

## LEEK EDUCATION PARTNERSHIP

## MULTIPLICATION AND DIVISION

	PLACE VALUE	MENTAL METHODS	WRITTEN METHODS
Y1	count in multiples of twos, fives and tens	find half (from fractions)	
Y2	count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward - recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers	show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot	calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication ( $\times$ ), division ( $\div$ ) and equals (=) signs
Y3	count from 0 in multiples of 4, 8, 50 and 100 - recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables	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 Written Methods)	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)

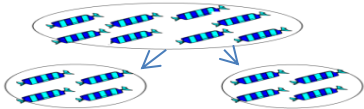
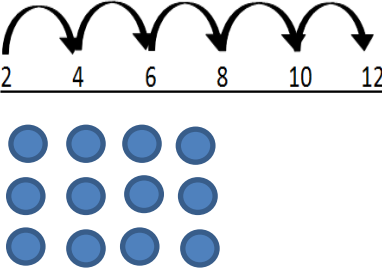
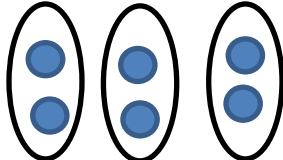
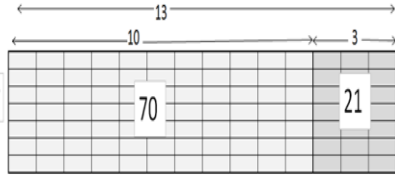
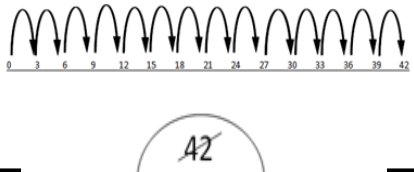
Y4	count in multiples of 6, 7, 9, 25 and 1 000 - recall multiplication and division facts for multiplication tables up to $12 \times 12$	use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers - recognise and use factor pairs and commutativity in mental calculations (appears also in Properties of Numbers) Pupils should have instant recall of the times tables to $12 \times 12$ showing precision and fluency	multiply two-digit and three-digit numbers by a one-digit number using formal written layout
Y5	count forwards or backwards in steps of powers of 10 for any given number up to 1000000	multiply and divide numbers mentally drawing upon known facts - multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	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 - 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

Y6		<p>perform mental calculations, including with mixed operations and large numbers - associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. 3/8) be able to calculate single digit by single digit decimal to two places eg. <math>6 \times 0.06 = 0.36</math> (copied from Fractions)</p>	<p>multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication - 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 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))</p>
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from new national curriculum

work on decimals and fractions needs to be completed in Years 1-4 before pupils begin calculations with them see Fractions and Deciamls sections. Division intially is in the fractions section.

# SION POLICY

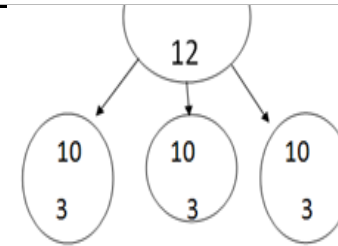
non statutory guidance	MULTIPLICATION	DIVISION
<p>They make connections between arrays, number patterns, and counting in twos, fives and tens.</p>		<p>find half of 8 sweets (divided into two groups)</p> 
<p>Pupils use a variety of language to describe multiplication and division. Pupils are introduced to the multiplication tables. They practise to become fluent in the 2, 5 and 10 multiplication tables and connect them to each other. They connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face. They begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations. Pupils work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities, to arrays and to repeated addition.</p>	 <p>Blank number lines - arrays - Enhance commutativity using arrays to reinforce</p> $2 \times 3 = 6 \qquad 3 \times 2 = 6$ $6 \div 3 = 2 \qquad 6 \div 2 = 3$	<p>half of larger quantities eg half of 40. Practical work into groups of 3 (grouping) and three groups (sharing) Blank number lines - arrays - Enhance commutativity using arrays to reinforce</p> $2 \times 3 = 6 \qquad 3 \times 2 = 6$ $6 \div 3 = 2$ $6 \div 2 = 3$ 
<p>Pupils continue to practise their mental recall of multiplication tables when they are calculating mathematical statements in order to improve fluency. Through doubling, they connect the 2, 4 and 8 multiplication tables. Pupils develop efficient mental methods, for example, using commutativity and associativity (for example, <math>4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240</math>) and multiplication and division facts (for example, using <math>3 \times 2 = 6</math>, <math>6 \div 3 = 2</math> and <math>2 = 6 \div 3</math>) to derive related facts (for example, <math>30 \times 2 = 60</math>, <math>60 \div 3 = 20</math> and <math>20 = 60 \div 3</math>).</p>	<p>Grid method - practically using squared paper and place value counters or dienes or Numicon. Emphasis of multiplying by ten is moving across a column</p> 	<p>Emphasis of dividing by ten is moving across the columns. Link multiplication and division practically using number lines for grouping and 'jar' for sharing <math>42 \div 3 =</math></p> 

Pupils practise recalling and using multiplication tables and related division facts to aid fluency. Pupils practise mental methods and extend this to three-digit numbers to derive facts, (for example  $600 \div 3 = 200$  can be derived from  $2 \times 3 = 6$ ). Pupils write statements about the equality of expressions (for example, use the distributive law  $39 \times 7 = 30 \times 7 + 9 \times 7$  and associative law  $(2 \times 3) \times 4 = 2 \times (3 \times 4)$ ). They combine their knowledge of number facts and rules of arithmetic to solve mental and written calculations for example,  $2 \times 6 \times 5 = 10 \times 6 = 60$ .

No need to move to column algorithm except for more able in Y6 as grid support algebra continue to work practically and use grid methods

$$23 \times 47$$

	40	7	
20	800	140	940
3	120	21	141
			1081



They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations. They use and understand the terms factor, multiple and prime, square and cube numbers. Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (for example,  $98 \div 4 =$  ninety-eight quarters  $= 24 \text{ r } 2 = 24$  and a half  $= 24.5 \approx 25$ . ninety-eight quarters  $= 24 \text{ r } 2 = 24$  a half  $= 24.5 \approx 25$ ). They understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalence statements (for example,  $4 \times 35 = 2 \times 2 \times 35$ ; Pupils use and explain the equals sign to indicate equivalence, including in missing number problems (for example,  $13 + 24 = 12 + 25$ ;  $33 = 5 \times \quad$ ).

No need to move to column algorithm except for more able in Y6 as grid support algebra continue to use grid methods

division using base ten practical equipment eg coins, dienes, place value counters  $52 \div 4 =$

Pupils continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency. Pupils explore the order of operations using brackets; for example,  $2 + 1 \times 3 = 5$  and  $(2 + 1) \times 3 = 9$ . Pupils should use a variety of images to support their understanding of multiplication with fractions. This follows earlier work about fractions as operators (fractions of), as numbers, and as equal parts of objects, for example as parts of a rectangle. Pupils use their understanding of the relationship between unit fractions and division to work backwards by multiplying a quantity that represents a unit fraction to find the whole quantity (for example, if one quarter of a length is 36cm, then the whole length is  $36 \times 4 = 144$ cm). Pupils are introduced to the division of decimal numbers by one-digit whole number, initially, in practical contexts involving measures and money. They recognise division calculations as the inverse of multiplication.

No need to move to column algorithm except for more able as grid support algebra most pupils to continue to use grid methods for decimals too.

2.34 x 6

	ones	tenths	hundredths	
x	2	0.3	0.04	
6	12	1.8	0.24	14.04

or

234 ( $\div 100$ ) x 6

x	200	30	4	
6	1200	180	24	1404

$1404 \div 100 = 14.04$

5 8 remainder 2 or 58% or 58.5

$$4 \overline{) 234}$$

5 8 . 5

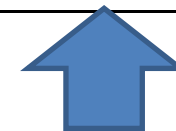
$$4 \overline{) 234.0}$$

1 0 . 8 7 5

$$4 \overline{) 43.500}$$





to be discussed with the middle/high schools which method or which first?



to be discussed with the middle/high schools which method short for decimal or compensation?

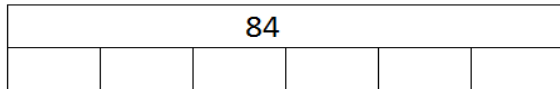
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RESOURCES	SINGAPORE METHODS	NON NEGOTIABLES
OBJECTS FOR SHARING	<p><b>1. Repeated Addition (Multiplication)</b>            Mackenzie eats 2 rolls a day. How many rolls does she eat in 5 days?  <math>2 + 2 + 2 + 2 + 2 = 10</math>  <math>2 \times 5 = 10</math>            She eats <b>10</b> rolls in 5 days.</p> 	<ul style="list-style-type: none"> <li>Count in multiples of 2, 5 and 10 forwards and backwards to</li> </ul>
counters blank number lines, numicon, straws, bead strings (for 5 and 10)	<p><b>2. The Grouping Method (Division)</b>            Mrs. Lee makes 14 sandwiches. She gives all the sandwiches equally to 7 friends. How many sandwiches does each friend receive?</p>  $14 \div 7 = 2$ Each friend receives <b>2</b> sandwiches.	<ul style="list-style-type: none"> <li>To know and understand vocabulary for +, -, x, ÷: a</li> <li>Recall x and ÷ facts in the 2, 5 and 10 table (up to 10)</li> </ul>
squared grids place value counters, dienes numicon	<p><b>5. The model that involves multiples</b>            Mrs. Drew buys 12 apples. She buys 3 times as many oranges as apples. She also buys 3 times as many cherries as oranges. How many pieces of fruit does she buy altogether?</p> <p>Apples <input type="text" value="12"/></p> <p>Oranges <input type="text" value="36"/></p> <p>Cherries <input type="text" value="108"/></p> <p style="text-align: right;">} ?</p> $13 \times 12 = 156$	<ul style="list-style-type: none"> <li>Count on and back from any number in 2s,3s,4s,5s,8s,10s,5</li> <li>Rapid recall: 2x,3x,4x,5x,8x,10, tables and their inverses</li> <li>Multiply a 2 digit by a 1 digit number</li> <li>Multiply any 10s number by a 2,3,4,5,8 or 10</li> <li>Divide 2,3,4,5,8 and 10 into a 2 digit number (no remainder)</li> </ul>

squared grids, place value counters, dienes numicon

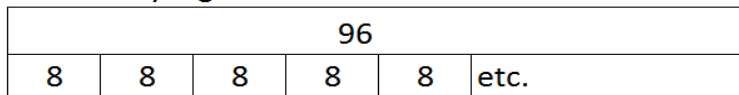
**Division involving sharing**

$84 \div 6 =$



**Division involving grouping**

How many eights in 96?



squared grids, place value counters, dienes numicon

**The model that involves creating a whole**

Ellen, Giselle, and Brenda bake 111 muffins. Giselle bakes twice as many muffins as Brenda. Ellen bakes 9 fewer muffins than Giselle. How many muffins does Ellen bake?



$(111 + 9) \div 5 = 24$

$(2 \times 24) - 9 = 39$

**The model that involves sharing**

There are 183 tennis balls in Basket A and 97 tennis balls in Basket B. How many tennis balls must be transferred from Basket A to Basket B so that both baskets contain the same number of tennis balls?

- Count in multiples of 2,3,4,5,6,7,8,9,10,25,50,100 and 100
- Recall multiplication and division facts for tables up to 12
- Multiply and divide 3 digit by a 1 digit number and show remainder
- Recognise what happens when dividing a 2 digit number by a 1 digit number
- Know what happens when multiplying by 0
- Recognise and use factor pairs within 144
- Multiply and divide decimal fractions by 10 and 100

Use related facts in multiplication and division eg  $60 \div 3 = 20$  because  $6 \div 3 = 2$

Identify multiples and factors, including finding all factors and common factors of two numbers

Know and use the vocabulary of prime numbers, prime numbers, composite numbers

Know all the prime numbers up to 19 and find prime factors

Multiply 4 digit numbers by a 2 digit number

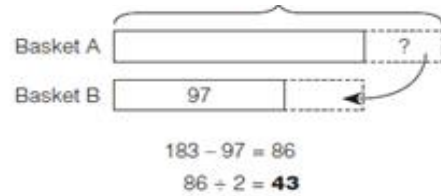
Divide a 4 digit number by a 1 digit number

Multiply and divide whole numbers and decimals by 10, 100 and 1000

Recognise and use square and cube numbers

Calculate fraction amounts of a quantity where the numerator is less than the denominator





Divide a 4 digit number by a 2 digit number

Multiply pairs of proper fractions

Divide proper fractions by a whole number

Associate fractions with division and convert between decimals

Multiply and divide by 10, 100 and 1000 giving answers with decimal places

Multiply a one digit number with up to 2 decimal places

Eg  $8.37 \times 24$

Use written method division where the answer has up to 2 decimal places

to 100

ind =  
12)

0s and 100s up to 1000

r)

0 from any given number  
x 12  
remainder when appropriate  
by 10 and 100

$$0 \div 3 = 200$$

Factor pairs of a number

Prime factors and

numbers up to 100

10, 100 and 1000

numerator is not 1

Convert fractions and

decimals up to 3

places by whole

numbers to 2 decimal