><td></td><td rowspan="3">solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher</td><td rowspan="3">solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts</td><td rowspan="3">solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects</td><td rowspan="3">solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects</td><td>solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes</td><td>solve problems involving addition, subtraction, multiplication and division</td></tr>
<tr><td></td><td>solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign</td><td></td></tr>
<tr><td></td><td>solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates</td><td>solve problems involving similar shapes where the scale factor is known or can be found
(copied from Ratio and Proportion)</td></tr>
</table>

Liscard Primary School Calculation Policy

Multiplication and Division

Multiplication

Objective and Strategies	Concrete	Pictorial	Abstract
Doubling	Use practical activities to show how to double a number.  double 4 is 8 4 × 2 = 8	Draw pictures to show how to double a number.  	 Partition a number and then double each part before recombining it back together.
Counting in multiples	 Count in multiples supported by concrete objects in equal groups.	 Use a number line or pictures to continue support in counting in multiples.	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25 , 30

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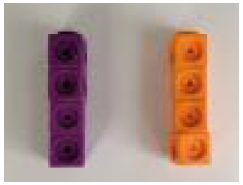
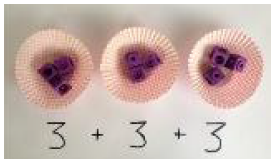
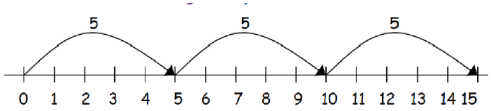
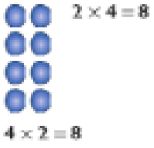
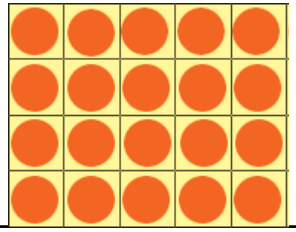
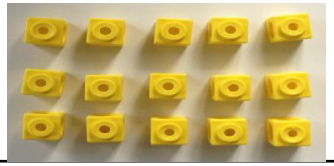
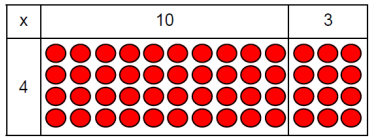
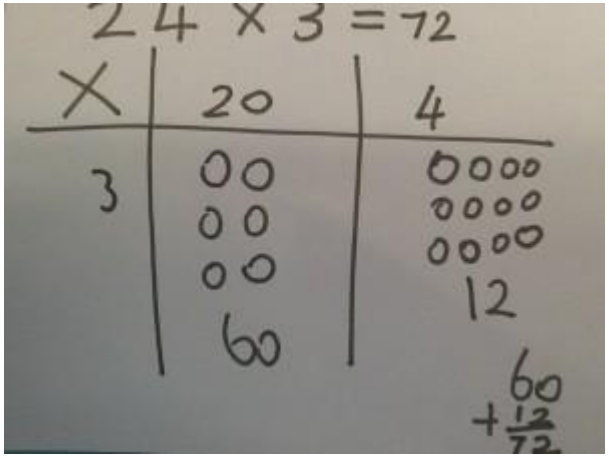
Multiplication and Division

Repeated addition	  Use different objects to add equal groups. 	There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there?  2 add 2 add 2 equals 6  5 + 5 + 5 = 15	Write addition sentences to describe objects and pictures.  2 + 2 + 2 + 2 + 2 = 10
Arrays- showing commutative multiplication	Create arrays using counters/ cubes to show multiplication sentences. 	Draw arrays in different rotations to find **commutative** multiplication sentences.   	Use an array to write multiplication sentences and reinforce repeated addition.  5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15

Liscard Primary School Calculation Policy

Multiplication and Division

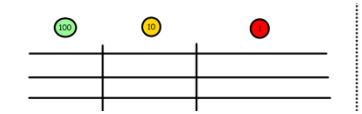
		Link arrays to area of rectangles.	
Grid Method	Show the link with arrays to first introduce the grid method.  4 rows of 10 4 rows of 3 Move on to using Base 10 to move towards a more compact method. 4 rows of 13	Children can represent the work they have done with place value counters in a way that they understand. They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.  	Start with multiplying by one digit numbers and showing the clear addition alongside the grid. | × | 30 | 5 | | 7 | 210 | 35 | 210 + 35 = 245 Moving forward, multiply by a 2 digit number showing the different rows within the grid method.

Liscard Primary School Calculation Policy

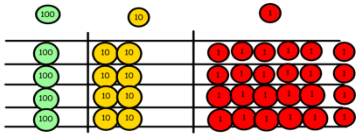
Multiplication and Division

Move on to place value counters to show how we are finding groups of a number.We are multiplying by 4 so we need 4 rows.

Fill each row with 126.

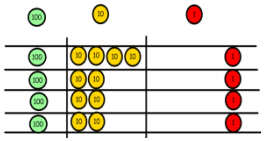


Calculations
4 x 126



Calculations
4 x 126

Add up each column, starting with the ones making any exchanges needed.



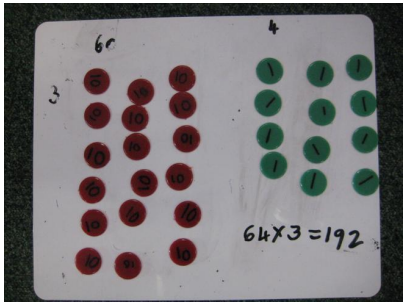
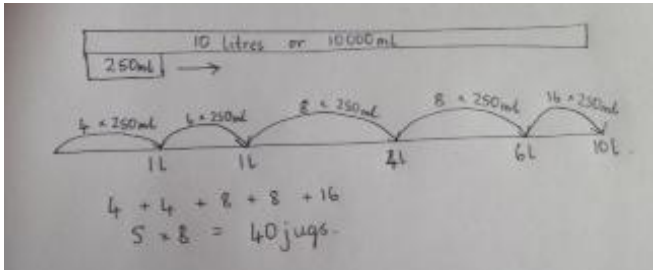
Then you have your answer.

	10	8
10	100	80
3	30	24

X	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16

Liscard Primary School Calculation Policy

Multiplication and Division

Column multiplication	Children can continue to be supported by place value counters at the stage of multiplication.  It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.	Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.  	Start with long multiplication, reminding the children about lining up their numbers clearly in columns. If it helps, children can write out what they are solving next to their answer. 32 x 24 8 (4 x 2) 120 (4 x 30) 40 (20 x 2) 600 (20 x 30) 768 × 6 3 1 2 2 1 0 2 4 0 + 4 2 0 0 4 6 6 2 This moves to the more compact method.

Liscard Primary School Calculation Policy

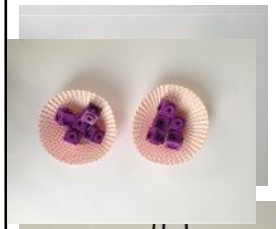
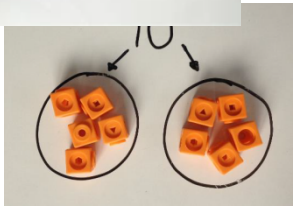
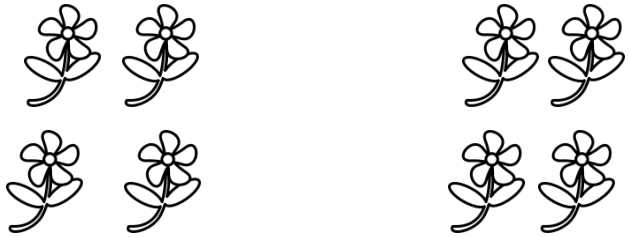
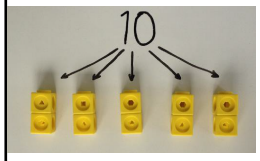
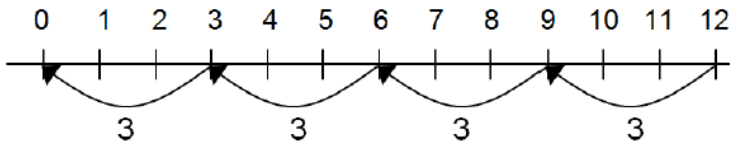
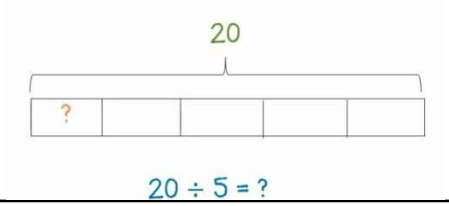
Multiplication and Division

Division

Objective and Strategies	Concrete	Pictorial	Abstract

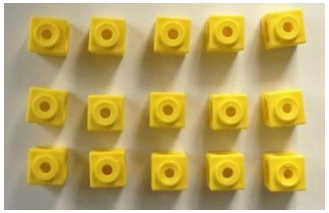
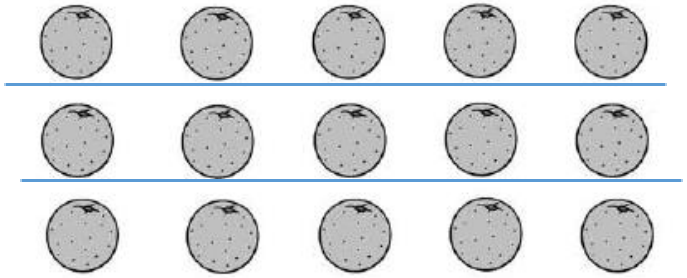
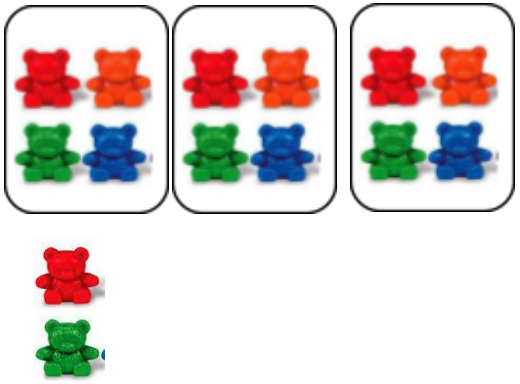
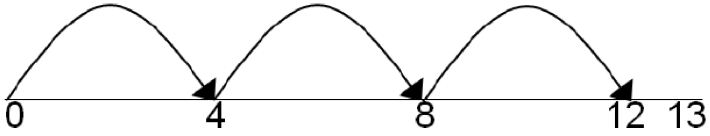
Liscard Primary School Calculation Policy

Multiplication and Division

Sharing objects into groups	  I have 10 cubes, can you share them equally in 2 groups?	Children use pictures or shapes to share quantities.  8 ÷ 2 = 4	Share 9 buns between three people. 9 ÷ 3 = 3
Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.   	Use a number line to show jumps in groups. The number of jumps equals the number of groups.  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. 	28 ÷ 7 = 4 Divide 28 into 7 groups. How many are in each group?

Liscard Primary School Calculation Policy

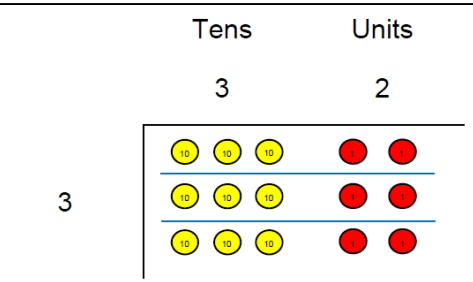
Multiplication and Division

Division within arrays	 Link division to multiplication by creating an array and thinking about the number sentences that can be created. Eg 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	 Draw an array and use lines to split the array into groups to make multiplication and division sentences.	Find the inverse of multiplication and division sentences by creating four linking number sentences. 7 x 4 = 28 4 x 7 = 28 28 ÷ 7 = 4 28 ÷ 4 = 7
Division with a remainder	14 ÷ 3 = Divide objects between groups and see how much is left over? 	Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.  Draw dots and group them to divide an amount and clearly show a remainder. 	Complete written divisions and show the remainder using r. 

Liscard Primary School Calculation Policy

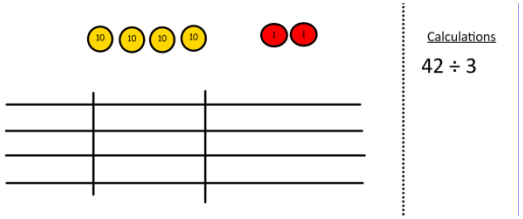
Multiplication and Division

Short division



96 ÷ 3 = 32

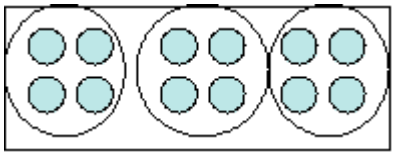
Use place value counters to divide using the bus stop method alongside



42 ÷ 3=

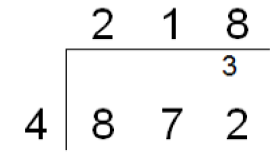
Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.

Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.

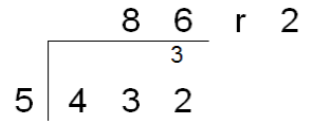


Encourage them to move towards counting in multiples to divide more efficiently.

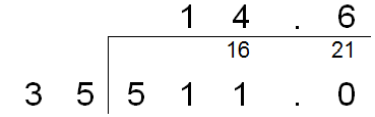
Begin with divisions that divide equally with no remainder.



Move onto divisions with a remainder.



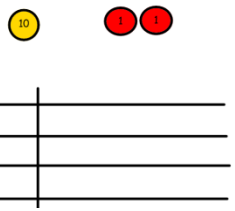
Finally move into decimal



places to divide the total accurately.

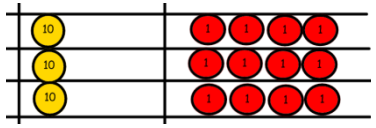
Liscard Primary School Calculation Policy

Multiplication and Division



Then exchange the ten into ones and share the ones equally among the groups.

We look how much in 1 group so the answer is 14.



We look how much is in one group across so the answer is 14