| Multiplication Calculation Policy		
Early Years		
Children first start to look at the idea of equal groups through their exploration of doubles. They use five frames and objects to check that groups are equal.		
Vocab for multiplication: groups of, lots of, equal, not equal		
	Steps in learning for Multiplication	**Explanatory note**
Sorting and making groups	Children sort everyday objects in groups and match items that are the same. 	**Children develop their understanding of 'groups'. Children will tidy and sort items in to the correct boxes or pots. Children will further sort mixed objects into two groups e.g. sorting all the teddies from the cars.** **One to one correspondence is also key to later work when making equal groups. Children must be able to count the correct number in one group first.**
Recognising doubles	Children explore doubles in their environment including in games such as on dominoes or dice. They focus on the understanding of doubles being two equal groups. 	
Making 2 equal groups and finding doubles	Children use objects such as five frames, counters, numicon and fingers to make equal groups and find doubles. They make or show **two equal groups** of the same amount and then count them altogether. Double 5 Double 3	**After exploring practically, children relate doubles to the addition sentences** **e.g. 3 + 3 = 6.** **This is further reinforced with Reception Learn its 1 + 1=, 2 + 2 =, 3 + 3=, 4 + 4 = and 5 + 5 =**

Double 5
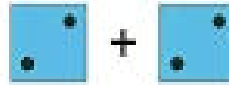
Double 2
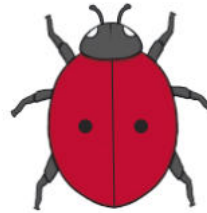
Double 1

Counting in groups of 10.	Children start to count in equal groups of ten. Using songs and looking at patterns on the hundred square children start to count in equal groups/ multiples of ten. Once children are able to orally count in multiples of ten they apply this to counting real life objects and orally finding the total.

Year 1
Children represent multiplication as repeated addition. In Year 1, children will use concrete and pictorial representations to solve problems. They link this to counting in 2s, 5s and 10s. They are not expected to record multiplication formally or see and understand the multiplication sign.

	Concrete and practical resources	Pictorial / Jottings	Abstract
Recognise and make equal groups	**Recognise:** Show children equal and unequal groups using objects. Children to say whether groups are equal or unequal. This can be moved to showing children pictorial representations of equal and unequal groups.		

A　　　B　　　C

Make: Children arrange objects in equal and unequal groups and understand how to recognise whether they are equal.

Show me four equal groups of 2

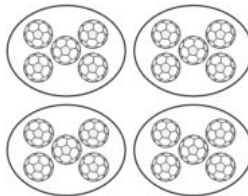| **Understand and use language such as groups of/ lots of (Linked to above)**	Children to show groups of or lots of using practical resources such as numicon/ cubes e.g. Show me 3 lots of 5. Show me 3 groups of 5 e.g. Show me three lots of 2 	Children to look at pictorial representations of equal groups and say what they can see. They describe equal groups using words e.g there are four **equal groups of** 2. e.g. 4 equal groups of 5
Count in multiples of 10	**See Early Years example. Extend to counting above 100 forwards and backwards**	
Count	Children start to count in equal groups of five. Using songs and looking at patterns on the hundred square children start to count in equal groups/ multiples of five. Once children are able to orally count in multiples of five they apply this to counting real life objects and finding the total.	

in multiples of 5	

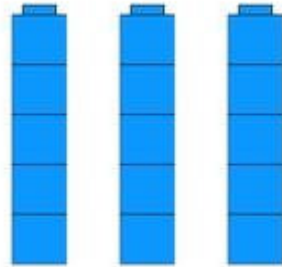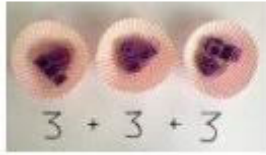| **Count in multiples of 2**	Children start to count in equal groups of two. Using songs and looking at patterns on the hundred square children start to count in equal groups/ multiples of two. Once children are able to orally count in multiples of two they apply this to counting real life objects and finding the total.
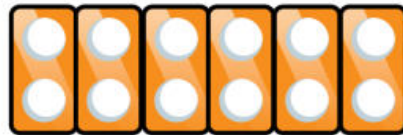
Equal groups and repeated addition	Use different real life objects/practical resources. Children are to write the repeated addition sentence and add equal groups	Using pictures children record the repeated addition number sentence.

$3 + 3 + 3$

$5 + 5 + 5 = 15$

There are 3 lots of/ groups of 5

$5 + 5 + 5 =$

$2 + 2 + 2 =$

There are 3 lots of 2
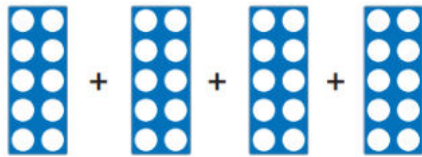
$2 + 2 + 2 =$

There are 2 lots of/ groups of 5

$5 + 5 =$

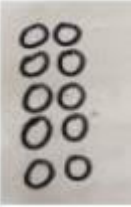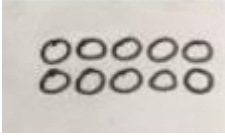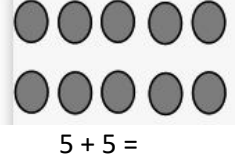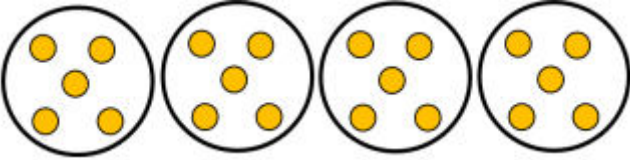| **Finding the total of equal groups by counting in 2s, 5s and 10s**

Link to counting in multiples of 2, 5 and 10. | To find the total children to make/ show the correct number of equal groups using **practical resources** then use their knowledge of oral counting in multiples of 2, 5 and 10 to find the total

e.g. What is four lots of ten?

There are 10, 20, 30, 40 altogther.

e.g. How many shoes?

 | This can then be moved to a pictorial form. Children will need to be secure in counting in multiples of 2, 5 or 10 before completing this step.

e.g. There are 5 crayons in a pack. How many altogether?

There are 5 pens in a pack….
There are… 5, 10, 15, 20, 25, 30, 35, 40 pens altogether.

e.g. add the coins |

	There are 2, 4, 6 shoes altogether	There are 2, 4, 6, 8, 10, 12 pennies altogether.	
Arrays	Children will find real life arrays, trays, ice cube trays, egg boxes, chocolate bars. Children understand arrays as groups of, lots of. They will be introduced to words **rows and columns.** They create arrays using counters and cubes to show groups of or lots of 3 lots of 5	Children use circles to draw arrays e.g. Draw 5 lots of 2 e.g. Draw 2 lots of 5	Children link arrays to repeated addition 5 + 5 =
Solve one step problems involving multiplication using concrete objects, pictorial representation and arrays with support from the teacher.	**Practical** Use practical resources to solve questions such as One bag holds 5 apples. How many apples do 4 bags hold? e.g. use Numicon, cubes etc	**Jottings** One bag holds 5 apples. How many apples do 4 bags hold? Make jottings to show 4 lots of 5 Or	**Abstract** Children use their knowledge of counting in multiples using fingers to show the number of groups One bag holds 5 apples. How many apples do 4 bags hold? • Hold up fingers to show the number of groups (4) • Count on in multiples e.g. 5

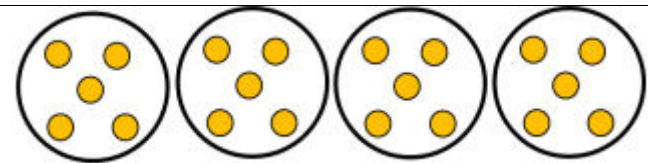| Year 2			
In Year 2 children revisit equal groups, repeated addition and arrays. They are taught the multiplication sign and explore the commutativity of multiplication through arrays. Year 2 children further their counting in 2, 5 and 10 by applying this to x2, x5 and x10 multiplication tables.			
Overarching Objective: Solve multiplication problems using materials, arrays, repeated addition, mental methods and multiplication facts including problems in context			
	Concrete and practical resources	**Pictorial / Jottings**	**Abstract**
Revisit equal groups and secure understanding of repeated addition	Children recognise and make equal groups using practical resources counters, cubes, numicon and real life objects. They write the groups as repeated addition sentences. They continue to use language such **as groups of/ lots of** For example: 3 lots of 5 5 + 5 + 5 = 15 15 altogether	Children recognise equal groups in pictorial representations and write as repeated addition sentences. For example: 3 groups of/ lots of 5 chairs. 5 + 5 + 5 = 15 15 chairs altogether	
To recognise the X sign as lots of/ groups of	Children to be taught that the X sign is **groups of / lots of.** Children can be given or shown practical resources first and can write the multiplication sentence to match what they see. For example:	Children are to write the multiplication fact to match the pictorial representation For example:	

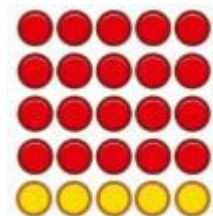| Calculate mathematical statements for multiplication and write them using the multiplication x and equal = sign.	4 lots of/ groups of 5 5 + 5 + 5 + 5 = 20 4 x 5 = 20	4 lots of/ groups of 5 5 + 5 + 5 + 5 = 4 x 5 = 20
Arrays **Write the multiplication fact for an array** **Draw an array to <u>represent the multiplication fact.</u>**	Children need to understand the relationship between arrays, repeated addition from Y1 and multiplication. This can be done **pictorially** first. For example: Write the multiplication fact to match the array I can see four groups of 5 I can see 5 groups of 5 5 + 5 + 5 + 5 = 5 x 5 = 4 x 5 = 2 x 4 =	Children to **<u>draw</u>** an array to match **a multiplication fact** using jottings. - Some children may need to physically move objects and create their array using counters or cubes before drawing. **Drawing using jotting/ circles** This can be linked back to language used in Y1 and help to reinforce the meaning of the multiplication symbol e.g. Draw 3 groups of/ lots of 2 3 x 2 For example: 3 x 2 = Children draw dots or circles to represent the array.
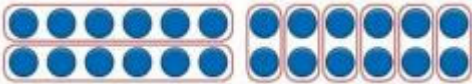
<u>Arrays</u>

4 X 3

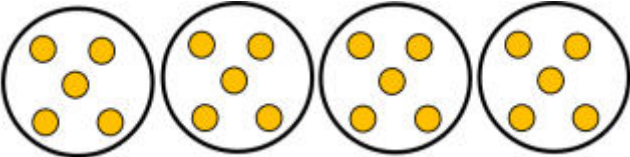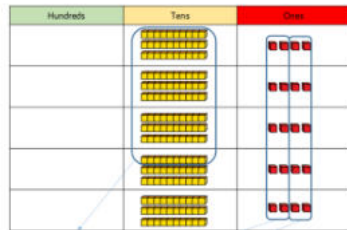| Understand commutativity Know that multiplication of 2 numbers can be done in any order.	Use real life arrays to visualise commutativity, physically turning the objects to look at the different groups. I can see 6 groups of 3. I can see 3 groups of 6.	Use pictorial representations of an array. Rotate the array to show that orientation does not change the multiplication. This is 2 groups of 6 and also 6 groups of 2.	Use arrays to visualise commutativity and link back to children writing related repeated addition and multiplication facts. 4 + 4 + 4 + 4 + 4 = 20 5 + 5 + 5 + 5 = 20 4 × 5 = 20 and 5 × 4 = 20
Solve multiplication problems using materials, arrays, repeated addition, mental methods and multiplication facts including problems in context	**Practical** Use practical resources to solve questions such as One bag holds 5 apples. How many apples do 4 bags hold? e.g. use Numicon, cubes etc 	**Jottings** One bag holds 5 apples. How many apples do 4 bags hold? Make jottings to show 4 lots of 5 <u>Or</u> 5 5 5 5	**Abstract** Children use their knowledge of counting in multiples using fingers to show the number of groups One bag holds 5 apples. How many apples do 4 bags hold? • Hold up fingers to show the number of groups (4) • Count on in multiples e.g. 5
Recall and use multiplication facts for the 2, 5 and 10. multiplication tables	All the work above will help children to develop an understanding of how to unitise groups of 2, 5 and 10 and learn times-table facts. Songs, chanting and hundred square work should also aid their understanding of how the times tables increase and contain patterns. Daily chanting of table facts should increase speed of recall. Children will make connections between the five times table and counting in 5s on the clock face and the two times table and even numbers. Children will notice the pattern in the ten times table- the ones are always 0 and the tens increase by 1 ten each time.		

Year 3	
In Year 3 children are to be taught the expanded method of multiplication in preparation for the formal written method in Year 4. Children should begin to apply their times tables knowledge from Year 2 (2, 5 and 10) and Year 3 (3s, 4s and 8s). The language related to the X sign will need exploration and be linked to their understanding of commutativity e.g. it is easier to work out 5 lots of 34, 34 five times rather than 34 lots of 5.	

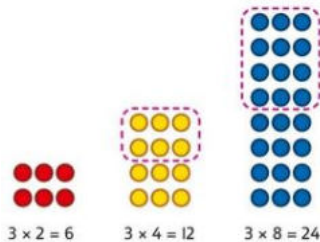|		
Multiply a 2d x 1d number Using mental and progressing to a formal written method. **(Using x table facts they know)**	Place value grids and use of base ten can be used to support the understanding of the expanded method. For example 34 x 5 = 5 lots of 34 34 five times. 150 + 20	Children will need to be able to partition 2 digit numbers. Start with 2 digit numbers **when there is one ten in the tens column** e.g. 15 x 5 , 13 x 2, 17 x 3. Later move to multiples any 2 digit number e.g. 43 x 6 =
Recall and use multiplication facts for the 3, 4 and 8 tables.	Children should continue to have daily practice counting in multiples. Children through doubling should connect the x2, x4 and x 8 tables Children can also explore patterns in the three times table noticing the odd, even, odd, even pattern	
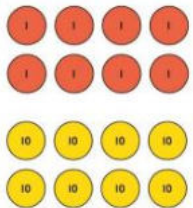
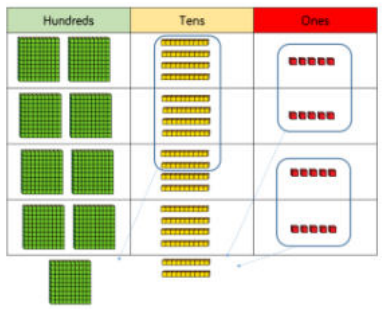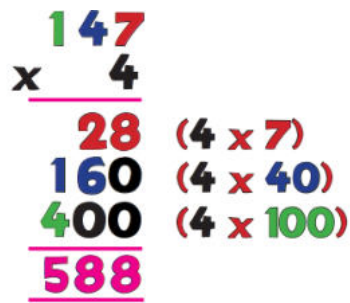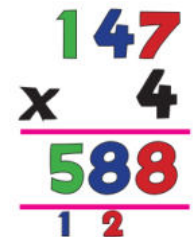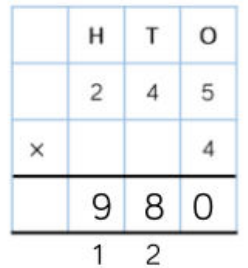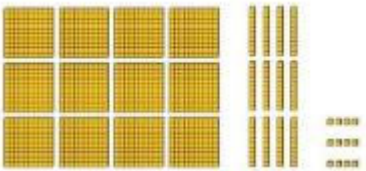|			
Mental multiplication Using known facts to calculate other facts for example to multiply 10s/scale numbers by ten $3 \times 40 =$ $30 \times 2 =$	Children explore the relationship between known times-tables and multiples of ten using base ten. For example: Make 4 groups of 3 ones Make four groups of 3 tens 4 x 3 = 12 and 4 x 30 = 120	Children learn how unitising 10s supports multiplying by multiples of 10 / scaling by ten. 2 lots of 4 ones is 8 ones 2 lots of 4 tens is 8 tens 2 x 4 = 8 2 x 40 = 80	Children apply their knowledge of commutativity and scaling to derive other facts/ fact family work e.g. I know 4 x 3 = 12 so 3 x 4 = 12 4 x 30 = 120 and 40 x 3 = 120
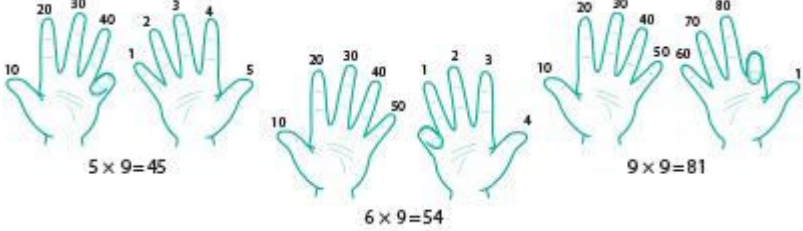
Year 4

When moving to three digits multiplied by one digit children should be encouraged to move from the expanded method taught in Year 3 towards <u>a short, formal method.</u> The aim is to secure the short, written method over the course of Year 4. Times tables are also a big focus in this year group and children should be able to recall multiplication facts up to 12 x 12 speedily by the end of the year.
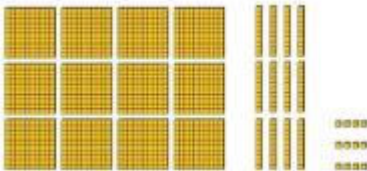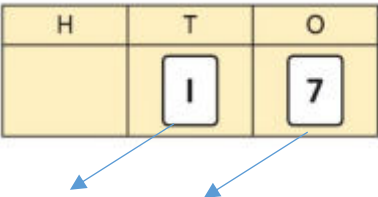
Multiply 2 digit and 3 digit numbers by one digit numbers using a formal written layout *** By end of Year 4 most children should be secure using the formal written method for multiplication.**	Base ten can once again support children's understanding of the written method. e.g. 245 x 4 = four lots of 245 245 four times 	It may also be useful for children to be shown the expanded method of multiplication for three digits x one digit first. They can relate this to the work that they did in Year 3 and teaching links can be made to the short, formal method. 	Start introducing the short formal written method. Begin **without any exchanges** and then exchange through the ones, then tens. If children are multiplying larger numbers and struggling with times tables encourage the use of multiplication grids so that children can focus on the use of the written method.

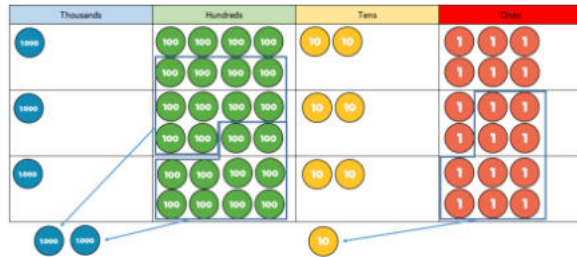|			
Mental multiplication Use place value and known facts to multiply numbers **e.g. 3 x 4 = 3 x 40 = 3 x 400** Linked to: Solve problems involving multiplication e.g. integer scaling problems (10, 100)	Use unitising and place value equipment to understand how to multiply by 1, 10 and 100. 3 groups of 4 ones is 12 ones 3 groups of 4 tens is 12 tens 3 groups of 4 hundreds is 12 hundreds	Use unitising and place value equipment to understand how to multiply any multiples of 1, 10 and 100. 3 x 4 = 12 3 x 40 = 120 3 x 400 = 1200	Children apply their knowledge of commutativity and scaling to derive other facts/fact family work e.g. I know 4 x 3 = 12 so 3 x 4 = 12 4 x 30 = 120 and 40 x 3 = 120 4 x 300 = 1200 and 400 x 3 = 1200
Multiply whole numbers by 10/100 and know this makes the number ten times bigger/ smaller	Use place value grids to explore the movement of digits when multiplying numbers by ten and teach 0 as a place holder.		Children to be able to apply their place value knowledge to multiply numbers by 10 and 100 including finding missing numbers to answer questions such as: 32 x 10 = 523 x 10 = _____ x 10 = 660 1500 = _____ x 10
Multiply mentally including multiplying by 1 and 0	Understand the special cases of multiplying by 1 and 0 5 × 1 = 5 5 × 0 = 0		

Multiply together three numbers	Understand that commutativity can be used to multiply in different orders $2 \times 6 \times 10 = 120$ or $2 \times 10 \times 6 = 120$ $10 \times 6 \times 2 = 120$ $12 \times 10 = 120$ $20 \times 6 = 120$ $60 \times 2 = 120$

Recall multiplication facts for tables up to 12 x 12	Pupils continue to practice speed and fluency in tables taught in Year 2 and 3. Pupils are taught how times tables relate to counting patterns. Children should still count daily supported by hundred squares or number lines.
	   • They understand links between the x3 table, x6 table and x9 table e.g. 5 x 6 is double 5 x 3
	   • They explore patterns in the x 9 table. They find the answers in the 9 times table, up to 9 × 9, whereby you use your fingers to demonstrate the changes in the tens and ones,
	
	   • They can explore how to use x 10 to work out x 9 facts e.g. if 6 x10 = 60 then 6 x 9 = 60 – 6.
	   • For the 11 times table, multiples of 11 that are less than one hundred are simply the multiplied digit repeated: so 2 × 11 = 22, 3 × 11 = 33, 4 × 11 = 44, and so on.
	   • For the seven times tables children will already know several facts due to commutativity. For many children 7 x 8 poses a particular problem, combining as it does both the 7 and 8 times tables. Teach children to place the answer first and count on: 56 = 7 x 8.

Year 5		
Understanding square numbers	Use counters to explore the meaning of square numbers e.g. 25 is a square number because it is made from 5 rows of 5	Understand the pattern of square numbers in the multiplication tables. Use multiplication grids to circle square numbers. Can children spot a pattern?
Multiply numbers up to 4 digits by a one or two	When multiplying four digit numbers, place value counters are the best manipulative to use to support children in their understanding of the formal method.	Consolidate the short formal written method. Begin **without any exchanges** and then exchange through the ones, then tens, then hundreds. If children are multiplying larger numbers and struggling with times tables encourage the use of multiplication grids so that children can focus on the use of the written method.

digit number using a formal written layout		$1{,}826 \times 3 = 5{,}478$
Multiply two 2 digit numbers (Long multiplication)	In preparation or the formal written method children can explore the grid method first to aid their understanding. When children are calucalting the answers within the grid, teach them to **work out the ones first (bottom row first e.g. 1 x 2 =, then 1 x 20 =)**	Children are expected to complete long multiplication using the formal written method.

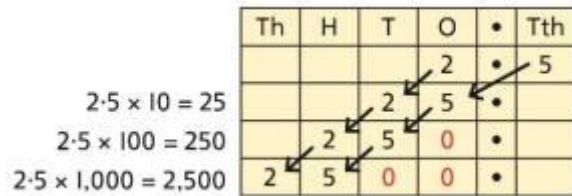|		
Multiply three digit numbers by two digits	In preparation or the formal written method children can explore the grid method first to aid their understanding. When children are calucalting the answers within the grid, teach them to **work out the ones first (bottom row first)** 	×	200	30	4
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30	6,000	900	120
2	400	60	8		
Multiply numbers mentally drawing upon known facts		Use known facts to multiply decimals by scaling by 0.1 and 0.01. Linked to multiplying whole numbers by ten and hundred Answer questions such as: Work out 3 x 4 = 0.3 X 4 = 0.03 x 4 =
Multiply whole numbers by 10, 100 and 1000	Children will use place value grids to understand how the digits move and change when multiplying by 10, 100 and 1, 000. They will understand 0 as a place holder. 	H	T	O
	1	7 | 17 × 10 = 170 17 × 100 = 17 × 10 × 10 = 1,700 17 × 1,000 = 17 × 10 × 10 × 10 = 17,000	Children work mentally to answer questions such as |	x 10	x 100	x 1000
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365			
432			
1230				

Multiply decimals by 10, 100 and 1000 (linked to converting standard units in measure)	Use place value equipment to explore and understand the exchange of 10 tenths, 10 hundredths or 10 thousandths. Represent multiplication by 10 as exchange on a place value grid.	Children to mentally answer questions such as
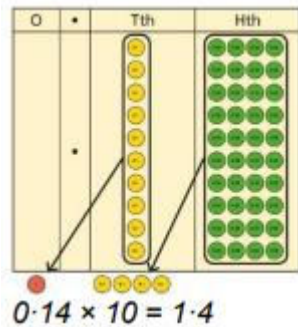
	x 10	x 100	x 1000
6.5			
62.5			
1.30			
132.4			

Multiply numbers with one decimal place by a whole number		Formal written method to be used., including exchange. 2

Year 6

When multiplying four digits by a two digit number children should be very confident using the formal written method. If they are still struggling with times tables then provide multiplication grids so that they can focus on the written method.

|		
Multiply multi digit numbers up to 4 digits by a two digit whole number using the formal written method of multiplication.		For example | TTh	Th	H	T	O
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	2	7	3	9
×			2	8
2	1	9	1	2
5	4	7	8	0
7	6	6	9	2	 $$\begin{array}{r} 3786 \\ \times 48 \\ \hline 30288 \\ + 151440 \\ \hline 181728 \end{array}$$ Consideration must be given to the placement of exchanged digits.
Multiply numbers by 10, 100 and 1,000 giving answers up to three decimal places	Use place value equipment to explore and understand the exchange of 10 tenths, 10 hundredths or 10 thousandths. $2·5 × 10 = 25$ $2·5 × 100 = 250$ $2·5 × 1,000 = 2,500$ Represent multiplication by 10 as exchange on a place value grid.	Children to mentally answer questions such as 		x 10	x 100	x 1000
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34.57			
12.53			
782.36			
563.897				

$0.14 \times 10 = 1.4$
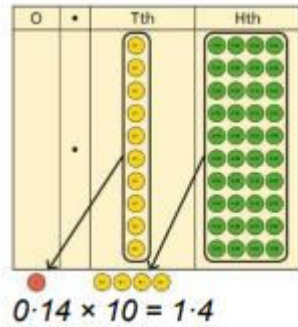
| **Multiply one digit numbers up to 2 decimals places by whole numbers** | | Use formal written method. For example: |