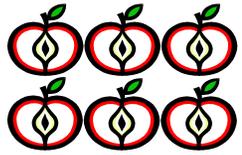
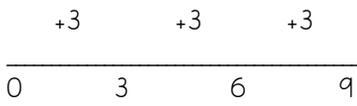
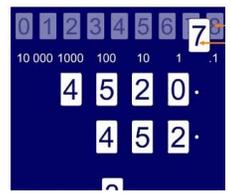


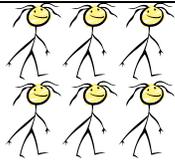


Newdale Primary school Maths Calculation Policy – Multiplication

Rec	Rec into Year 1	Year 2	Year 3
<p>Jumping along number lines in jumps of 1,2,5 & 10.</p> <p>Understand that multiplication is repeated addition, use practical equipment to understand.</p> <p>Be able to double numbers to 10.</p> <p>Know that multiplication is commutative so can be done in any order.</p> <p>Use practical apparatus to show doubles of numbers.</p> <div style="text-align: center;">  <p>$1 + 1 = 2$ double 1 is 2</p>  <p>$2 + 2 = 4$ double 2 is 4</p> </div> <p>Use a number line to show repeated addition as a way to multiply –use concrete models to make the link.</p> <div style="text-align: center;">   </div> <p><i>Pictures to show 2 lots of 3 or 3 lots of 2.</i></p>	<p>KPI: Solve one step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays, with the support of the teacher.</p> <p>Count in 2s, 5s and 10s and begin counting in 3s.</p> <div style="text-align: center;">  </div> <p>Show multiplication using pictures as repeated addition.</p> <div style="text-align: center;">  </div> <p>1 group of 3 = 3 and 2 groups of 3 = 6</p> <p>$3 \times 2 = 6$ three lots/groups of 2</p> <p>Use apparatus to double numbers and quantities to 10.</p> <p><u>Repeated Addition on a numberline</u> Recording repeated addition on a numberline.</p> <div style="text-align: center;">  </div> <p>Introduce the x symbol once repeated addition is understood.</p> <p>Understand patterns when dealing with multiples –</p>	<p>KPI: Recall and use multiplication facts for the 2, 5 and 10 times tables, including recognising odd and even numbers.</p> <p>Know tables facts 2s, 10s and 5s and begin counting in 3s and 4s</p> <p>Calculate mathematical statements for multiplication within the multiplication tables and write them using x and =</p> <p>Know that multiplication of two numbers can be done in any order (commutative).</p> <p>Solve problems involving multiplication using materials, arrays, repeated addition, mental methods and multiplication facts, including problems in context.</p> <p>Consolidate arrays and repeated addition.</p> <div style="text-align: center;">  </div> <p>$5 \times 3 =$ 'I have 3 groups of 5, so I need 3 jumps on the numberline.'</p> <p>Understand what happens to a number when you multiply it by 10; be able to explain the movement of the digits.</p> <p>http://www.taw.org.uk/lic/itp/mov_digits.html</p> <div style="text-align: center;">  </div>	<p>KPI: Count from 0 in multiples of 4, 8, 50 and 100.</p> <p>Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including 2-digit and 3 digit numbers x 1 digit numbers, using mental and progressing to written methods.</p> <p>Solve problems, including missing number problems, involving multiplication with corresponding problems in which <i>n</i> objects are connected to <i>m</i> objects.</p> <p>Recall and use multiplication facts for the 3,4 and 8 times tables, in addition to 2,3, 5 and 10 Be able to recall facts in any order.</p> <p>Multiply one and two digit numbers by 100, be able to explain the movement of the digits.</p> <p>Understand that multiplication can be done in any order/commutative law and it is the inverse of division.</p> <p>Informal recording of partitioned numbers</p> <p>$15 \times 5 = 75$</p> <p>$10 \times 5 = 50$ $5 \times 5 = 25$ $50 + 25 = 75$</p> <p>$24 \times 3 =$</p> <p>$20 \times 3 = 60$ $4 \times 3 = 12$ $60 + 12 = 72$</p>



Newdale Primary school Maths Calculation Policy – Multiplication



2 lots of 3 = 6
3 lots of 2 = 6

describe the pattern, what number will come next?
Will 4+7 be in the pattern? Why? How do you know?

Use multiplication in a range of different contexts.

E.g. with money. Counting in 2,5,10ps using questions such as
- How many groups of 2ps make 14p?
- What is the value of 4 groups of 2ps?
With practical reinforcement.

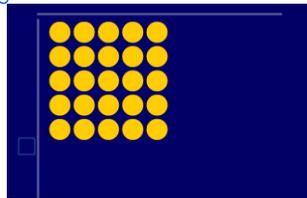
Array

'8 lots of 3'
'3 groups of 8'

*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*

Use ITP Multiarray facts to show arrays and different ways of recording.

http://www.mathsmap.co.uk/uploads/Image/Resources%20from%20Steps%20CD/level_3_4/downloads/multiarray.swf



Mastery check –

Captain Conjecture says, 'I can double any number, but I can only halve some numbers.'

Do you agree?

Explain your reasoning.

Show 19p using only 2p, 5p and 10p coins.

Find three different ways to do it.



See NCETM materials for more examples

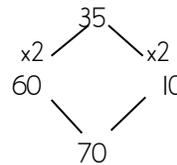
Know that doubles are the same as x2

Use accurate vocabulary including double, multiply, groups of, sets of, lots of.

Quick recall of facts.

Use partitioning as a strategy for doubling

Double 35 = 30 x 2 + 5 x 2



Develop this into
30 x 2 = 60
5 x 2 = 10

Recognise the use a symbols which are replacing unknown numbers and signs.

E.g. $\triangle \times 4 = 20$

$\bigcirc \times 10 = 50$

Link facts to number dials and dartboards – Wmnet Gordons

Application of multiplication facts in different contexts e.g. multiplication triangles (reinforcing division)

Mastery check – See NCETM materials for more examples

This array represents $5 \times 3 = 15$.



Write three other multiplication or addition facts that this array shows.

Write one division fact that this array shows.

Sally buys 3 cinema tickets costing £5 each. How much does she spend?

Write this multiplication number sentence and calculate the cost.

If Sally paid with a £20 note, how much change would she get?

Find different ways to find the answer to 12×4 .



Children are expected to use their 2, 5 and 10 times tables to answer this question.

Together Rosie and Jim have £12.

Rosie has twice as much as Jim.

How much does Jim have?

The bar model can be helpful in solving these types of problems.

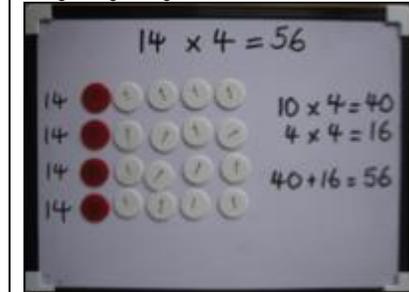
Rosie $\square \square \square \square \square \square \square \square$ £12

Jim $\square \square \square$

$12 \div 3 = 4$

Jim has £4

Use the grid method for multiplication when x 2 digits by 1 digit numbers.



x	30	5
7	210	35

210 + 35 = 245

Use digit counters to support.

Extend to bigger numbers

$146 \times 9 = 1314$

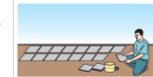
X	100	40	6
9	900	360	54

Addition to be done either mentally or across.

Mastery check –



Roger is having tiles. He has 84 tiles altogether. How many complete rows of tiles can he make?



Roger has 96 patio slabs. Using all of the slabs find three different ways that he can arrange the slabs to form a rectangular patio.

Complete the following: $3 \times \square = 12$ $4 \times \square = 20$

$\square \times 3 = 15$ $8 \times \square = 24$

$\square \square \times \square = 7$

Putting the digits 1, 2 and 3 in the empty boxes, how many different calculations can you make?

Which one gives the largest answer?

Which one gives the smallest answer?

Use a column method to calculate the following:

123×3 324×4 234×8

Find the missing digits.

$\square \square \square \times \square = 7$	$\square \square \square \times \square = 7$	$\square \square \square \times \square = 4$
$\begin{array}{r} \square \\ \times \square \\ \hline \square \square \end{array}$	$\begin{array}{r} \square \\ \times \square \\ \hline \square \square \end{array}$	$\begin{array}{r} \square \\ \times \square \\ \hline \square \square \end{array}$

See NCETM materials for more examples



Newdale Primary school Maths Calculation Policy – Multiplication

Year 4	Year 5	Year 6																																											
<p>KPI: Know table facts up to 12 x 12</p> <p>Count in multiples of 6,7,9, 25 and 100.</p> <p>Use place value, known derived facts to multiply mentally</p> <ul style="list-style-type: none"> - Including multiplying by 0 and 1 - Including multiplying together three numbers. <p>Recognise and use factor pairs and commutativity in mental calculations.</p> <p>Solve problems, including missing number problems, involving multiplication with harder corresponding problems in which n objects are connected to m objects and including using the distributive law to multiply two-digit numbers by 1 digit and integer scaling problems.</p> <p>Explain the effect of multiplying by 10 and 100</p> <p>Partition TU x U, HTU x TU, HTU x HTU</p> <p>Multiply 2 digit and 3 digit numbers by a 1 digit number using a formal written layout</p> <p>Consolidate grid method</p> <p>$146 \times 9 = 1314$</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>X</td> <td>100</td> <td>40</td> <td>6</td> </tr> <tr> <td>9</td> <td>900</td> <td>360</td> <td>54</td> </tr> </table> <p>Move then onto longer multiplication using U</p> <p>Mastery check –</p> <p>What do you notice about the following calculations? Can you use one calculation to work out the answer to other calculations?</p> <table style="font-size: small;"> <tr> <td>$2 \times 3 =$</td> <td>$6 \times 7 =$</td> <td>$9 \times 8 =$</td> </tr> <tr> <td>$2 \times 30 =$</td> <td>$6 \times 70 =$</td> <td>$9 \times 80 =$</td> </tr> <tr> <td>$2 \times 300 =$</td> <td>$6 \times 700 =$</td> <td>$9 \times 800 =$</td> </tr> <tr> <td>$20 \times 3 =$</td> <td>$60 \times 7 =$</td> <td>$90 \times 8 =$</td> </tr> <tr> <td>$200 \times 3 =$</td> <td>$600 \times 7 =$</td> <td>$900 \times 8 =$</td> </tr> </table> <p>Place one of these symbols in the circle to make the number sentence correct. >, < or =.</p> <p>Explain your reasoning.</p> <table style="font-size: small;"> <tr> <td>8×50</td> <td>50×8</td> </tr> <tr> <td>8×50</td> <td>80×5</td> </tr> <tr> <td>300×3</td> <td>5×200</td> </tr> </table>	X	100	40	6	9	900	360	54	$2 \times 3 =$	$6 \times 7 =$	$9 \times 8 =$	$2 \times 30 =$	$6 \times 70 =$	$9 \times 80 =$	$2 \times 300 =$	$6 \times 700 =$	$9 \times 800 =$	$20 \times 3 =$	$60 \times 7 =$	$90 \times 8 =$	$200 \times 3 =$	$600 \times 7 =$	$900 \times 8 =$	8×50	50×8	8×50	80×5	300×3	5×200	<p>KPI: Identify factors and multiples, including finding all factor pairs of a number and common factors of two numbers.</p> <p>Solve problems involving multiplication where larger numbers are used by decomposing them into their factors.</p> <p>Multiply numbers up to 4 digits by a 1 or 2 digit number, using a formal written method, including long multiplication for 2 digit numbers (Th HTU, HTU, TU x TU and U)</p> <p>Multiply numbers mentally by drawing on known facts.</p> <p>Multiply whole numbers and those involving decimals by 10, 100 and 1000.</p> <p>Recognise and use square numbers and cube numbers. Solve problems involving multiplication, including their knowledge of factors, multiples, squares and cubes.</p> <p>Know table facts up to 12 x 12</p> <p>Short Multiplication</p> <p>Progress into short when ready</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: right;">78</td> <td style="text-align: left;">78</td> </tr> <tr> <td style="text-align: right;"><u>x 42</u></td> <td style="text-align: left;"><u>x42</u></td> </tr> <tr> <td style="text-align: right;">16 (2 x 8)</td> <td style="text-align: left;">15.6</td> </tr> <tr> <td style="text-align: right;">140 (2 x 70)</td> <td style="text-align: left;"><u>31.20</u></td> </tr> <tr> <td style="text-align: right;">320 (40 x 8)</td> <td style="text-align: left;"><u>3 276</u></td> </tr> <tr> <td style="text-align: right;"><u>2800 (40 x 70)</u></td> <td></td> </tr> <tr> <td style="text-align: right;"><u>3276</u></td> <td></td> </tr> </table> <p style="margin-left: 40px;">346</p> <p style="margin-left: 40px;"><u>x 9</u></p> <p style="margin-left: 40px;">54 (9 x 6)</p> <p style="margin-left: 40px;">360 (9 x 40)</p> <p style="margin-left: 40px;"><u>2 7.00 (9 x 300)</u></p> <p style="margin-left: 40px;"><u>3 1 1 4</u></p>	78	78	<u>x 42</u>	<u>x42</u>	16 (2 x 8)	15.6	140 (2 x 70)	<u>31.20</u>	320 (40 x 8)	<u>3 276</u>	<u>2800 (40 x 70)</u>		<u>3276</u>		<p>Know all times tables to 12 and corresponding divisions.</p> <p>Children to choose suitable method for number size.</p> <p>Children need to recognise and use cubed numbers up to 12 x 12</p> <p>Long Multiplication (HTU x TU)</p> <p>$124 \times 13 = 1612$</p> $ \begin{array}{r} 124 \\ \underline{13} \\ 372 \\ 1240 \\ \underline{1612} \end{array} $ <p>Progress onto larger numbers. (HTU x HTU)</p> <p>Least significant digit first.</p> <p>124×26 becomes</p> $ \begin{array}{r} 124 \\ \underline{26} \\ 744 \\ \underline{2480} \\ 3224 \\ \underline{11} \\ 3224 \end{array} $ <p>Answer: 3224</p> <p>Decimals – Teach children to use known facts to build new facts, eg.</p> <p>0.75×6</p> <p>$0.7 \times 6 = 4.2$</p> <p>$0.05 \times 6 = 0.3$</p> <p>$0.75 \times 6 = 4.5$</p>
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Newdale Primary school Maths Calculation Policy – Multiplication

Three children calculated 7×6 in different ways. Identify each strategy and complete the calculations.

Annie
 $7 \times 6 = 7 \times 5 + \square$
 $= \square$

Bertie
 $7 \times 6 = 7 \times 7 - \square$
 $= \square$

Cara used the commutative law
 $7 \times 6 = \square \times \square$
 $= \square$

Multiply a number by itself and then make one factor one more and the other one less. What happens to the product?

E.g.
 $4 \times 4 = 16$ $6 \times 6 = 36$
 $5 \times 3 = 15$ $7 \times 5 = 35$

What do you notice? Will this always happen?

Now find the answer to 6×9 in three different ways.

See NCETM materials for more examples.

Use short multiplication using least significant digit first.

24×6 becomes

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

Answer: 144

342×7 becomes

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

Answer: 2394

2741×6 becomes

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

Answer: 16446

Long Multiplication

24×16 becomes

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

Answer: 384

Mastery check –

- 8 is a multiple of and a factor of
- 6 is a multiple of and a factor of
- is a multiple of and a factor of
- is a multiple of and a factor of

Captain Conjecture says, Factors come in pairs so all numbers have an even number of factors.

Do you agree?
Explain your reasoning.

A 50 cm length of wood is cut into 4 cm pieces. How many 4 cm pieces are cut and how much wood is left over?



Fill in the blanks to represent the problem as division:
 \div = remainder
 Fill in the blanks to represent the problem as multiplication:
 \times = 50

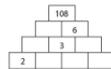
A 1 m piece of ribbon is cut into equal pieces and a piece measuring 4 cm remains.

What might the lengths of the equal parts be?

In how many different ways can the ribbon be cut into equal pieces?



Fill in the missing numbers in this multiplication pyramid.



Put the numbers 1, 2, 3 and 4 in the bottom row of this multiplication pyramid in any order you like.

What different numbers can you get on the top of the number pyramid? How can you make the largest number?

Explain your reasoning.



See NCETM materials for more examples.

Mastery check –

Find numbers to complete these number sentences.

- $736 + 23 = \square$ $\square \times 100 = 2400$ $\square \times 100 = 10 \times \square$
- $7360 + 230 = \square$ $25 \times \square = 200$ $25 \times \square = 4 \times \square$
- $230 \times 24 = \square$ $23 \times \square = 161$ $23 \times \square = 161 \times \square$
- $240 \times 23 = \square$ $24 \times \square = 168$ $24 \times \square = 168 \times \square$
- $1668 \div 8 = \square$ $161 = \square - 23$ $161 = \square \div 23 \times \square$
- $2085 \times 8 = \square$ $\square + 25 = 9$ $\square \div 25 = 9 \times \square$

Fill in the missing numbers to make these number sentences true.

- $\square \times \square = 864$
- $\square \times \square \times \square = 864$

Miriam and Alan each buy 12 tins of tomatoes.
 Miriam buys 3 packs each containing 4 tins. A pack of 4 costs £1.40.
 Alan buys 2 packs each containing 6 cans. A pack of 6 costs £1.90.
 Who gets the most change from a £5 note?

Miriam buys 19 tins of soap. All the tins cost the same price.
 She goes to the shop with just one note, and comes home with the tins and the change in coins. On the way home she drops the change. She looks carefully and she thinks she picks it all up. When she gets home she gives £2.22 change to her mother.
 Do you think that Miriam picked up all the change that she dropped?

Explain your reasoning.

See NCETM materials for more examples.