

Meadowfield Primary School

Calculation Policy

(based on the White Rose Maths Calculation Policy)

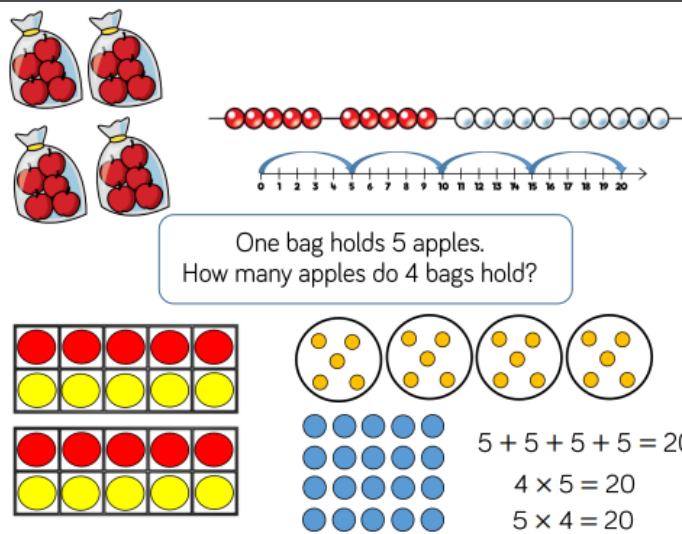
Multiplication progression

Skill	Year	Representations and models	
Solve one-step problems with multiplication	1/2	Bar model Counters	Ten frames Number lines
Multiply 2-digit by 1-digit numbers	3/4	Base 10	Short written method Expanded written method
Multiply 3-digit by 1-digit numbers	4	Base 10	Short written method
Multiply 4-digit by 1-digit numbers	5		Short written method

Skill	Year	Representations and models	
Multiply 2-digit by 2-digit numbers	5	Base 10	Short written method Grid method
Multiply 2-digit by 3-digit numbers	5		Short written method Grid method
Multiply 2-digit by 4-digit numbers	5/6	Formal written method	

Skill: Solve 1-step problems using multiplication

Year: 1/2



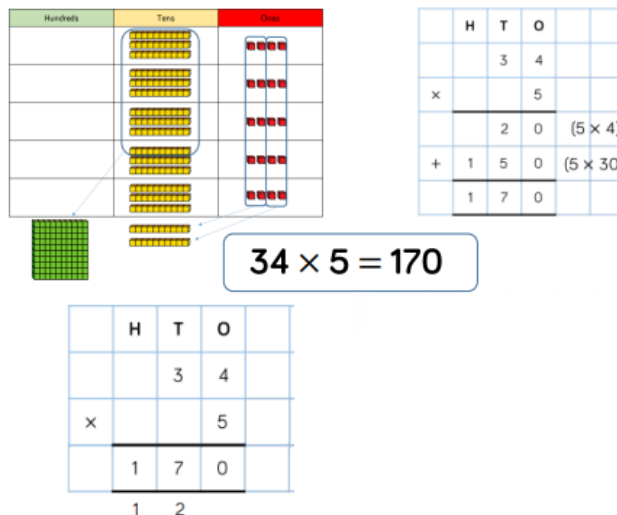
Children represent multiplication as repeated addition in many different ways.

In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record multiplication formally.

In Year 2, children are introduced to the multiplication symbol.

Skill: Multiply 2-digit numbers by 1-digit numbers

Year: 3/4

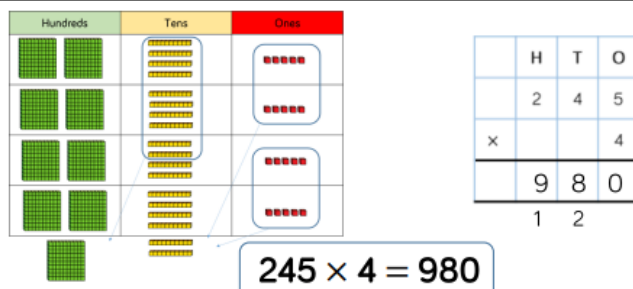


Teachers may decide to first look at the expanded column method before moving on to the short multiplication method.

The place value counters should be used to support the understanding of the method rather than supporting the multiplication, as children should use times table knowledge.

Skill: Multiply 3-digit numbers by 1-digit numbers

Year: 3/4



When moving to 3-digit by 1-digit multiplication, encourage children to move towards the short, formal written method.

Base 10 and place value counters continue to support the understanding of the written method. Limit the number of exchanges needed in the questions and move children away from resources when multiplying larger numbers.

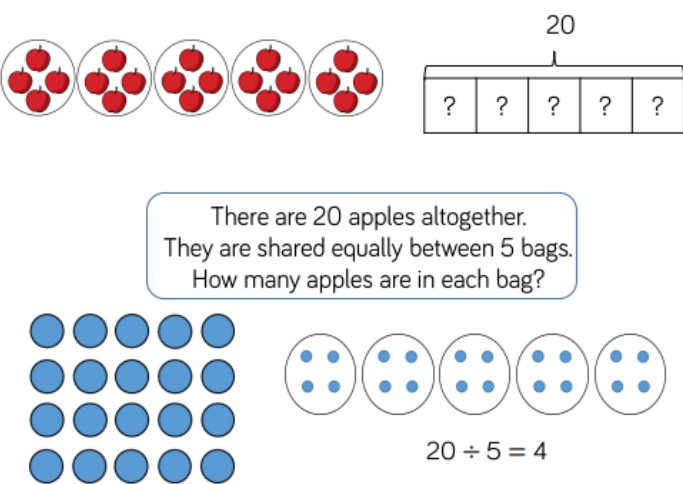
Skill: Multiply 4-digit numbers by 1-digit numbers	Year: 5																																	
<div style="border: 1px solid black; border-radius: 10px; padding: 10px; text-align: center; margin: 20px auto; width: fit-content;"> $1,826 \times 3 = 5,478$ </div> <table border="1" style="margin: 20px auto; text-align: center;"> <tr> <td></td> <td>Th</td> <td>H</td> <td>T</td> <td>O</td> </tr> <tr> <td></td> <td>1</td> <td>8</td> <td>2</td> <td>6</td> </tr> <tr> <td>×</td> <td></td> <td></td> <td></td> <td>3</td> </tr> <tr> <td></td> <td>5</td> <td>4</td> <td>7</td> <td>8</td> </tr> <tr> <td></td> <td>2</td> <td></td> <td>1</td> <td></td> </tr> </table>		Th	H	T	O		1	8	2	6	×				3		5	4	7	8		2		1		<p>When multiplying 4-digit numbers, place value counters are the best manipulative to use to support children in their understanding of the formal written method.</p> <p>If children are multiplying larger numbers and struggling with their times tables, encourage the use of multiplication grids so children can focus on the use of the written method.</p>								
	Th	H	T	O																														
	1	8	2	6																														
×				3																														
	5	4	7	8																														
	2		1																															
Skill: Multiply 2-digit numbers by 2-digit numbers	Year: 5																																	
<table border="1" style="margin: 20px auto; text-align: center;"> <tr> <td>×</td> <td>20</td> <td>2</td> </tr> <tr> <td>30</td> <td>600</td> <td>60</td> </tr> <tr> <td>1</td> <td>20</td> <td>2</td> </tr> </table> <div style="border: 1px solid black; border-radius: 10px; padding: 10px; text-align: center; margin: 20px auto; width: fit-content;"> $22 \times 31 = 682$ </div> <table border="1" style="margin: 20px auto; text-align: center;"> <tr> <td></td> <td>H</td> <td>T</td> <td>O</td> </tr> <tr> <td></td> <td></td> <td>2</td> <td>2</td> </tr> <tr> <td>×</td> <td></td> <td>3</td> <td>1</td> </tr> <tr> <td></td> <td></td> <td>2</td> <td>2</td> </tr> <tr> <td></td> <td>6</td> <td>6</td> <td>0</td> </tr> <tr> <td></td> <td>6</td> <td>8</td> <td>2</td> </tr> </table>	×	20	2	30	600	60	1	20	2		H	T	O			2	2	×		3	1			2	2		6	6	0		6	8	2	<p>When multiplying a multi-digit number by 2-digits, use the area model to help children understand the size of the numbers they are using. This links to finding the area of a rectangle by finding the space covered by the Base 10.</p> <p>The grid method matches the area model as an initial written method before moving on to the formal written multiplication method.</p>
×	20	2																																
30	600	60																																
1	20	2																																
	H	T	O																															
		2	2																															
×		3	1																															
		2	2																															
	6	6	0																															
	6	8	2																															

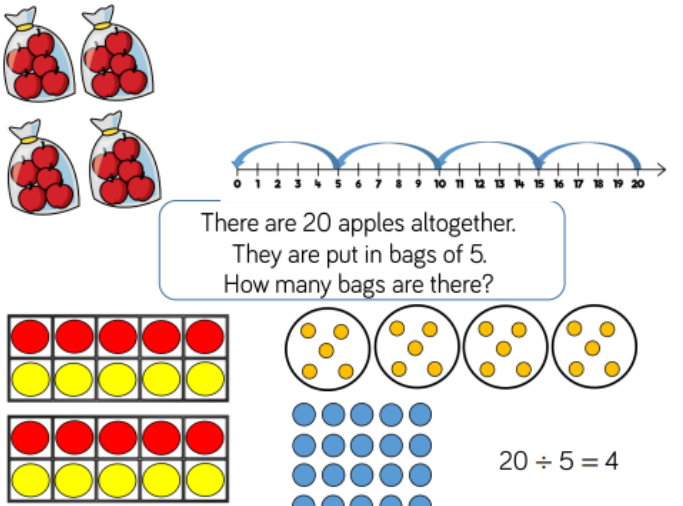
Skill: Multiply 3-digit numbers by 2-digit numbers	Year: 5																																				
<div><table><tr><th>Th</th><th>H</th><th>T</th><th>O</th></tr><tr><td></td><td>2</td><td>3</td><td>4</td></tr><tr><td>x</td><td></td><td>3</td><td>2</td></tr><tr><td></td><td>4</td><td>6</td><td>8</td></tr><tr><td>¹7</td><td>¹0</td><td>2</td><td>0</td></tr><tr><td>7</td><td>4</td><td>8</td><td>8</td></tr></table></div> <div><table><tr><td>x</td><td>200</td><td>30</td><td>4</td></tr><tr><td>30</td><td>6,000</td><td>900</td><td>120</td></tr><tr><td>2</td><td>400</td><td>60</td><td>8</td></tr></table></div> <div><div>234 × 32 = 7,488</div></div>	Th	H	T	O		2	3	4	x		3	2		4	6	8	¹ 7	¹ 0	2	0	7	4	8	8	x	200	30	4	30	6,000	900	120	2	400	60	8	<p>Children can continue to use the area model when multiplying 3-digits by 2-digits. Place value counters become more efficient to use but Base 10 can be used to highlight the size of numbers.</p> <p>Encourage children to move towards the formal written method, seeing the links with the grid method.</p>
Th	H	T	O																																		
	2	3	4																																		
x		3	2																																		
	4	6	8																																		
¹ 7	¹ 0	2	0																																		
7	4	8	8																																		
x	200	30	4																																		
30	6,000	900	120																																		
2	400	60	8																																		

Division progression


























Skill	Year	Representations and models
Solve one-step problems with division (sharing)	1/2	Bar model Real life objects Arrays Counters
Solve one-step problems with division (grouping)	1/2	Real life objects Number shapes Ten frames Number lines Arrays Counters
Divide 2-digits by 1-digit (no exchange sharing)	3	Base 10 Bar model Part-whole model
Divide 2-digits by 1-digit (sharing with exchange)	3	Base 10 Bar model Part-whole model
Skill	Year	Representations and models
Divide 2-digits by 1-digit (sharing with remainders)	3/4	Base 10 Bar model Part-whole model
Divide 2-digits by 1-digit (grouping)	4/5	Counters Place value grid Written short division
Divide 3-digits by 1-digit (sharing with exchange)	4	Base 10 Bar model Part-whole model
Divide 3-digits by 1-digit (grouping)	4/5	Counters Place value grid Written short division










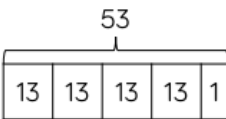
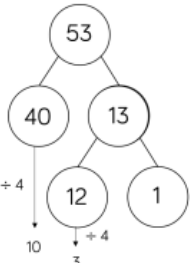
















Skill	Year	Representations and models	
Divide 4-digits by 1-digit (grouping)	5	Counters	Place value grid Written short division
Divide multi-digits by 2-digits (short division)	6	Written short division	List of multiples
Divide multi-digits by 2-digits (long division)	6	Written long division	List of multiples

Skill: Solve 1-step problems using multiplication (sharing)	Year: 1/2
 <p>There are 20 apples altogether. They are shared equally between 5 bags. How many apples are in each bag?</p> <p>$20 \div 5 = 4$</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>In Year 2, children are introduced to the division symbol.</p>

Skill: Solve 1-step problems using division (grouping)	Year: 1/2
 <p>There are 20 apples altogether. They are put in bags of 5. How many bags are there?</p> <p>$20 \div 5 = 4$</p>	<p>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 can use concrete representations in fixed groups such as number shapes which helps to show the link between multiplication and division.</p>

Skill: Divide 2-digits by 1-digit (sharing with no exchange)	Year: 1/2						
<div data-bbox="359 286 665 414"> <table border="1"> <thead> <tr> <th>Tens</th><th>Ones</th></tr> </thead> <tbody> <tr> <td>10 10</td><td>1 1 1 1</td></tr> <tr> <td>10 10</td><td>1 1 1 1</td></tr> </tbody> </table> </div> <div data-bbox="359 504 534 728"> </div> <div data-bbox="574 504 829 560"> $48 \div 2 = 24$ </div> <div data-bbox="630 582 997 750"> </div>	Tens	Ones	10 10	1 1 1 1	10 10	1 1 1 1	<p>When dividing larger numbers, children can use manipulatives that allow them to partition into tens and ones.</p> <p>Straws, Base 10 and place value counters can all be used to share numbers into equal groups.</p> <p>Part-whole models can provide children with a clear written method that matches the concrete representation.</p>
Tens	Ones						
10 10	1 1 1 1						
10 10	1 1 1 1						

Skill: Divide 2-digits by 1-digit (sharing with exchange)	Year: 3/4														
<div></div> <table border="1" data-bbox="346 916 681 1099"><thead><tr><th>Tens</th><th>Ones</th></tr></thead><tbody><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></tbody></table> <div data-bbox="766 916 979 1034"><p>52</p><table border="1"><tr><td>?</td><td>?</td><td>?</td><td>?</td></tr></table></div> <div data-bbox="352 1117 561 1370"><div><div>52</div><div><div>40</div><div>12</div></div><div><div>÷ 4</div><div>÷ 4</div></div><div><div>10</div><div>3</div></div><div>10 + 3 = 13</div></div><div data-bbox="576 1106 826 1162">$52 \div 4 = 13$</div></div>	Tens	Ones									?	?	?	?	<p>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.</p> <p>Flexible partitioning in a part-whole model supports this method.</p>
Tens	Ones														
															
															
															
															
?	?	?	?												

Skill: Divide 2-digits by 1-digit (sharing with remainders)	Year: 3/4										
<div></div> <table border="1"><thead><tr><th>Tens</th><th>Ones</th></tr></thead><tbody><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></tbody></table> <div></div> <div></div> <div>$52 \div 4 = 13 \text{ r}1$</div>	Tens	Ones									<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.</p> <p>Flexible partitioning in a part-whole model supports this method.</p>
Tens	Ones										
											
											
											
											

Skill: Divide 2-digits by 1-digit (grouping)	Year: 4/5										
<table border="1"><tr><td></td><td></td><td>1</td><td>3</td><td></td></tr><tr><td></td><td>4</td><td>5</td><td>12</td><td></td></tr></table>			1	3			4	5	12		<p>When using the short division method, children use grouping. Starting with the largest place value, they group by the divisor.</p> <p>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?'</p> <p>Remainders can also be seen as they are left ungrouped.</p>
		1	3								
	4	5	12								

Skill: Divide 3-digits by 1-digit (sharing)	Year: 4																			
<div><div>$844 \div 4 = 122$</div><div><div>844</div><div><table><tr><td>?</td><td>?</td><td>?</td><td>?</td></tr></table></div></div></div> <div><table><thead><tr><th>H</th><th>T</th><th>O</th></tr></thead><tbody><tr><td>100</td><td>10</td><td>1</td></tr><tr><td>100</td><td>10</td><td>1</td></tr><tr><td>100</td><td>10</td><td>1</td></tr><tr><td>100</td><td>10</td><td>1</td></tr></tbody></table></div> <div><div><div>844</div><div><div>800</div><div>40</div><div>4</div></div><div><div>$\div 4$</div><div>$\div 4$</div><div>$\div 4$</div></div></div></div> <div><div>$844 \div 4 = 122$</div><div><div><div>856</div><div><div>800</div><div>40</div><div>16</div></div><div><div>$\div 4$</div><div>$\div 4$</div><div>$\div 4$</div></div></div></div></div>	?	?	?	?	H	T	O	100	10	1	100	10	1	100	10	1	100	10	1	<p>Children can continue to use place value counters to share 3-digit numbers into equal groups. Children should start with the equipment outside the place value grid before sharing the hundreds, tens and ones equally between the rows. This method can also help to highlight remainders. Flexible partitioning in a part-whole model supports this method.</p>
?	?	?	?																	
H	T	O																		
100	10	1																		
100	10	1																		
100	10	1																		
100	10	1																		

Skill: Divide 3-digits by 1-digit (grouping)	Year: 5										
<div><table><tr><td></td><td></td><td>2</td><td>1</td><td>4</td></tr><tr><td></td><td>4</td><td>8</td><td>5</td><td>16</td></tr></table></div> <div>856 ÷ 4 = 214</div>			2	1	4		4	8	5	16	<p>Children can continue to use grouping to support their understanding of short division when dividing a 3-digit number by a 1-digit number.</p> <p>Place value counters or plain counters can be used on a place value grid to support this understanding. Children can also draw their own counters and group them through a more pictorial method.</p>
		2	1	4							
	4	8	5	16							

Skill: Divide 4-digits by 1-digit (grouping)	Year: 5
<div> <div> <div></div> <div>4</div> <div>2</div> <div>6</div> <div>6</div> </div> <div> <div>2</div> <div>8</div> <div>5</div> <div>13</div> <div>12</div> </div> </div> <div> $8,532 \div 2 = 4,266$ </div>	<p>Place value counters or plain counters can be used on a place value grid to support children to divide 4-digits by 1-digit. Children can also draw their own counters and group them through a more pictorial method.</p> <p>Children should be encouraged to move away from the concrete and pictorial when dividing numbers with multiple exchanges.</p>

Skill: Divide multi digits by 2-digits (short division)	Year: 6
<div> <div> <div></div> <div></div> <div>0</div> <div>3</div> <div>6</div> </div> <div> <div>12</div> <div>4</div> <div>43</div> <div>72</div> </div> </div> <div> $432 \div 12 = 36$ </div> <div> <div> <div></div> <div>0</div> <div>4</div> <div>8</div> <div>9</div> </div> <div> <div>15</div> <div>7</div> <div>73</div> <div>133</div> <div>135</div> </div> </div> <div> $7,335 \div 15 = 489$ </div> <div> <div>15</div> <div>30</div> <div>45</div> <div>60</div> <div>75</div> <div>90</div> <div>105</div> <div>120</div> <div>135</div> <div>150</div> </div>	<p>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.</p>

Skill: Divide multi-digits by 2-digits (long division)	Year: 6
<div> <div> <div> <div></div> <div>0</div> <div>3</div> <div>6</div> </div> <div> <div>1</div> <div>2</div> <div>4</div> <div>3</div> <div>2</div> </div> <div> <div>-</div> <div>3</div> <div>6</div> <div>0</div> </div> <div> <div></div> <div></div> <div>7</div> <div>2</div> </div> <div> <div>-</div> <div></div> <div>7</div> <div>2</div> </div> <div> <div></div> <div></div> <div></div> <div>0</div> </div> </div> <div> <div>(x30)</div> <div>(x6)</div> </div> <div> <div>12 × 1 = 12</div> <div>12 × 2 = 24</div> <div>12 × 3 = 36</div> <div>12 × 4 = 48</div> <div>12 × 5 = 60</div> <div>12 × 6 = 72</div> <div>12 × 7 = 84</div> <div>12 × 8 = 96</div> <div>12 × 7 = 108</div> <div>12 × 10 = 120</div> </div> <div> $432 \div 12 = 36$ </div> <div> <div> <div></div> <div>0</div> <div>4</div> <div>8</div> <div>9</div> </div> <div> <div>15</div> <div>7</div> <div>3</div> <div>3</div> <div>5</div> </div> <div> <div>-</div> <div>6</div> <div>0</div> <div>0</div> <div>0</div> </div> <div> <div></div> <div>1</div> <div>3</div> <div>3</div> <div>5</div> </div> <div> <div>-</div> <div>1</div> <div>2</div> <div>0</div> <div>0</div> </div> <div> <div></div> <div></div> <div>1</div> <div>3</div> <div>5</div> </div> <div> <div>-</div> <div></div> <div>1</div> <div>3</div> <div>5</div> </div> <div> <div></div> <div></div> <div></div> <div></div> <div>0</div> </div> </div> <div> <div>(x40)</div> <div>(x80)</div> <div>(x9)</div> </div> <div> <div>1 × 15 = 15</div> <div>2 × 15 = 30</div> <div>3 × 15 = 45</div> <div>4 × 15 = 60</div> <div>5 × 15 = 75</div> <div>10 × 15 = 150</div> </div> <div> $7,335 \div 15 = 489$ </div> </div>	<p>Children can also divide by 2-digit numbers using long division.</p> <p>Children can write out multiples to support their calculations with larger remainders.</p> <p>Children will also solve problems with remainders where the quotient can be rounded as appropriate.</p>

Skill: Divide multi digits by 2-digits (long division)								Year: 6																																															
<div>$372 \div 15 = 24 \text{ r}12$</div>								<p>$1 \times 15 = 15$ $2 \times 15 = 30$ $3 \times 15 = 45$ $4 \times 15 = 60$ $5 \times 15 = 75$ $10 \times 15 = 150$</p>																																															
<table><tr><td></td><td></td><td></td><td>2</td><td>4</td><td>r</td><td>1</td><td>2</td></tr><tr><td>1</td><td>5</td><td>3</td><td>7</td><td>2</td><td></td><td></td><td></td></tr><tr><td></td><td>-</td><td>3</td><td>0</td><td>0</td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td>7</td><td>2</td><td></td><td></td><td></td></tr><tr><td></td><td>-</td><td></td><td>6</td><td>0</td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td>1</td><td>2</td><td></td><td></td><td></td></tr></table>													2	4	r	1	2	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																																																			
<div>$372 \div 15 = 24 \frac{4}{5}$</div>								<p>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.</p> <p>Children can also answer questions where the quotient needs to be rounded according to the context.</p>																																															
<table><tr><td></td><td></td><td></td><td>2</td><td>4</td><td></td><td></td><td></td></tr><tr><td>1</td><td>5</td><td>3</td><td>7</td><td>2</td><td></td><td></td><td></td></tr><tr><td></td><td>-</td><td>3</td><td>0</td><td>0</td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td>7</td><td>2</td><td></td><td></td><td></td></tr><tr><td></td><td>-</td><td></td><td>6</td><td>0</td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td>1</td><td>2</td><td></td><td></td><td></td></tr></table>													2	4				1	5	3	7	2					-	3	0	0							7	2					-		6	0							1	2	
			2	4																																																			
1	5	3	7	2																																																			
	-	3	0	0																																																			
			7	2																																																			
	-		6	0																																																			
			1	2																																																			

Glossary

Array – An ordered collection of counters, cubes or other item in rows and columns.

Commutative – Numbers can be multiplied in any order.

Dividend – In division, the number that is divided.

Divisor – In division, the number by which another is divided.

Exchange – Change a number or expression for another of an equal value.

Factor – A number that multiplies with another to make a product.

Multiplicand – In multiplication, a number to be multiplied by another.

Partitioning – Splitting a number into its component parts.

Product – The result of multiplying one number by another.

Quotient – The result of a division

Remainder – The amount left over after a division when the divisor is not a factor of the dividend.

Scaling – Enlarging or reducing a number by a given amount, called the scale factor