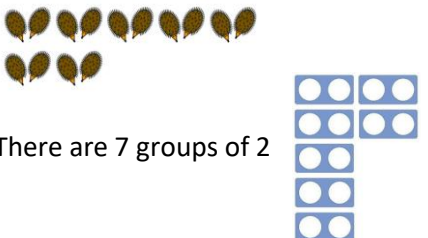
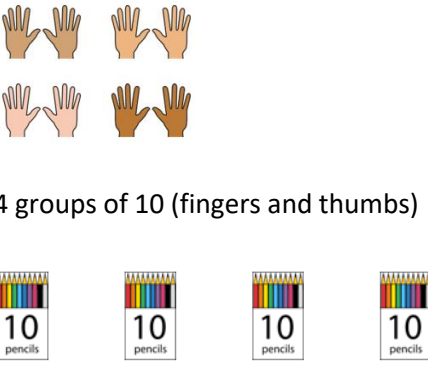
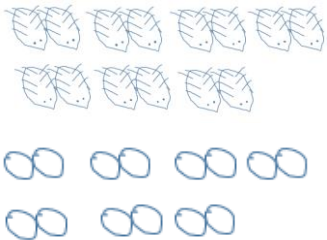
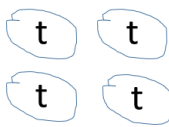
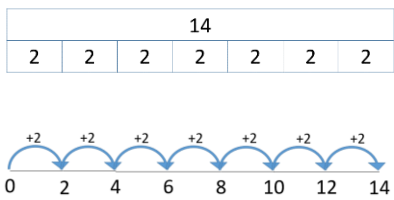
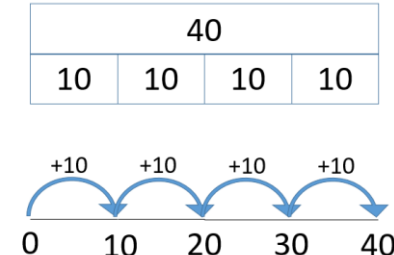


Sledmere and Wetwang Federation Calculation Policy

EYFS Multiplication

	Mental Strategies	Concrete	Pictorial	Abstract	Vocabulary	Models, Images and resources
EYFS	The link between addition and multiplication should be introduced through doubling. If available, Numicon is used to visualise the repeated adding of the same number. These can then be drawn around or printed as a way of recording.  Real life contexts and use of practical equipment to count in repeated groups of the same size: How many wheels are there altogether?  Count in twos; fives; tens both aloud and with objects.	Repeated grouping/repeated addition 	Children to draw the concrete resources they are using. 	Write the number sentence $2 + 2 + 2 = 6$	Lots of Groups of Times Repeated addition Double	100 square Number lines Number tracks Bead strings (for children) Bead bar Tens Frame Numicon Place Value Disks Cuisenaire Base tens and ones
	Useful IWB links for manipulatives	https://www.coolmath4kids.com/manipulatives/base-ten-blocks https://mathsbot.com/manipulatives/placeValueCounters https://mathsbot.com/manipulatives/bar https://classroomsecrets.co.uk/free-year-1-part-whole-model-iwb-addition-and-subtraction-activity/ https://www.nctm.org/Classroom-Resources/Illuminations/Interactives/Ten-Frame/ http://www.ictgames.com/mobilePage/tenFrame/index.html				

Year One Multiplication

	Mental Strategies	Concrete	Pictorial	Abstract	Vocabulary	Models, Images and resources
Year 1	Count on from and back to zero in ones, twos, fives or tens Make connections between arrays, number patterns, and counting in twos, fives and tens.	<u>Repeated Addition – Counting in 2s</u> Use images of different objects  There are 7 groups of 2 <u>Repeated addition – Counting in Tens</u> Use images of different objects – including Numicon  4 groups of 10 (fingers and thumbs)	<u>Repeated Addition - – Counting in 2s</u> Draw the objects  There are 7 groups of 2 <u>Repeated addition – Counting in Tens</u> Draw the objects  4 groups of ten (t represents ten)	<u>Repeated Addition - – Counting in 2s</u> Can use bar model, number line and equation  $2 + 2 + 2 + 2 + 2 + 2 + 2 = 14$ <u>Repeated addition – Counting in Tens</u> As above  $10 + 10 + 10 + 10 = 40$	Lots of Groups of Times Repeated addition Double Sets Groups, Pairs Array	100 square Number lines Number tracks Bead strings (for children) Bead bar Tens Frame Numicon Place Value Disks Cuisenaire Base tens and ones

4 groups of 10 pens

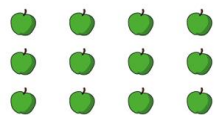
18 – 5 using counters

Repeated addition – Counting in Fives

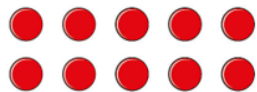
Please follow the guidance from counting in 2s and 10s – exactly the same principle

Using arrays

Explain the language of columns and rows. Use concrete apparatus.



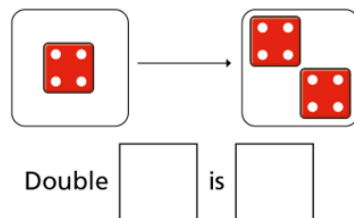
There are 3 apples in each column.
There are 4 columns.
There are 12 apples altogether.



There are 5 counters in each row.
There are 2 rows.
There are 10 counters altogether.

Doubling

Use lots of different manipulatives to support doubling numbers



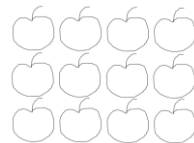
Try to avoid pupils drawing out ALL ten objects 4 times.

Repeated addition – Counting in Fives

Please follow the guidance from counting in 2s and 10s – exactly the same principle

Using arrays

Explain the language of columns and rows. Children can draw the arrays



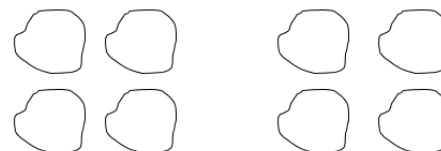
There are 3 apples in each column.
There are 4 columns.
There are 12 apples altogether.



There are 5 counters in each row.
There are 2 rows.
There are 10 counters altogether.

Doubling

Children can draw it



Repeated addition – Counting in Fives

Please follow the guidance from counting in 2s and 10s – exactly the same principle

Using arrays

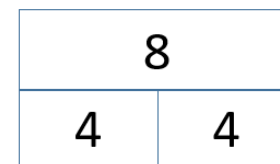
Explain the language of columns and rows

$$3 + 3 + 3 + 3 = 12$$

$$5 + 5 = 10$$

Doubling

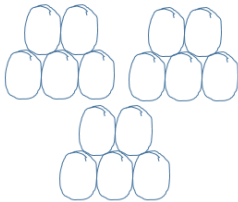
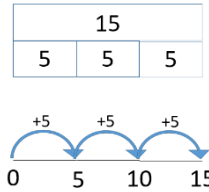
Use a bar model and equation

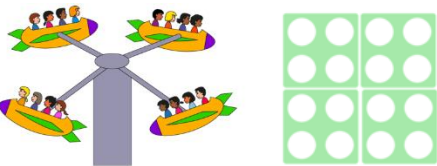
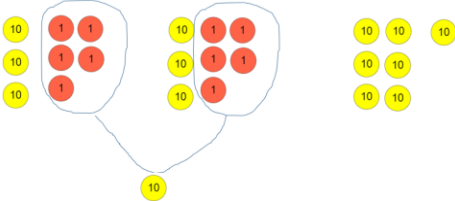
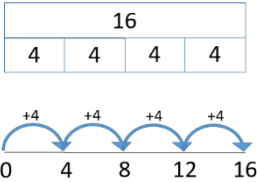
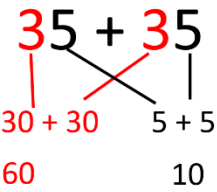


$$4 + 4 = 8$$

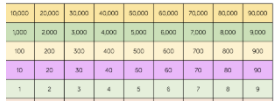
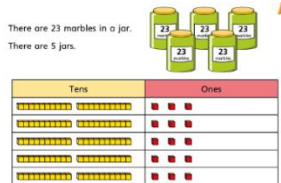
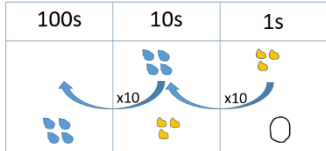
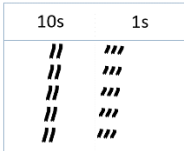
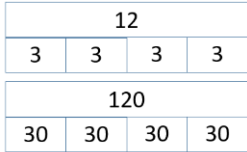
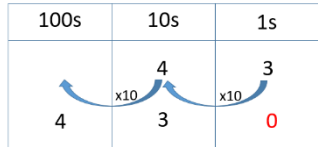
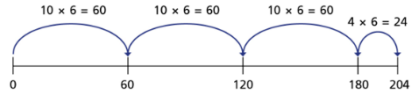
		Solve simple one-step problems, calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. Understanding multiplication as an array: see above. Practical problem solving activities involving equal sets or groups. Through grouping small quantities, pupils should begin to understand multiplication; doubling numbers and quantities.		
	Useful IWB links for manipulatives	https://www.coolmath4kids.com/manipulatives/base-ten-blocks https://mathsbot.com/manipulatives/placeValueCounters https://mathsbot.com/manipulatives/bar https://classroomsecrets.co.uk/free-year-1-part-whole-model-iwb-addition-and-subtraction-activity/ https://www.nctm.org/Classroom-Resources/Illuminations/Interactives/Ten-Frame/ http://www.ictgames.com/mobilePage/tenFrame/index.html		

Year Two Multiplication

	Mental Strategies	Concrete	Pictorial	Abstract	Vocabulary	Models, Images and resources
Year 2	Practise to become fluent in recall and use of multiplication facts for the 2, 5 and 10 multiplication tables, (connect the 10x table to place value, and the 5x table to the divisions on the clock face) Double any multiple of 5 up to 50, eg. double 35 Find the total number of objects when they are	<u>Fluent in the recall and calculations of 2, 5 and 10 multiplication tables</u> Please see the guidance for Year 1 Here is one example  3 equal groups of 5 equals 15 eggs <u>Using arrays</u> Please see the guidance for Year 1 and	<u>Fluent in the recall and calculations of 2, 5 and 10 multiplication tables</u> Please see the guidance for Year 1 Here is one example – hand drawn  <u>Using arrays</u> Please see the guidance for Year 1 and using arrays below	<u>Fluent in the recall and calculations of 2, 5 and 10 multiplication tables</u> Please see the guidance for Year 1  Introduce the multiplication symbol 5 + 5 + 5 = 5 x 3 = 15 <u>Using arrays</u> Please see the guidance for Year 1 and using arrays below	Lots of Groups of Times Repeated addition Double Sets Groups, Pairs Array	100 square Number lines Number tracks Bead strings (for children) Bead bar Tens Frame Numicon Place Value Disks

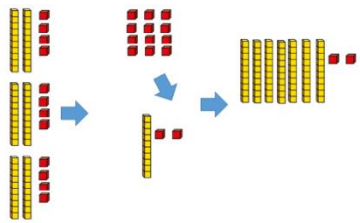
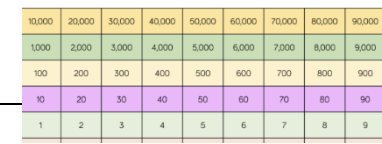
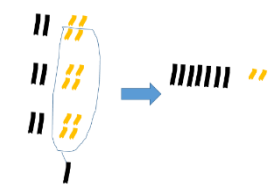
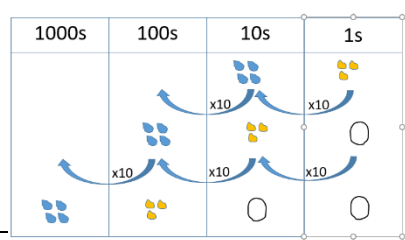
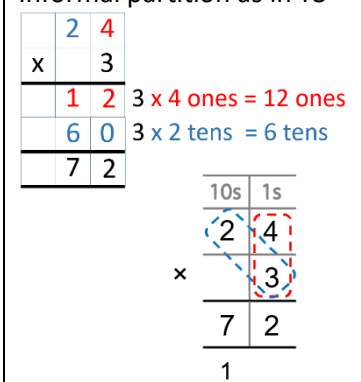
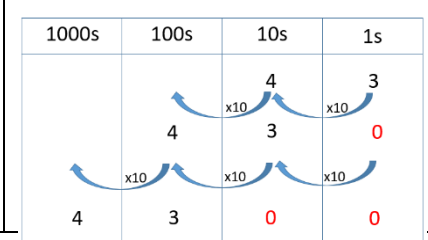
organised into groups of 2, 5 or 10 Recognise odd and even numbers Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot. Introduce the symbol for multiplication	using arrays below <u>Recognising Multiplication with other factors</u>  four groups of four children Numicon can be used too. <u>Doubling</u> See Y1. Children need to double multiples of 10 to 100, then double multiples of 5 to 100 E.g. 35 doubled – use counters – 	<u>Recognising Multiplication with other factors</u>  four groups of four children <u>Doubling</u> See Y1. Children need to double multiples of 10 to 100, then double multiples of 5 to 100 E.g. 35 doubled Can be drawn 	<u>Recognising Multiplication with other factors</u>   $4 + 4 + 4 + 4 = 4 \times 4$ <u>Doubling</u> See Y1. Children need to double multiples of 10 to 100, then double multiples of 5 to 100 E.g. 35 doubled 	symbol x times as big ...as wide ...as long	Cuisenaire Base hundreds tens and ones Arrow Cards
Useful IWB links for manipulatives	Calculate mathematical statements and write them using the multiplication (x) and equals (=) signs Solve one-step x problems using materials, arrays, repeated addition and x facts, include problems in contexts. Understand multiplication as repeated addition Begin recording subtraction in columns to support understanding of place value and prepare for efficient written methods https://www.coolmath4kids.com/manipulatives/base-ten-blocks https://mathsbot.com/manipulatives/placeValueCounters https://mathsbot.com/manipulatives/bar https://classroomsecrets.co.uk/free-year-1-part-whole-model-iwb-addition-and-subtraction-activity/ https://www.nctm.org/Classroom-Resources/Illuminations/Interactives/Ten-Frame/				

Year 3 Multiplication

	Mental Strategies	Concrete	Pictorial	Abstract	Vocabulary	Models, Images and resources
Year 3	Recall and use multiplication facts for the 4, 8 and 3 multiplication tables Practise mental recall of x tables to improve fluency. Use doubling to connect the 2, 4 and 8 x tables. Use x facts to derive related facts and write mathematical statements e.g. using $3 \times 2 = 6$ to derive $30 \times 2 = 60$ Develop efficient mental methods using commutativity e.g. $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$ Double any two-digit number, e.g. double 39 and any multiple of 5, 10 or 100, e.g. double 340, double 800, Multiply one-digit or two-digit numbers by	<u>Consolidate 2, 5 10 times table</u> Please see Y2 examples <u>4, 8 then 3 times table</u> Please see Y2 examples as they hold the same principles <u>Make connections x10</u> 4 x 3, 4 x 30, 4 x 300 – use counters  Also use the Gattegno Chart to help  <u>Simple 2 digit by one digit</u> Use dienes or counters 	<u>Consolidate 2, 5 10 times table</u> Please see Y2 examples <u>4, 8 then 3 times table</u> Please see Y2 examples as they hold the same principles <u>Make connections x10</u> 4 x 30 = 120 – draw it Draw on a place value grid  <u>Simple 2 digit by one digit</u> Draw it in a grid 	<u>Consolidate 2, 5 10 times table</u> Please see Y2 examples <u>4, 8 then 3 times table</u> Please see Y2 examples as they hold the same principles <u>Make connections x10</u> 4 x 3 = 12 4 x 30 = 120  Use place value grid  <u>Simple 2 digit by one digit</u> 23 x 5 = 20 x 5 + 3 x 5 = 100 + 15 = 115 	Lots of Groups of Times Repeated addition Double Sets Groups, Pairs Array symbol x times as big ...as wide ...as long factor product multiple	100 square Number lines Number tracks Bead strings (for children) Bead bar Tens Frame Numicon Place Value Disks Cuisenaire Base hundreds tens and ones Arrow Cards Gattegno chart Place Value Grid

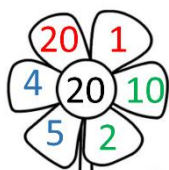
10 or 100 and understand the effect e.g. 7×100, 46×10, 54×100 Know the vocabulary below Factor multiplied by factor equals product factor product 6 x 4 = 24 factor	<u>Doubling all two digit numbers</u>	Draw it in a grid See above <u>Doubling all two digit numbers</u>	14×3 $14 \times 3 = 10 \times 3 + 4 \times 3$ $= 30 + 12$ $= 42$ <u>Doubling all two digit numbers</u>	ten times the size hundred times the size a tenth the size a hundredth the size	
Useful IWB links for manipulatives	https://www.coolmath4kids.com/manipulatives/base-ten-blocks https://mathsbot.com/manipulatives/placeValueCounters https://mathsbot.com/manipulatives/bar https://classroomsecrets.co.uk/free-year-1-part-whole-model-iwb-addition-and-subtraction-activity/ https://www.nctm.org/Classroom-Resources/Illuminations/Interactives/Ten-Frame/ http://www.ictgames.com/mobilePage/tenFrame/index.html				

Year 4 Multiplication

	Mental Strategies	Concrete	Pictorial	Abstract	Vocabulary	Models, Images and resources
Year 4	Recall and practise multiplication facts for tables up to 12×12 to aid fluency. Use place value, known and derived facts to multiply mentally, including multiplying by 0 and 1 TU by 4 or 8, eg. 26×4 by doubling three numbers together two digit by a unit eg. 17×3 numbers to 1000 by 10 and 100 (whole-number answers) eg. 325×10, 42×100 Extend mental methods to HTU to derive facts e.g. $200 \times 3 = 600$ into $600 \div 3 = 200$ Recognise and use factor pairs e.g. give the factor pair associated with a	<u>Consolidate 3, 4, 8 times table</u> See Y3 guidance - same principle <u>Learn the remaining tables to x 12</u> See Y3 guidance - same principle <u>Multiply 2 digit by one digit</u> 24×3 – Use Dienes or counters  <u>Make connections x10 x 100</u> 4×3, 4×30, 4×300 – use counters  Also use the Gattegno Chart to help 	<u>Consolidate 3, 4, 8 times table</u> See Y3 guidance - same principle <u>Learn the remaining tables to x 12</u> See Y3 guidance - same principle <u>Multiply 2 digit by one digit</u> 24×3 – Draw it  <u>Make connections x10 x 100</u> The counters can be drawn also 	<u>Consolidate 3, 4, 8 times table</u> See Y3 guidance - same principle <u>Learn the remaining tables to x 12</u> See Y3 guidance - same principle <u>Multiply 2 digit by one digit</u> Informal partition as in Y3  <u>Make connections x10 x 100</u> $43 \times 100 = 43 \times 10 \times 10$ Use Place Value charts 	Lots of Groups of Times Repeated addition Double Sets Groups, Pairs Array symbol x times as big ...as wide ...as long factor product multiple	100 square Number lines Number tracks Bead strings (for children) Bead bar Tens Frame Numicon Place Value Disks Cuisenaire Base hundreds tens and ones Arrow Cards Gattegno chart Place Value Grid

multiplication fact, (if $2 \times 3 = 6$ then 6 has the factor pair 2 and 3)

Factor flower for 20



Know the vocabulary below

Factor multiplied by factor equals product

factor product
 $6 \times 4 = 24$
 factor

factor times factor is equal to product
 $22 \times 7 = 154$

Use divisibility tests to identify multiples of 2, 4, 10 and 5

Useful IWB links for manipulatives

Multiply using partitioning

Develop fluency in efficient written method of short multiplication

Write statements using the distributive law $39 \times 7 = 30 \times 7 + 9 \times 7$ and associative law $(2 \times 3) \times 4 = 2 \times (3 \times 4)$

Solve two step problems with increasingly harder numbers and in which n objects are connected to m objects eg. finding all possibilities '6 hats and 5 coats, how many different outfits?'

Understand multiplication as scaling, not just repeated addition.

E.g. "23, made 100 times the size, is 2,300."

Then they can solve simple equations

$\square \times 100 = 600$ $1,500 = \square \times 10$
 $\square \div 100 = 8$ $1,200 = \square \div 10$

Understand that adjacent multiples of a times table have a difference of the multiplication table.

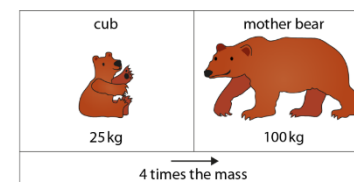
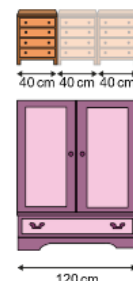
E.g. adjacent multiples of 6, have a difference of 6.

Understand the distributive law. Where a factor can be partitioned and multiplied out.

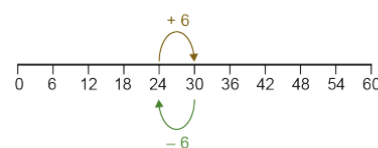
$a \times (b + c) = a \times b + a \times c$ and $a \times (b - c) = a \times b - a \times c$

The wardrobe is 3 times the width of the cabinet. How wide is the wardrobe?

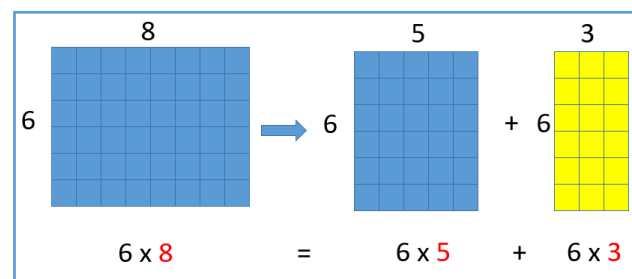
$40 \text{ cm} \times 3 = 120 \text{ cm}$



$25 \text{ kg} \times 4 = 100 \text{ kg}$



$\times$	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	4	6	8	10	12
3	3	6	9	12	15	18
4	4	8	12	16	20	24
5	5	10	15	20	25	30



ten times the size

hundred times the size

a tenth the size

a hundredth the size

scaling

adjacent multiples

<https://www.coolmath4kids.com/manipulatives/base-ten-blocks>

<https://mathsbot.com/manipulatives/placeValueCounters>

<https://mathsbot.com/manipulatives/bar>

<https://classroomsecrets.co.uk/free-year-1-part-whole-model-iwb-addition-and-subtraction-activity/>

Year 5 and Year 6 Multiplication

	Mental Strategies	Concrete	Pictorial	Abstract	Vocabulary	Models, Images and resources																																																																																																										
Year 5 6	Multiply TU X U mentally using known facts for all multiplication tables to 12 x 12 numbers Identify multiples and factors, including finding all factor pairs for numbers to 100, e.g. 30 has the factor pairs 1 x 30, 2 x 15, 3 x 10 and 5 x 6 Establish whether a number up to 100 is prime and recall prime numbers up to 19 Recognise and use square and cube numbers, and relevant notation. Multiply by 25 or 50, e.g. 48 x 25, 32 x 50 Multiply whole numbers decimals by 10, 100 and 1000 e.g. 4.3 x 10, 0.75 x 100 Multiply pairs of multiples of 10, e.g. 60 x 30, and a multiple of 100 by a single digit number, e.g. 900 x 8 $30 \times 80 = 3 \times 8 \times 10 \times 10$$= 3 \times 8 \times 100$$= 2,400$	<u>Multiply up to 4 digits by a one- number</u> 2214 x 4 – use counters <table><tr><th>Th</th><th>H</th><th>T</th><th>O</th></tr><tr><td></td><td></td><td></td><td></td></tr></table> <u>Multiply up to 4 digits by a two- number</u> If children are working at this level – moving straight to a formal method is the best approach.	Th	H	T	O					<u>Multiply up to 4 digits by a one- number</u> 2214 x 4 – can draw in a place value grid <table><tr><th>1000s</th><th>100s</th><th>10s</th><th>1s</th></tr><tr><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td></tr></table> <u>Multiply up to 4 digits by a two- number</u> If children are working at this level – moving straight to a formal method is the best approach.	1000s	100s	10s	1s																	<u>Multiply up to 4 digits by a one- number</u> Use formal short method <table><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td>2</td><td>2</td><td>1</td><td>4</td></tr><tr><td></td><td>x</td><td></td><td></td><td></td><td>4</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> <u>Multiply up to 4 digits by a two- number</u> <table><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td>4</td><td>3</td><td></td></tr><tr><td></td><td>x</td><td></td><td>1</td><td>3</td><td></td></tr><tr><td></td><td></td><td>1</td><td>2</td><td>9</td><td></td></tr><tr><td></td><td></td><td>4</td><td>3</td><td>0</td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> $\begin{array}{r} 75.5 \\ \times 45 \\ \hline 3775 \\ 30200 \\ \hline 33975 \end{array}$															2	2	1	4		x				4																												4	3			x		1	3				1	2	9				4	3	0								As above factor product multiple ten times the size hundred times the size a tenth the size a hundredth the size scaling adjacent multiples prime square cubed	100 square Number lines Number tracks Bead strings (for children) Bead bar Tens Frame Numicon Place Value Disks Cuisenaire Base hundreds tens and ones Arrow Cards Gattegno chart Place Value Grid
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Use divisibility tests to identify multiples of 3, 6, 9 8 and revise 2, 4, 10 and 5

Year 6

Multiply two-digit decimals such as 0.8×7 and pairs of multiples of 10 and 100, e.g. 50×30 , 600×20

Double decimals with units and tenths, e.g. double 7.6

Scale up and down using known facts, e.g. given that three oranges cost 24p, find the cost of four oranges

Identify numbers with an odd number of factors (square numbers), even numbers of factors and no factor pairs other than 1 and themselves (prime numbers)

Explore the order of operations using brackets; eg. $2 + 1 \times 3 = 5$ and $(2 + 1) \times 3 = 9$.

Use multiplication facts to solve ratio and proportion problems.

Useful IWB links for manipulatives

Multiplying whole numbers by 10, 100 and 1000 using place value grids

HTh	TTh	Th	H	T	O
					9

$9 \times 100 =$

$9 \times 1,000 =$

HTh	TTh	Th	H	T	O
				1	6

$16 \times 100 =$

$16 \times 1,000 =$

Multiplying decimals by 10 and 100 using place value grids

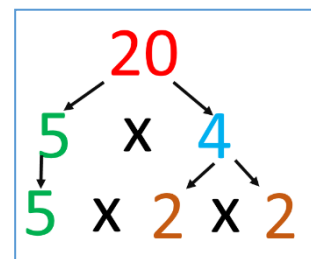
H	T	O	Tths	Hths
		4	1	

$4.1 \times 100 =$

H	T	O	Tths	Hths
		4	1	5

$4.15 \times 100 =$

Express a product as a multiple of three factors



<https://www.coolmath4kids.com/manipulatives/base-ten-blocks>
<https://mathsbot.com/manipulatives/placeValueCounters>
<https://mathsbot.com/manipulatives/bar>
<https://classroomsecrets.co.uk/free-year-1-part-whole-model-iwb-addition-and-subtraction-activity/>
<https://www.nctm.org/Classroom-Resources/Illuminations/Interactives/Ten-Frame/>

