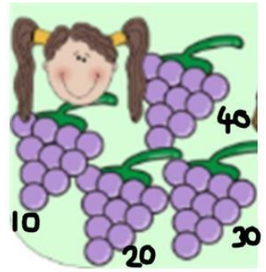
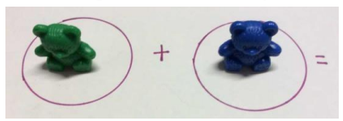
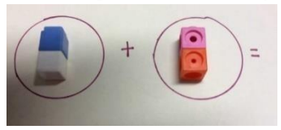
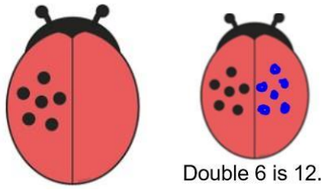
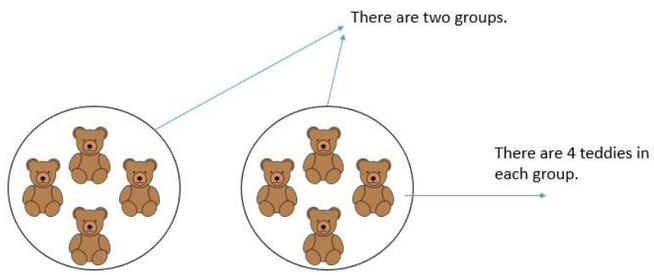
Foundation Stage

Key Vocabulary: *multiplication, multiply, multiplied by, multiple, grouping, doubling, array*

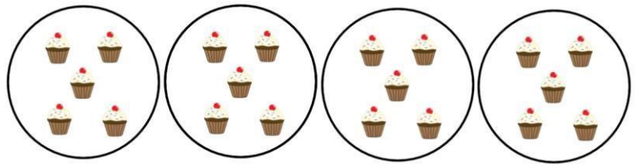
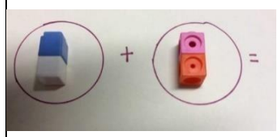
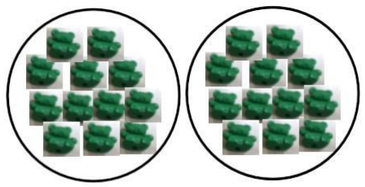
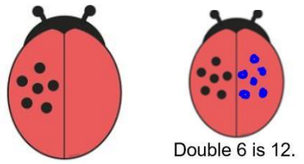
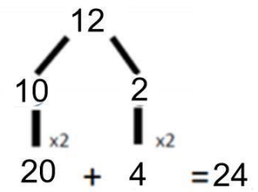
Times Tables: *To count in steps of 2s and 10s and begin to count in 5s.*

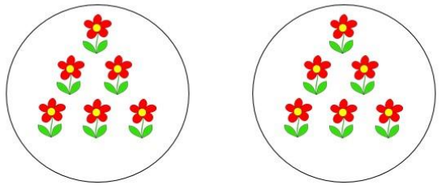
Objective & Strategy	Concrete	Pictorial	Abstract
To count in steps of 2s and 10s and begin to count in steps of 5.	Children will use resources to count in steps of 2 and 10 and begin to count in steps of 5.  **2 4 6 8**	Children will be able to find totals by counting in steps of 2 and 10 from pictorial representations. They will begin to also count in steps of 5.  There are 40 grapes.	Children will begin to count in steps through song, stories and rhymes. **2, 4, 6, 8…** **10, 20, 30, 40…** **5, 10, 15, 20, 25, 30…**
To be able to double numbers up to 10.	Use practical resources to understand the concept of doubling as 'twice as many'. They may use resources such as mirrors to support this understanding. **Double 1 is 2.**  **Double 2 is 4.** 	Children will double numbers using pictorial representations.  Double 6 is 12.	**To be able to verbalise:** Double 6 equals 12. **6 + 6 = 12**
To experience equal groups of objects.	Children will understand multiplication as <u>equal</u> groups of objects. They will be encouraged to count the groups, then count how many objects are in a group in total. **Two groups of 4.** 	Children understand pictorial representations of multiplication. 	**<u>To be able to verbalise:</u>** I know there are **<u>4</u>** in each group and there are **<u>2</u>** equal groups. **4 x 2 = 8**

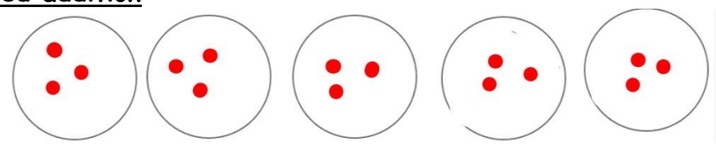
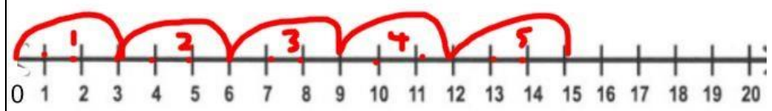
Year 1

Key Vocabulary: *multiplication, multiply, multiplied by multiple, grouping, doubling, array*

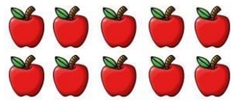
Times Tables: *Children in Year 1 need to count in steps of 2, 5 and 10 and begin to recall their 2, 5 and 10 times table.*

Objective & Strategy	Concrete	Pictorial	Abstract
To count in steps of 2, 5 and 10s.	Children will be able to use concrete resources to count in equal steps of 2, 5 and 10.  5 10 15 20 **There are 20 objects altogether.**	Children find the total amount in a pictorial representation by noticing how many are in each equal group and counting aloud in steps of this number.  5 10 15 20 **There are 20 cupcakes in total.**	Children will be able to write sequences with multiples of numbers. **2, 4, 6, 8…** **10, 20, 30, 40…** **5, 10, 15, 20, 25, 30…** Children will be able to count aloud in sequences, starting at different points. **8, 10, 12, ? , ?**
To double numbers up to 20 (no bridging).	Children will deepen their understanding of doubling using concrete resources. They understand doubling as two <u>equal</u> groups. **Double 2 is 4.**  **Double 12 is 24.**  12 12	Children will double a given number by using pictorial representations.  Double 6 is 12. Children will be able to calculate double a number by creating their own pictorial representation and counting the total. Double 12 is 24. 	Children will begin to double a number by first partitioning into tens and ones, doubling each part and finally recombining.  12 10 2 x2 x2 20 + 4 =24

<table>
<tr>
<td>To make equal groups and count the total.</td>
<td>Children will use a range of concrete resources to make equal groups.
 
6 x 2
 
=12</td>
<td>Children will represent multiplication statements pictorially to demonstrate their knowledge of equal groups.
6 x 2 = 12
 
I know there are 2 groups and in each group there are 6 flowers.</td>
<td>Children solve one step problems involving multiplication.
Joe makes two trays of cakes. There are 6 cakes on each tray. How many cakes does he bake?
.</td>
</tr>
<tr>
<td>To understand multiplication as repeated addition.</td>
<td>Children will understand multiplication as repeated addition and use a range of concrete resources to add equal groups.
3 x 5 = 15 (3 gems, five times)
 

There are 15 gems altogether.</td>
<td>Children will use pictorial representations to solve multiplication statements as repeated addition.
This will include the use of a number line.
3 x 5= 15
<u>Repeated addition</u>
 
3 + 3 + 3 + 3 + 3 = 15
<u>Number line</u>
 

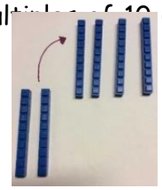
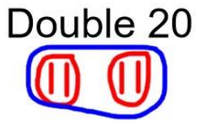
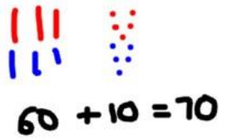
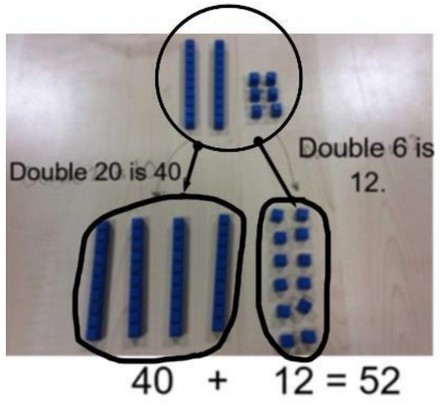
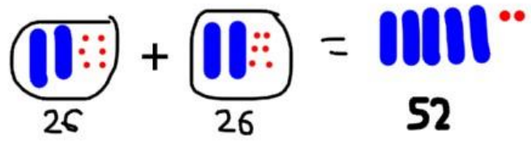
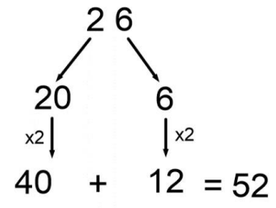
There are 5 jumps of 3 to make 15.</td>
<td>Children will be able to write addition number sentences linked to multiplication to describe pictures or objects.
3 x 5= 15
 
3 + 3 + 3 + 3 + 3 = 15
Children solve one step problems involving multiplication.
There are 3 sweets in 1 bag. How many sweets are in 5 bags altogether?</td>
</tr>
</table>

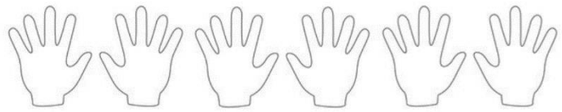
To understand multiplication as arrays.	Children will create arrays to show multiplication statements using concrete objects. **5 lots of 2 or 5 x 2** 	Children will be able to explain the multiplication statement showed in a pictorial array. **5 x 2 = 10**  They will also draw their own pictorial representations to show understanding of arrays for multiplication.  4 lots of 3 or 4 x 3 .	Children solve one step problems involving multiplication. ***There are 4 flowers with 3 bees on each flower. How many bees are there in all?*** 

Year 2

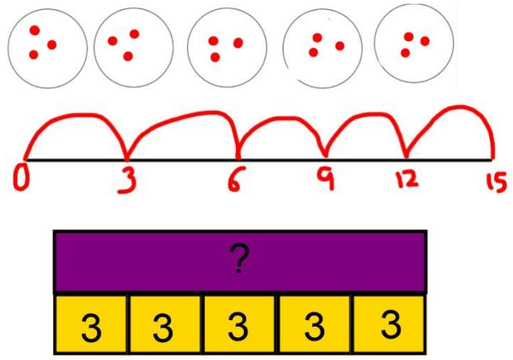
Key Vocabulary: *multiplication, multiply, multiplied by, multiple, grouping, doubling, array, row, column, groups of, times once, twice, three times … ten times, repeated addition, one each, two each, three each … ten each, equal groups of, multiplication table, multiplication fact.*

Times Tables: children in Year 2 learn to count in steps of 2, 3, 5 and 10s and can recall their 2, 3, 5 and 10 times table.

Objective & Strategy	Concrete	Pictorial	Abstract
To double multiples of 10 up to 100.	Children will use resources to double multiples of 10 up to 100.  **Double 20 equals 40.**	Children draw their own representations to show how to double numbers. **Double 20 =40** 	Children will use their knowledge of doubling numbers to 10 to double multiples of 10 up to 100. **Double 3 is 6 so double 30 is 60.** **Double 8 is 16 so double 80 = 160.**
To double multiples of 5 up to 100.	Children will use resources to double multiples of 5 up to 100. **Double 35 equals 70.** 	Children draw their own representations to show how to double numbers. **Double 35 equals 70.** 	Children solve problems involving doubling. ***Jack has 35 toy cars. Mary has double the amount. How many toy cars does Mary have?***
To double numbers up to 100 (including bridging).	Children use resources to explore doubling larger numbers. The children will partition the whole number into tens and ones, double the tens, double the ones and finally recombine to find the total. Children understand that 10 ones are exchanged for one ten. **Double 26 is 52.** 	Children will represent the calculation pictorially. Children understand that 10 ones are exchanged for one ten. **Double 26 is 52.** 	Children will begin to double a number by first partitioning into tens and ones, doubling each part and finally recombining. 

<table>
<tr>
<td>To count in multiples of 2s, 3s, 5s and 10s (repeated addition).</td>
<td>The children will use a variety of resources to skip count in multiples to find the total amount. Children may use their fingers as they are skip counting.
 
2 4 6 8 10 12 14
 
5 10 15 20 25 30</td>
<td>Children find the total amount from a pictorial representation by noticing how many are in each equal group and skip counting aloud in steps of this number.

They will understand and use pictorial representations, both marked and empty number lines and the bar model.

3 x 5 = 15
 
</td>
<td>Children will count in multiples of a number aloud and write them as number sequences.

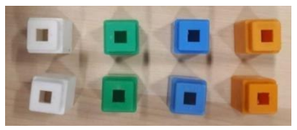
0, 2, 4, 6, 8, 10…

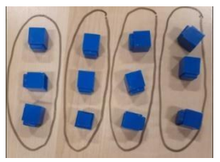
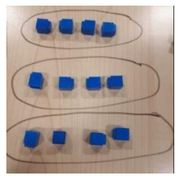
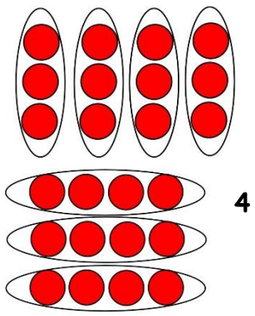
0, 3, 6, 9, 12, 15…

0, 5, 10, 15, 20, 25…

0, 10, 20, 30, 40…

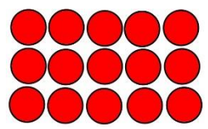
They will start from any number.

14, 16, ☐ , 20, ☐ , 24
35, ☐ , 25, 20, ☐</td>
</tr>
<tr>
<td>To show that multiplication is commutative and can be completed in any order.</td>
<td>Children will create arrays using a variety of concrete resources, including cubes and counters.
  

Pupils understand that multiplication is commutative and can be completed in any order but will make the same product.
  
3 x 4 = 12 4 x 3 = 12</td>
<td>Children will find the linked multiplication facts from pictorial representations of arrays and understand commuatativity.
 
3 x 4 =12

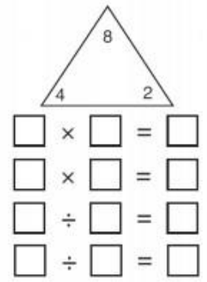
4 x 3 = 12</td>
<td>Children will write linked multiplication sentences to show the commutative law and understand that they will always give the same product.

12 = 3 x 4 12 = 4 x 3

Children will also be able to use an array to write multiplication number sentences and reinforce repeated addition.
 
3 + 3 + 3 + 3 + 3= 15 5 x 3 = 15
5 + 5 + 5 = 15 3 x 5 = 15</td>
</tr>
</table>

<table>
<tr>
<td>To use related multiplication and division facts using the inverse for the 2, 3, 5 and 10 times table.

This will be taught alongside division to show how the numbers relate and build fluency.</td>
<td>Children will use concrete resources, including cubes to represent arrays. These will then form part of the learning process to explain number related facts and begin to write these in number form.

2 x 4 =8 4 x 2 = 8 8 ÷ 2 = 4 8 ÷ 4 = 2
  </td>
<td>Children will use pictorial representations to solve missing number facts that demonstrate related facts.
  </td>
<td>Children will show related number sentences to demonstrate related facts.

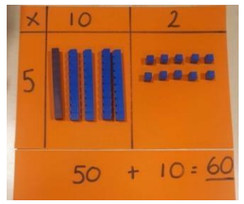
2 x 4 = 8 4 x 2 = 8
8 = 2 x 4 8 = 4 x 2
8 ÷ 2 = 4 8 ÷ 4 = 2
2 = 8 ÷ 4 4 = 8 ÷ 2

Children will solve missing box problems and related division statements.

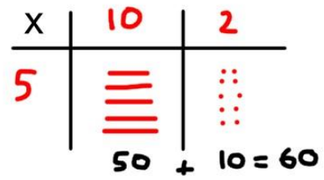
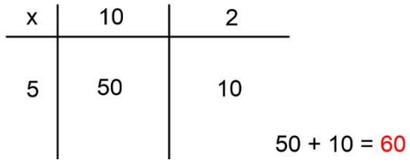
4 x ☐ = 20 ☐ x 3 = 18 50 = ☐ x 5
20 ÷4 = ☐ 18 ÷ 3 = ☐ 50 ÷5 =</td>
</tr>
<tr>
<td>To begin to use the grid method to solve multiplication problems for known times tables (Distributive Law).

2 digit x 1 digit number.</td>
<td>Children will be introduced to the formal grid method by using practical resources and present as arrays.

12 x 5 = 60

Step 1: Partition the number into tens and ones, e.g. 12 = 10 + 2. They then place the multiplier to the side.
 
Step 2: Multiply the multiplicand by the multiplier. E.g. 10 x 5= 50 and 2 x 5=10 and record the answers in base 10 in the boxes.

Step 3: Add both sections to find the total for the multiplication sentence. E.g. 50 + 10 = 60 so 12 x 5 =60.</td>
<td>Children represent multiplication of tens and ones with place value counters or base 10 in a way that they understand.

They may use different colours to show each part or represent base 10 as shown below.
12 x 5 = 60
  </td>
<td><u>Formal Method</u>
Children progress to using a formal written method for multiplication.
Children start with multiplying a small 2-digit number by a one- digit number. They then add the totals in each box.
12 x 5 = 60
 

Children solve problems, including missing number problems, positive scaling problems and correspondence problems.

There are 13 biscuits in a packet. How many are there in 5 packets?

Joe builds a tower which is five bricks tall. Gina builds one four times as high. How many bricks does Gina use?</td>
</tr>
</table>

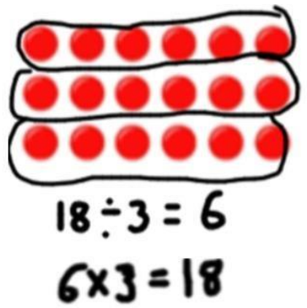
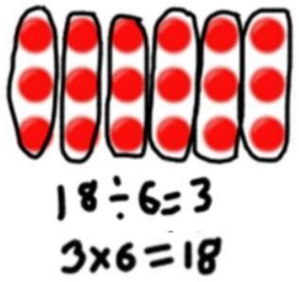
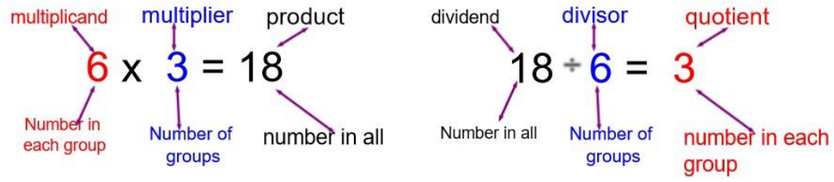
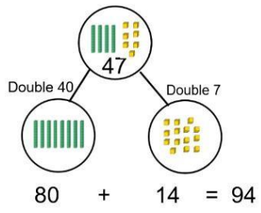
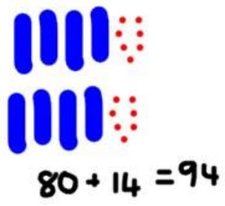
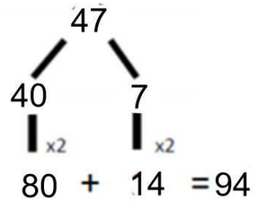
Year 3

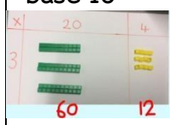
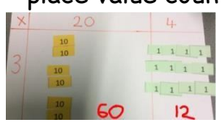
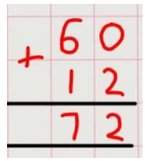
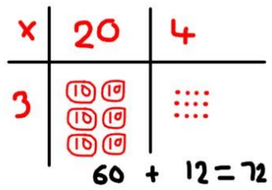
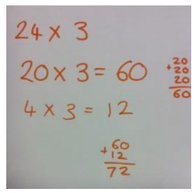
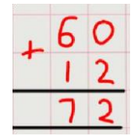
Key Vocabulary: *multiplication, multiply, multiplied by, multiple, factor, product, grouping, doubling, array, row, column, groups of, times once, twice, three times … ten times, repeated addition, one each, two each, three each … ten each, equal groups of, multiplication table, multiplication fact.*

Times tables/ counting- Children in Year 3 need to be able to confidently count in steps of 2, 3, 4, 5, 6, 8, 10, 50 and 100.

Mental strategies

Skill	Strategy
Use knowledge of doubling to derive the 2, 4, 8 times table and the 3, 6 times tables.	3 x 4= **12** 3 x 8 = **24** Children use their knowledge of doubling to derive the 2, 4 and 8 times tables. For example, if they know that 3x **4**=12 then they can double the product (double 12= 24) to find 3 x **8** because the 8x table is double the 4x table. They also use the 2x table to derive the 4 times table. 5 x 3= **12** 5 x 6 = **24** Children use their knowledge of doubling to derive the 3 and 6 times tables. For example, if they know that 5x**3**=15 then they can double the product (double 15=30) to find 5 x **6** because the 6x table is double the 3x table.
To double numbers up to 100 (involving bridging).	**Double 47** Children build upon their mental strategies and knowledge of doubling from Year 2 to mentally double numbers involving bridging. They may make a few jottings to help them. To double 47, children would partition 47 (40+7) and double each part. E.g. Double **40**= 80, double **7** is 14, then recombine each part 80 + 14= 94 so double 47 is 94.
Multiply a one-digit by a multiple of 10.	**70 x 3** Children will use their knowledge of their times tables to multiply multiples of 10. For **7**0 x **3**, children would know that **7** x **3** =21 so when multiplying by 70 (which is ten times bigger than 7) they would make the product ten times bigger. **7** x **3**= 21 so **7**0 x **3**= 210. **4 x ?** = **480** Children will use their division facts to apply to missing box questions. For example, for 6 x = 480, children know **48**÷4 = 12 so **480**÷4 = 120 so 4 x 120 = 480.
Multiply a 'teens' number by 2, 3, 4, 5 or 8.	**17 x 3** Children begin to partition mentally to multiply teen numbers. They may make a few jottings to help them. To solve 17 x 3, children would partition 17 (10+7) and multiply each part by the multiplier 3. E.g. **10**x3=30, **7** x 3 = 21 then recombine each part 30 + 21 = 51 so 17 x 3 =51.
Multiply a two-digit by a one-digit number (begin to bridge over 100).	**43 x 4** Children build upon their mental strategies and begin to mentally multiply numbers involving bridging. They may make a few jottings to help them. To solve 43 x 4, children would partition 43 (40+3) and multiply each part by the multiplier 4. E.g. **40**x4=160, **3** x 4 = 12 then recombine each part: 160 + 12 =172 so 43 x 4 =172.

Objective & Strategy	Concrete	Pictorial	Abstract
To use related multiplication and division facts using the inverse for the 2, 3, 4, 5, 6, 8 and 10 times table.	Children understand the link between multiplication and division and use physical objects to find related facts. **6 x 3= 18**  **18 ÷ 3 = 6** **3 x 6 = 18**  **18 ÷ 6 = 3**	Children represent an array pictorially then find the associated multiplication and division facts by sorting   into equal groups.	Children apply their understanding of inverse relationships to write related multiplication and division statements. **3 x 6 = 18** **18 = 3 x 6** **6 x 3 = 18** **18 = 6 x 3** **18 ÷ 3 = 6** **6= 18 ÷ 3** **18 ÷ 6 = 3** **3= 18 ÷ 6** Children understand and apply multiplication and division in varied representations. 3 x 6 = $\begin{array}{r} 3 \\ \times\ 6 \\ \hline \end{array}$ $3\overline{)18}$ 18 ÷ 3 = Children use associated vocabulary correctly and know what each number represents in the calculation. 
To double numbers up to 100.	Children use resources to explore doubling larger numbers. The children will partition the whole number into tens and ones, double the tens and then the ones and finally recombine to find the total. Children understand that ten ones are exchanged for one ten. **Double 47 is 94.**  	Children will represent the calculation pictorially. Children understand that 10 ones are exchanged for one ten. **Double 47 is 94**  	Children solve problems involving doubling. ***Jack has £47. Mary has double the amount. How much money does Mary have?*** Children will begin to double a number by first partitioning into tens and ones then doubling each part and finally recombine. 

To use a formal written method of multiplication using the grid method for known times tables (Distributive Law). 2-digit x 1 digit number	Children use a range of resources to multiply numbers by partitioning. They partition the multiplicand (number in each group) and multiply each part by the multiplier (number of groups). Children use base ten and place value counters to represent arrays of the partitioned number. **24 x 3 = 72** base 10 place value counters   to  They then recombine to find the total.	Children show their understanding by represent the calculation in the grid using their own pictorial representation. **24 x 3 = 72**  Children use jottings to partition the multiplicand and multiply each part by the multiplier. 	**<u>Formal Method</u>** The children use the grid method for larger numbers. They multiply numbers by first partitioning the multiplicand and then multiplying each part by the multiplier. In year 3 children are expected to multiply 2digit by a 1 digit number. **24 x 3 = 72** X | 20 | 4 3 | 60 | 12  Children apply their knowledge of multiplication to word problems including integer scaling problems and correspondence problems. ***There are 5 balloons in a packet. There are 18 packets in a box. How many balloons are there altogether in a box?*** ***Jack's tower is 56cm tall. Malcolm builds a tower 4 times the height. How tall is Malcolm's tower?***

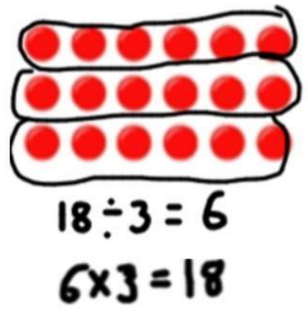
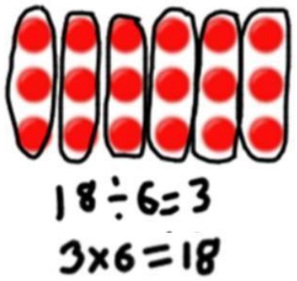
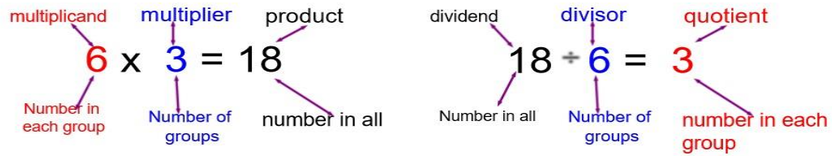
Year 4

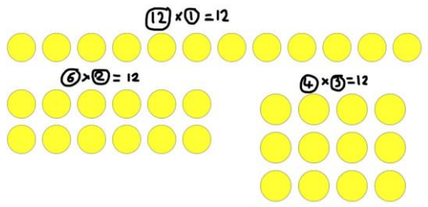
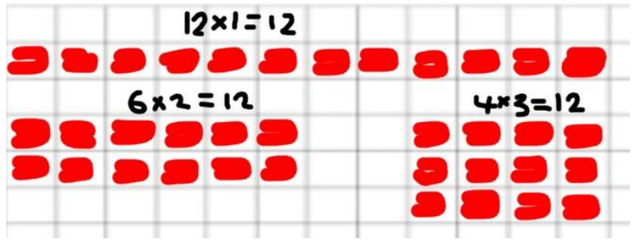
Key Vocabulary: *multiplication, multiply, multiplied by, multiple, factor, product, grouping, doubling, array, row, column, groups of, times once, twice, three times … ten times, repeated addition, one each, two each, three each…ten each, equal groups of, multiplication table, multiplication fact, inverse, square, squared, cube, cubed, distributive law.*

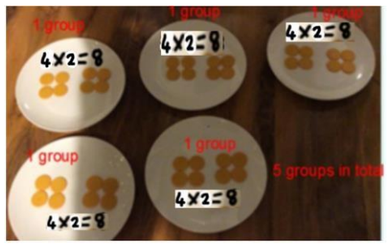
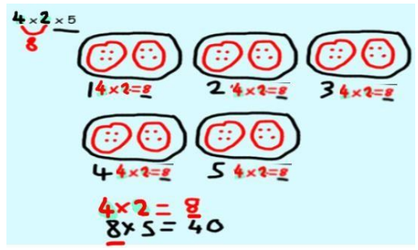
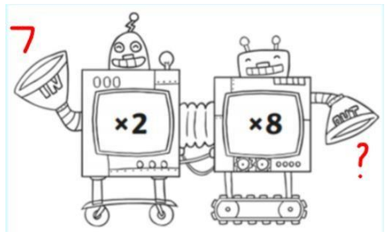
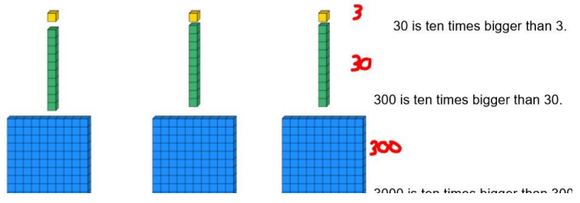
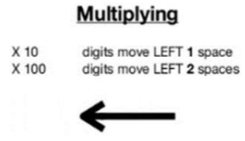
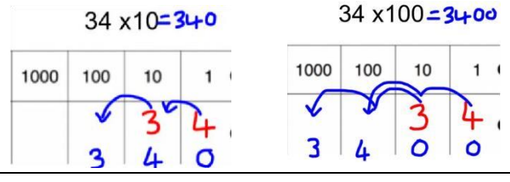
Times tables- Children in Year 4 need to be able to confidently count in steps of 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 , 12 and 1000.

Mental strategies

Skill	Strategy
Use knowledge of doubling to derive the 2, 4, 8 times table and the 3, 6 times tables.	3 x 4= **12** 3 x 8 = **24** Children use their knowledge of doubling to derive the 2, 4 and 8 times tables. For example, if they know that3x**4**=12 then they can double the product (double 12= 24) to find 3 x **8** because the 8x table is double the 4x table. They also use the 2x table to derive the 4 times table. 5 x 3= **12** 5 x 6 = **24** Children use their knowledge of doubling to derive the 3 and 6 times tables. For example, if they know that 5x**3**=15 then they can double the product (double 15=30) to find 5 x **6** because the 6x table is double the 3x table.
Double any 2-digit number and begin to extend this to 3-digit numbers.	**Double 78** Children build upon their mental strategies and knowledge of doubling from Year 3 to mentally double numbers involving bridging. They may make a few jottings to help them. To double 78, children would partition 78 (70+8) and double each part. E.g. Double **70**= 140, double **8** is 16, then recombine each part 140 + 12= =156 so double 78 is 156.
Double multiples of 10 and 100.	**Double 340** Children apply their knowledge of doubling to multiples of 10. They may make a few jottings to help them. To double **34**0, children would first make the number 10 times smaller (**34**) and double 34 to make **68**. They would then make their product ten times bigger (68 x 10= **680**). Double 34 = 68 so double 340 is 680. **Double 4500** Children apply their knowledge to multiples of 100. To double **45**00, children would first make the number 100 times smaller (**45**) and double 45 to make **90**. They would then make their product one hundred times bigger (90 x 100= **9000**). Double 45 = 90 so double 4500 is 9000.
Multiply a 2-digit number by a 1digit number (begin to bridge into tens and hundreds).	**37 x 6** Children build upon mental multiplication in year 3 and mentally multiply larger numbers involving bridging. They may make a few jottings to help them. To solve 37x 6, children would partition 37 (30+7) and multiply each part by the multiplier 6. E.g. **30**x6= 180, **7**x 6 = 42 then recombine each part 180 + 42 =222 so 37x 6 = 222.

Objective & Strategy	Concrete	Pictorial	Abstract
To recall multiplication and division facts for multiplication tables up to 12x 12. To understand commutativity of multiplication calculations (can be done in any order).	Children understand the link between multiplication and division and use physical objects to find related facts. **6 x 3= 18** **3 x 6 = 18**  3 | 18 **18 ÷ 3 = 6** **18 ÷ 6 = 3**	Children represent an array pictorially then find the associated multiplication and division facts by sorting  18÷3=6 6x3=18  18÷6=3 3x6=18 into equal groups.	Children apply their understanding of inverse relationships to write related multiplication and division statements. **3 x 6 = 18** **6 x 3 = 18** **18 = 3 x 6** **18 = 6 x 3** **18 ÷ 3 = 6** **18 ÷ 6 = 3** **6= 18 ÷ 3** **3= 18 ÷ 6** Children understand and apply multiplication and division in varied representations. 3 x 6 = 3 x 6 | 3 | 18 18 ÷ 3 = Children use associated vocabulary correctly and know what each number represents in the calculation. 

To recognise and use factor pairs.	Children will find factors of multiples by making arrays practically. Children are encouraged to work systematically to find factor pairs. **The factors of 12 are 1, 2, 3, 4, 6 and 12.**  	Children represent their understanding pictorially in their own way, continuing to work using a systematic method.  	Children readily apply their knowledge of their times table and division facts to find all factor pairs. **1 x 12= 12** **4 x 3 = 12** **2 x 6 =12** **6 x 2 = 12** **3 x 4 = 12** **12 x 1= 12** They understand that 12 x 1 gives the same factors as 1 x 12 etc so only list them once. **The factors of 12 would be 1, 2, 3, 4, 6 and 12.**

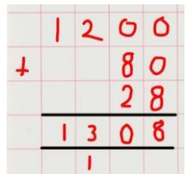
To multiply and divide mentally, including: multiplying by 0 and 1 and multiplying together 3 numbers.	Children multiply and divide numbers by zero and one. They understand the meaning of the  2 x 6 = 12 1 x 6 = 6 0 x 6 = 0 calculation and the use of equal sized groups. Children use objects to calculate totals when three numbers are multiplied together.  **4 x 2 x 5 = 40**	Children show their understanding of multiplying by 0 and 1 by drawing representations.  Children use objects to calculate totals when three numbers are multiplied together. Children understand multiplication as commutative (can be done in any order) and choose the order which is easiest to work with. **4 x 2 x 5 = 40**  	Children understand how to multiply by 1 and 0 and apply to missing box problems. **□ x 83 = 83** **67 x □ = 0** **□ x 1 = 76** **0 x □ = 23** Children solve number puzzles, such as function machines, using the knowledge of multiplying 3 single digit numbers.  Make the target number 30 by using three of the digits below. 7 5 3 4 6 2 _____ x _____ x _____ = 30
To multiply whole numbers by 10 and 100.	Children use resources to understand what 10 and 100 times bigger looks like.  	Children use place value grids to multiply numbers by 10 and 100. They understand the movement of the digits on the place value grid and the use of a zero as a place holder.   	Children apply their knowledge of place value to multiply numbers by 10 and 100. **53 x □ = 530** **□ x 100= 7200** **□ x 10 = 6540** **123 x 100 = □**

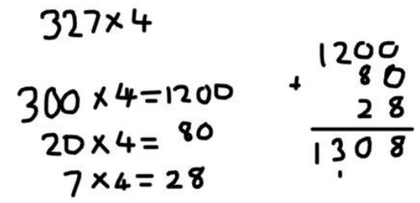
<table>
<tr>
<td>To use a formal written method of multiplication (grid method).

3-digit x 1 digit number</td>
<td>Children revisit the grid method introduced in Year 3 and represent calculations using the place value counters and base ten equipment. They first partition the multiplicand then multiply each part by the multiplier.

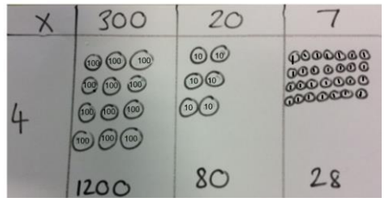
327 x 4 = 1308

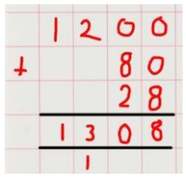
 
</td>
<td>Children use jottings to partition the multiplicand and multiply each part by the multiplier.

Children show their understanding by representing the calculation in the grid using their own pictorial representation.

327 x 4 = 1308

 
</td>
<td><u>Formal Method</u>
The children continue to use the grid method to multiply the partitioned multiplicand by the multiplier.
327 x 4 = 1308

<table>
<tr><td>X</td><td>300</td><td>20</td><td>7</td></tr>
<tr><td>4</td><td>1200</td><td>80</td><td>28</td></tr>
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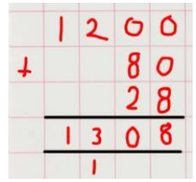
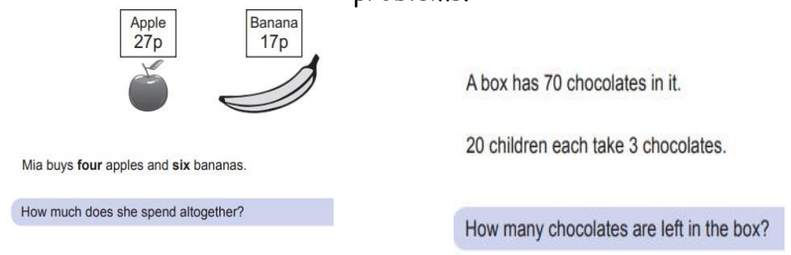
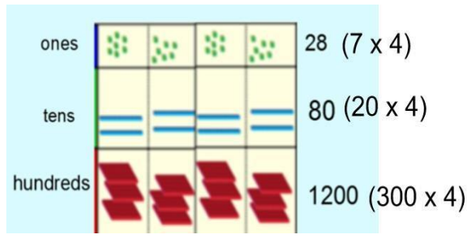


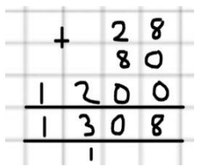
Children apply their knowledge of multiplication to worded problems including integer scaling problems and more complex correspondence problems.

 
</td>
</tr>
<tr>
<td>To use a formal written method of multiplication (short multiplication).

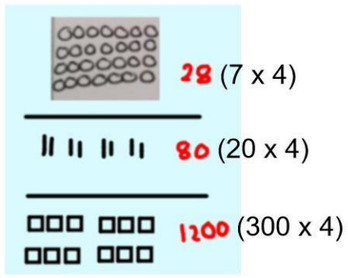
3-digit x 1 digit number</td>
<td>Children represent calculations using the place value counters and base ten equipment and move towards using a columnar method. As they move towards the condensed method, they begin by multiplying the ones, the tens then the hundreds before finding the total.

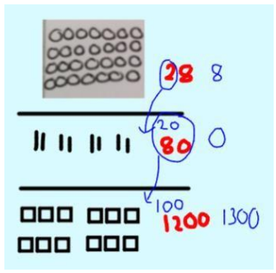
327 x 4= 1308

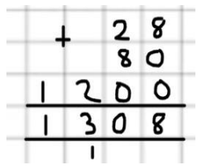
 
</td>
<td>327 x 4 = 1308

Children represent the calculation by drawing pictorial representations. They partition the multiplicand then multiply each part by the multiplier.

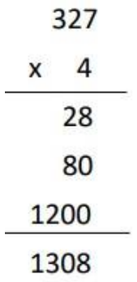
Children understand the place value and can exchange between columns which leads to the formal

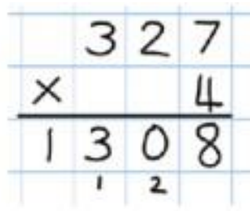
 

condensed method.</td>
<td><u>Formal Method</u>
In year 4 children are expected to multiply a 3-digit by a 1 digit number.

Children apply their knowledge of the grid method and begin to record in a columnar form so that they understand what each number represents.. At this stage, children still partition the multiplicand and multiply each part by the multiplier.

Children then move on to using the condensed method of short multiplication. They carry below the line and understand what each of these numbers represent.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</tr>
</table>

Year 5

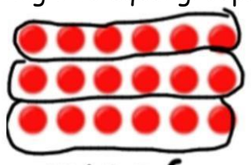
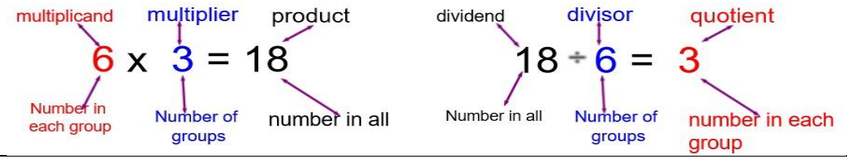
Key Vocabulary: *multiplication, multiply, multiplied by, multiple, factor, product, grouping, doubling, array, row, column, groups of, times once, twice, three times … ten times, repeated addition, one each, two each, three each … ten each, equal groups of, multiplication table, multiplication fact, inverse, square, squared, cube, cubed, distributive law.*

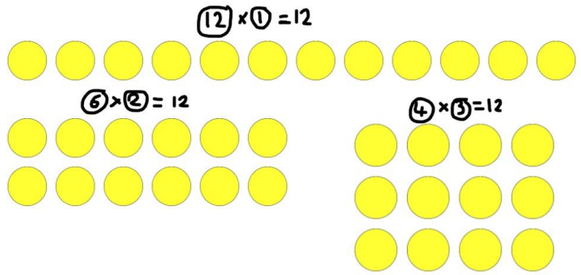
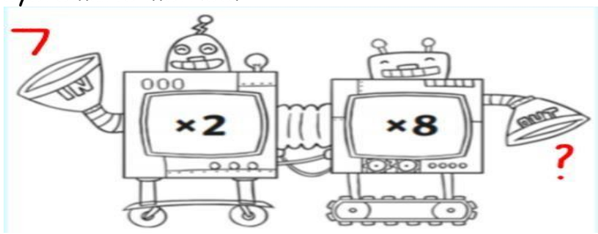
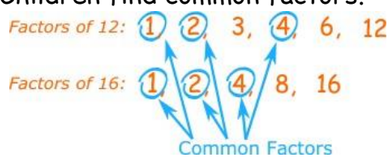
Times tables- Children in Year 5 need to be able to confidently count in steps of 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 1 as well a powers of 10 for any given number up to 1,000,000.

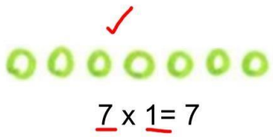
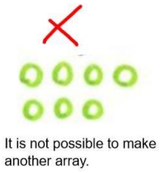
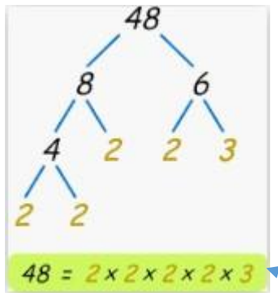
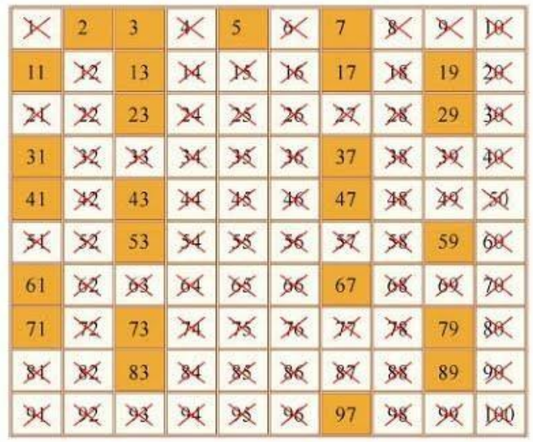
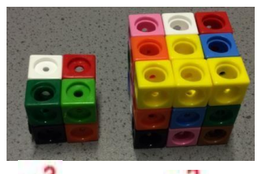
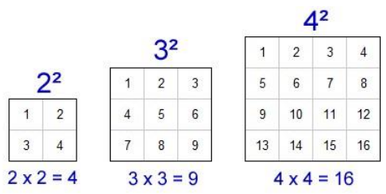
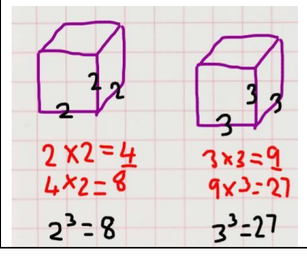
Mental strategies

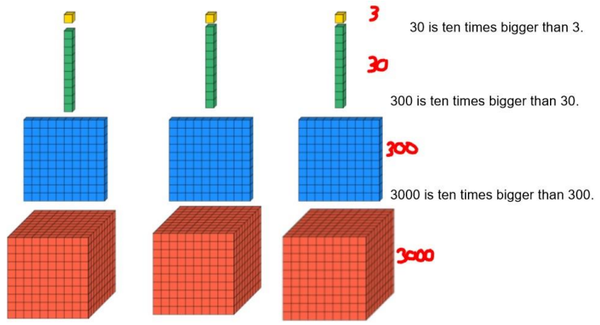
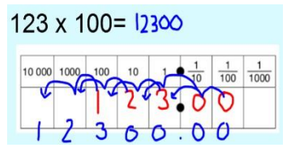
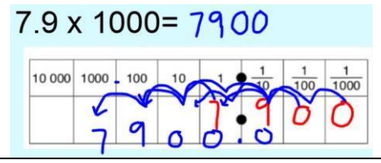
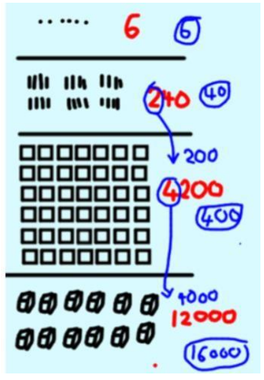
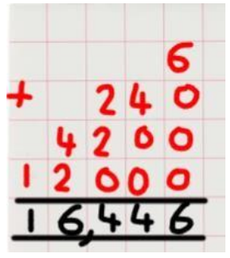
Skill	Strategy
Multiply a multiple of 10 by a multiple of 10.	**30 x 90** Children use their knowledge of place value and the times tables to multiply a multiples of 10 by another multiple of 10. For **3**0 x **9**0, children would know that **3** x **9** =27 so when multiplying 30 (which is ten times bigger than 3) by 90 (which is ten times bigger than 90) they would make the product one hundred times bigger (10 x 10). **3** x **9**= 27 so **3**0 x **9**0= 2700. **30 x = 2100** Children use division facts to apply to missing box questions. For 30 x = 2100, children know 21÷3 = 7 so **2100**÷3 = 70 so 30x 70 = 2100.
Multiply 3 numbers (including tens).	**2 x 50 x 8** Children will build upon their knowledge of multiplying 3 numbers from Year 4 but apply to larger numbers. Children understand multiplication as commutative (can be done in any order) and choose the order which is easiest to work with. For 2 x 50 x8, it could be solved by multiplying **2**x **50** = 100 then multiplying by **8** to make 800, or **50** x **8** = 400 x **2** = 800 whereas **2** x **8**= 16 x **50**= 800 is a much harder calculation.
Form equivalent calculations and use doubling to solve.	**235 x 20** Children learn to multiply 20 by doubling the multiplicand, 235x2= 470 then multiply this by 10 470 x 10= 4700 so 235 x 20= 4700. **57 x 8** Children learn to multiply by 8 by doubling three times using their understanding of the links between the 2, 4, and 8 times tables. For 57 x 8, double once= 114 (57x2), double twice = 228 (114 x 2), double three times-= 456 (224 x 2) so 57 x 8 = 456.

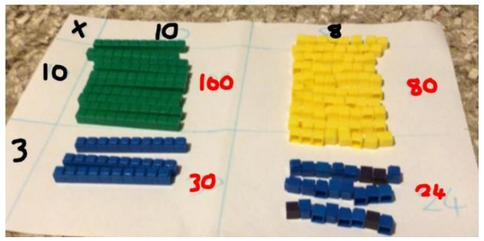
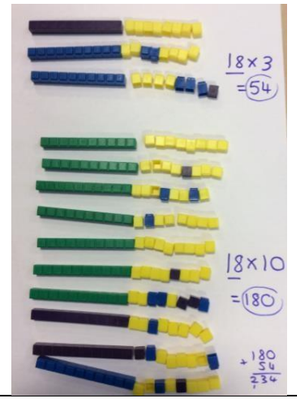
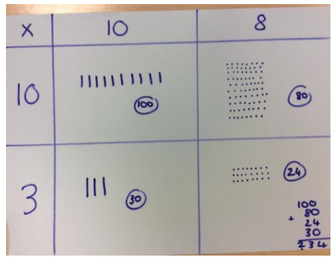
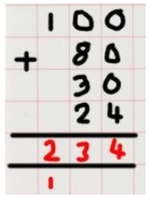
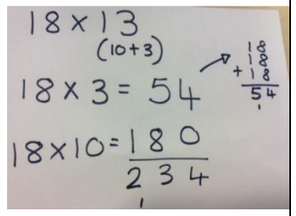
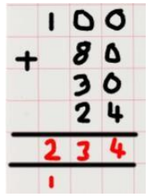
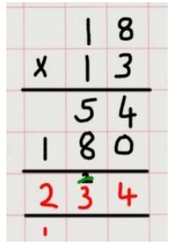
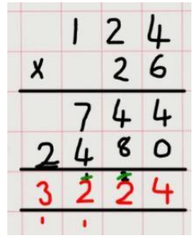
Double 3-digit numbers (involving bridging).	**Double 236** Children build upon their mental strategies and knowledge of doubling from Year 4 to mentally double 3-digit numbers involving bridging. They may make a few jottings to help them. To double 236, children would partition 236 (200+30+6) and double each part. E.g. Double **200**= 400, double **30** is 60, double **6** is 12 then recombine each part 400 + 60 + 12= 472 so double 236 is 472.
Multiply two and three digit numbers by a one-digit number.	**87 x 9** Children build upon mental multiplication in year 4 and mentally multiply larger numbers involving bridging. They may make a few jottings to help them. To solve 87 x9, children would partition 87 (80+7) and multiply each part by the multiplier 9. E.g. 80x9= 720, **7**x 9 = 63 then recombine each part 720 + 63 =783 so 87x 9 = 783. **284 x6** Children build upon this to multiply 3 digit numbers involving bridging. They may make a few jottings to help them. To solve 284 x 6, children would partition 284 (200+80+4) and multiply each part by the multiplier 6. E.g. **200**x6= 1200, **80**x 6 = 480, **4** x 6 = 24 then recombine each part 1200+ 480+24= 80 + 63 =1704 so 284x 6 = 1704.

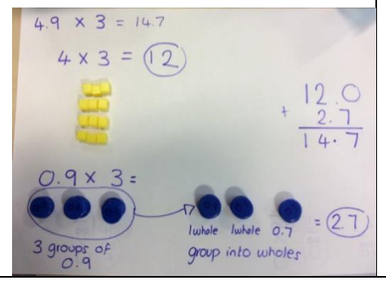
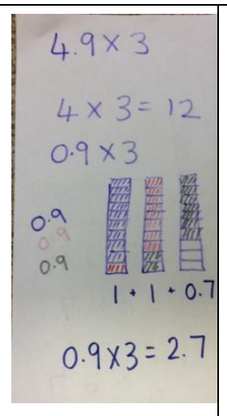
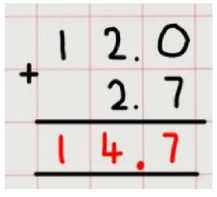
Objective & Strategy	Concrete	Pictorial	Abstract
To recall multiplication and division facts for multiplication tables up to 12x 12. To understand commutativity of multiplication calculations (can be done in any order).	Children understand the link between multiplication and division and use physical objects to find related facts. **6 x 3= 18** **3 x 6 = 18** **18 ÷ 3 = 6** **18 ÷ 6 = 3** 3 x 6 3 | 18	Children represent an array pictorially then find the associated multiplication and division facts by sorting into equal groups.  18÷3 = 6 6x3 = 18  18÷6=3 3x6=18	Children apply their understanding of inverse relationships to write related multiplication and division statements. **3 x 6 = 18** **6 x 3 = 18** **18 = 3 x 6** **18 = 6 x 3** **18 ÷ 3 = 6** **18 ÷ 6 = 3** **6= 18 ÷ 3** **3= 18 ÷ 6** Children understand and apply multiplication and division in varied representations. 3 x 6 = 3 x 6 3 | 18 18 ÷ 3 = Children use associated vocabulary correctly and know what each number represents in the calculation. 

To identify multiples and factors, including finding common factors.	Children will find factors of multiples by making arrays practically. Children are encouraged to work systematically to find factor pairs. *The factors of 12 are 1, 2, 3, 4, 6 and 12.* 	Children represent their understanding pictorially in their own way, continuing to work using a systematic method. 	Children readily apply their knowledge of their times table and division facts to find all factor pairs. **1 x 12= 12 2 x 6 =12 3 x 4 = 12 4 x 3 = 12 6 x 2 = 12 12 x 1= 12** They understand that 12 x 1 gives the same factors as 1 x 12 etc so only list them once. **The factors of 12 would be 1, 2, 3, 4, 6 and 12.** Children find common factors.  Children solve word problems using their knowledge of factors and multiples. ***I am thinking of two 2-digit numbers. Both of the numbers have a digit total of 6. Their common factors are: 1, 2, 3, 4, 6 and 12.*** ***What are the numbers?***

To establish whether a number up to 100 is a prime number and recall prime numbers up to 20. To know and use the vocabulary of prime numbers, prime factors and composite (non-prime numbers)	Children understand that prime numbers can only have two factors, one and itself. They explore this using resources to make arrays.  7 x 1= 7  It is not possible to make another array. The only possible array for 7 is 1 x 7 and 7 x 1. It is not possible to make any other arrays so 7 has no other factors other than itself and 1. Therefore 7 is a prime number.	Children sort prime and composite numbers into pictorial representations. Sort the numbers into the table. 2 3 5 9 15 24 29 30 |	Prime	Composite | |---|---|---| | Exactly 2 factors (1 and itself) | | | | More than 2 factors | | | Children use factor trees to find prime factors. **Prime factors of 48 are 2 and 3.**  Prime factorisation (the prime numbers which multiply together to make the original number).	Children can fluently recite all prime numbers up to 20 off by heart. **2, 3, 5, 7, 11, 13, 17, 19.** Children use known facts about multiples to find the prime numbers up to 100. 
To recognise and use square numbers and cube numbers and use the notation for squared (²) and cubed (³).	Children use resources to explore square and cube numbers. **Square numbers**  2^2 = 4 3^2 = 9 4^2 = 16 **Cubed numbers**  2^3 = 8 3^3 = 27	Children represent square and cube numbers pictorially. They use the correct notation for squared (²) and cubed (³).   	Children can find and recognise square and cube numbers and use the correct notation for squared (²) and cubed (³). 2^2 or 2 x 2 = 4 3^2 or 3 x 3 = 9 4^2 or 4 x 4 = 16 1^3 = 1 x 1 x 1 = 1 2^3 = 2 x 2 x 2 = 8 3^3 = 3 x 3 x 3 = 27 4^3 = 4 x 4 x 4 = 64 Children solve problems involving knowledge of square and cube numbers. Always, Sometimes, Never A square number has an even number of factors.

To multiply whole numbers and those involving decimals by 10, 100 and 1,000.	Children use resources to understand what 10, 100 and 1000 times bigger looks like.  	Children use place value grids to multiply numbers by 10, 100 and 1000s. They understand the movement of the digits on the place value grid. **Multiplying** X 10 digits move LEFT **1** space X 100 digits move LEFT **2** spaces X 1000 digits move LEFT **3** spaces  They apply this knowledge to decimal numbers.  	Children apply their knowledge of place value to multiply numbers by 10, 100 and 1000, including decimal numbers. **34 x ☐ = 3400** **☐ x 10 = 56** **☐ x 1000= 12000** **12.3 x 100 =** They apply their knowledge to word and number puzzles. ***Breen Airways charges £1654 for a return flight to Australia. King Airlines is ten times cheaper. How much do King Airlines charge?***
To use a formal written method of multiplication (short multiplication). Up to 4-digit x 1digit number	Children represent calculations using the place value counters and base ten equipment. They solve in a columnar form and begin by multiplying the ones, then the tens then the hundreds then the thousands before finding the total.  **2741 x 6 = 16,446**	Children represent the calculation by drawing pictorial representations. They partition the multiplicand then multiply each part by the multiplier. They understand place value and can confidently exchange between columns. This leads to the condensed method.  **2741 x 6 = 16,446**  	**Formal Method** In year 5 children are expected to multiply numbers up to a 4-digit by a 1 digit number. The children continue to use the condensed method of short multiplication but with larger numbers. The number is carried underneath between columns. They understand what each number represents. 342 x 7 becomes 3 4 2 × 7 2 3 9 4 2 1 2741 x 6 becomes 2 7 4 1 × 6 1 6 4 4 6 4 2 To solve word problems involving multiplication. ***Arnie earns £985 a month. How much does he earn in half a year?***

To use a formal written method of multiplication (long multiplication). Up to 4-digit x 2 digit number	Children begin by representing long multiplication calculations using the place value counters using the grid method.  **18 x 13 = 234** **18 x 13 = 234** Children then solve in a columnar form. They begin by multiplying the ones, the tens, the hundreds then the thousands before finding the total.  	Children will first use their knowledge of place value to partition the multiplicand and multiplier. They then show their understand pictorially in a grid method. **18 x 13 = 234**   **18 x 13 = 234** Children then move towards the columnar method by representing each stage with jottings. Children are encouraged to multiply the ones first.  	Children will first secure their understanding using the grid method. **18 x 13 = 234** | X	10	8
---	---	---
10	100	80
3	30	24	  They will then move on to a more condensed method of long multiplication. **18 x 13= 234**  **124 x 26 = 3224**  Children solve word problems involving multiplication. ***Pencils come in boxes of 64. A school bought 270 boxes. Rulers come in packs of 46. A school bought 720 packs. How many more rulers were ordered than pencils?***

To use a formal written method of multiplication to multiply number up to 2 decimal places (grid method). Decimal numbers x 1 digit number	Children represent calculations using the place value counters and base ten equipment. They partition the decimal number and multiply by the multiplier. They then find the total. **4.9 x 3 = 14.7** 	Children continue to multiply decimal numbers by partitioning the decimal number. They draw pictorial representations and use jottings to find the total. **4.9 x 3 = 14.7** 	Using the grid method, children will be able to multiply decimals with one decimal place by a single digit number. They should know that the decimal points line up under each other and place holders are added. **4.9 x 3= 14.7** **X** | **4** | **0.9** **3** | 12 | 2.7 

Year 6

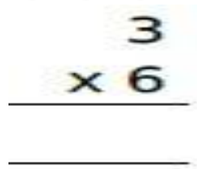
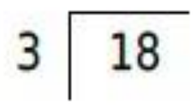
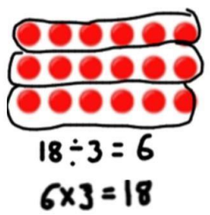
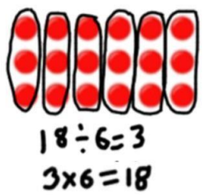
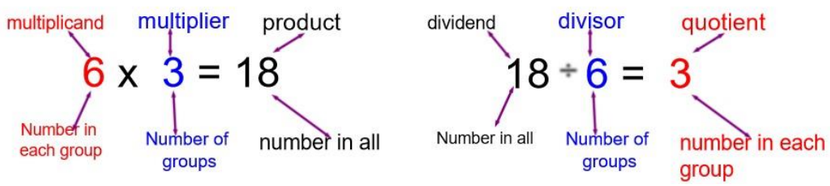
Key Vocabulary: *multiplication, multiply, multiplied by, multiple, factor, product, grouping, doubling, array, row, column, groups of, times once, twice, three times … ten times, repeated addition, one each, two each, three each … ten each, equal groups of, multiplication table, multiplication fact, inverse, square, squared, cube, cubed.*

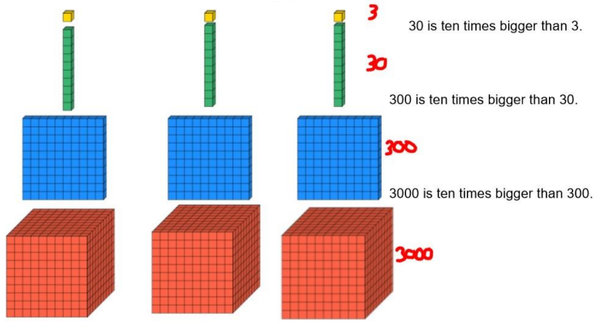
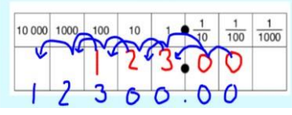
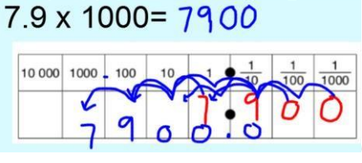
Times tables-children in Year 6 needs to be able to confidently count in steps of 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12.

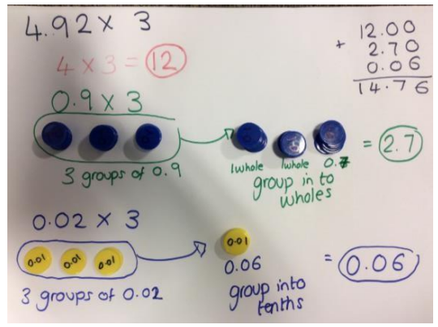
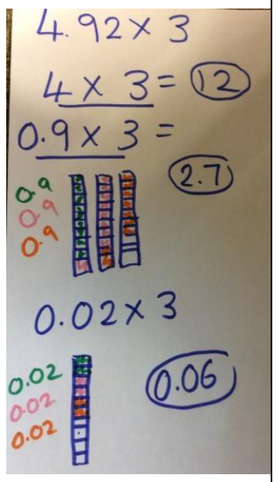
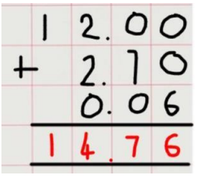
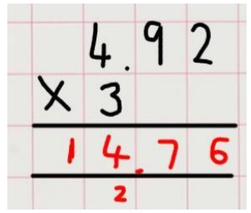
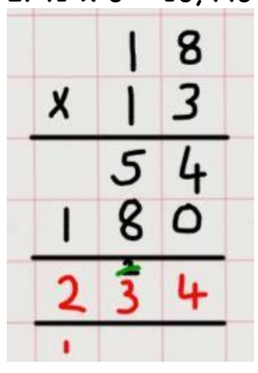
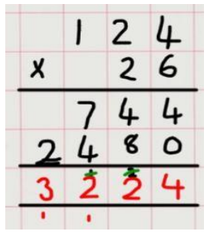
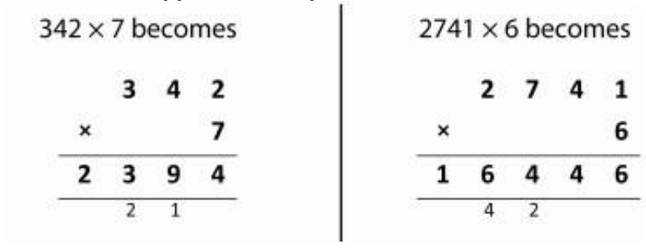
Mental strategies

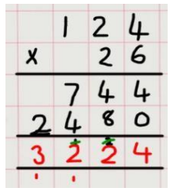
Skill	Strategy
Explore the order of operations using brackets.	Children use their knowledge of order of operations (BODMAS). They understand to calculate the brackets first, then division, multiplication, addition and subtraction. **2 + 1 x 3** Children would complete the multiplication first (**1** x **3**= 3) then add **2** (3 + **2**= 5) so 2 + 1 x 3 = 5. **(2+1) x 3** Children would complete the brackets first (**2+1**=3) then multiply by **3** (3 x 3 = 9) so (2+1) x 3 = 9.
Recall square and cube numbers and corresponding multiples of 10.	**40²** Children build upon their learning in Year 5 and will be able to recall square numbers up to 12 x 12 (1, 4, 9, 16, 25 etc) and apply to multiples of 10. For 40², children would use their knowledge of **4**²= 16 and make it one hundred times bigger because 40 is ten times bigger than 4 so **40**² (40x40)= **16**00. **30³** Children build upon their learning in Year 5 and will be able to cube numbers (1, 8, 27 etc) and apply to multiples of 10. For 30³, children would use their knowledge of **3**³= 27 and make it one thousand times bigger so **30**³(30 x30 x 30)= 27,000.
Find factor pairs of larger numbers using knowledge and rules of divisibility.	Children will use their times table knowledge to establish factor pairs. For example, to find the factor pairs of 52 they would know 54 is the same as **1**x **54**, **2**x **27**, **3**x**18**, **6**x **9** so the factors of 54 are 1, 2, 3, 6, 9, 18, 27 and 54. They understand divisibility rules such as: *Multiples of 2 are even numbers, multiples of 3 are numbers where the sum of their digits is divisible by 3, multiples of 4 are numbers where the last two digits are multiples of 4, multiples of 5 end in 0 or 5, multiples of 6 will also be divisible by 2 and 3., multiples of 9 are numbers where the sum of the digits totals a multiple of 9 and multiples of 10 end in zero.*
Recall prime numbers to 20 and establish prime numbers up to 100.	Children build upon their learning in Year 5 and can fluently recall all prime numbers up to 20 (2, 3,5, 7, 11, 13, 17, 19), They can then use their knowledge of times tables to find larger prime numbers up to 100. They will begin to combine known facts to help them. For example, 51 is not a prime number because is it a multiple of 3 (30 is a multiple of 3 and 21 is a multiple of 3 so 51 will be a multiple of 3 (30 + 21).

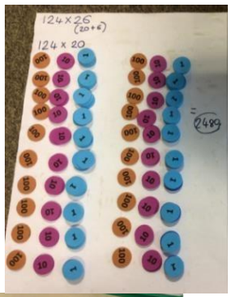
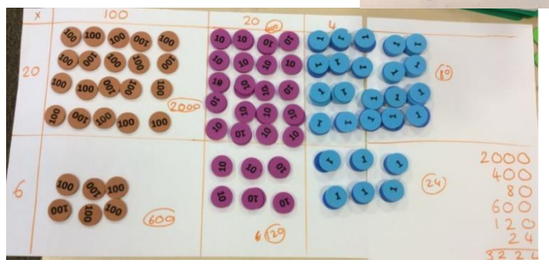
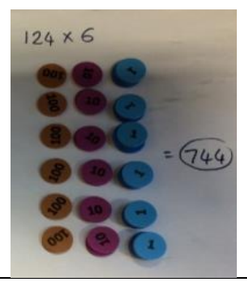
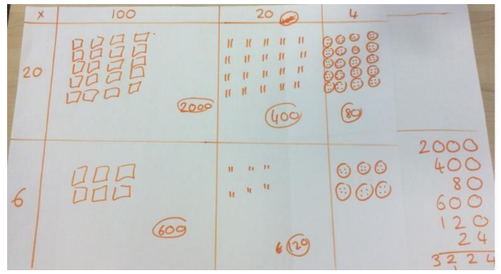
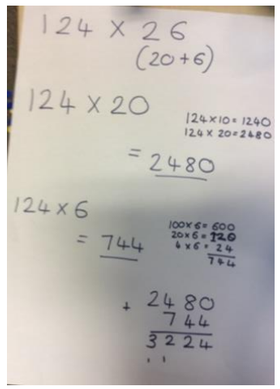
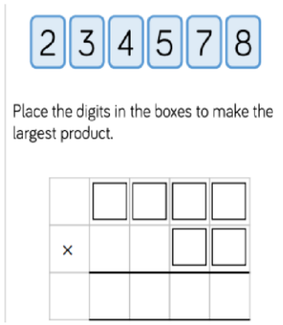
Multiply a multiple of 10 by a multiple of 100.	**40 x 600** Children will build upon their knowledge from Year 5 and use their knowledge of place value and the times tables to multiply a multiple of 10 by a multiple of 100. For **4**0 x **6**00, children would know that **4** x **6** =24 so when multiplying 40 (which is ten times bigger than 4) by 600 (which is one hundred times bigger than 6) they would make the product one thousand times bigger (10 x 100). **4** x **6** =24 so **40** x **600** =24,000. **70 x = 49,000** Children will use their division facts to apply to missing box questions. For example, for 70 x = 49,000, children know 49÷7 = 7 so **49,000** ÷7 = 7000 so 49,000÷70 = 700. Therefore, 70x 700 = 49,000.
Multiply a tenth number by a one-digit number.	**0.7 x 6** Children use their knowledge of times tables and apply this to decimal numbers. For 0.7 x 6, children would make 0.7 ten times bigger and multiple 7 x6 =42. They then make the number 10 times smaller 42÷10=4.2. So if 7 x 6 =42 then 0.7x6= 4.2 **4 x = 4.8** Children will use their division facts to apply to missing box questions. For example, for 4 x = 4.8, children know **48**÷6 = 8 so **4.8**÷6 = 0.8 (ten times smaller) so 4 x 0.8= 4.8
Multiply a tenths number by a multiple of 10.	**0.6 x 30** Children will use their knowledge of place value and the times tables to multiply a tenths number by a multiple of 10. For 0.**6** x **3**0, children would know that **0.6** x **3** =1.8 so when multiplying by 30 the product will be 10 times bigger because 30 is 10 times bigger than 3. **0.6** x **3** =1.8 so **0.6** x **30** =18
Multiply a hundredths number by a onedigit number.	**0.08 x 3** Children use their knowledge of times tables and apply this to decimal numbers. For 0.08 x 3, children would make 0.08 one hundred times bigger (**8**) and multiply by the multiplier, 3. **8** x3 =24. They then make the number 100 times smaller 24 ÷100= 0.24 so if 8 x 3 =24 then 0.08x3= 0.24 **6 x = 0.72** Children use division facts to apply to missing box questions. For example, for 6 x = 0.72, children know 72÷6 = 12 so 0.72÷6 = 0.12 (one hundred times smaller) so 6 x 0.12= 0.72
Double decimals with ones and tenths.	**Double 7.6** Children build upon their mental strategies and knowledge of doubling to double decimal numbers (1 d.p). They may make a few jottings to help them. To double 7.6, children would make the number 10 times bigger (**76**) then use partitioning to double 76= 152. They then make the product ten times smaller. 152÷10= 15.6. double 76= 152, double 7.6= 15.2 Alternatively, children may use the partitioning method to double **7**.6 by doubling **7** to make 14 and double 0.6 to make 1.2 and recombine14+1.2= 15.2
Multiply a ones and tenths number by a one-digit number.	**4.3 x 6** Children will use the partitioning method to multiple each part of the multiplicand by the multiplier. For 4.3 x 6, children would partition 4.3 (**4** + **0.3**) then multiply each part by 6, **4**x6=24 and **0.3** x6=1.8 Children will then recombine 24 and 1.8 to make 25.8 so 4.3 x 6= 25.8

Objective & Strategy	Concrete	Pictorial	Abstract
To recall multiplication and division facts for multiplication tables up to 12 x 12. To understand commutativity of multiplication calculations (can be done in any order).	Children understand the link between multiplication and division and use physical objects to find related facts. **6 x 3= 18** **3 x 6 = 18** **18 ÷ 3 = 6** **18 ÷ 6 = 3**   	Children represent an array pictorially then find the associated multiplication and division facts by sorting into equal groups.   	Children apply their understanding of inverse relationships to write related multiplication and division statements. **3 x 6 = 18** **6 x 3 = 18** **18 = 3 x 6** **18 = 6 x 3** **18 ÷ 3 = 6** **18 ÷ 6 = 3** **6= 18 ÷ 3** **3= 18 ÷ 6** Children understand and apply multiplication and division in varied representations. 3 x 6 = 3 / x 6 / ____ 3 | 18 18 ÷ 3 = Children use associated vocabulary correctly and know what each number represents in the calculation. 

To multiply whole numbers and those involving decimals by 10, 100 and 1,000	Children use resources to understand what 10, 100 and 1000 times bigger looks like.  	Children use place value grids to multiply numbers by 10, 100 and 1000. They understand the movement of the digits on the place value grid. **Multiplying** X 10 digits move LEFT **1** space X 100 digits move LEFT **2** spaces X 1000 digits move LEFT **3** spaces 123 x 100= 12300  They apply this knowledge to decimal numbers. 7.9 x 1000= 7900  	Children apply their knowledge of place value to multiply numbers by 10, 100 and 1000, including decimal numbers. **34 x ☐ = 3400** **☐ x 10 = 5.6** **☐ x 1000= 120** **12.23 x 100☐** = They apply their knowledge to word and number puzzles. Here are five number cards. 0.47 10 100 1000 4.07 Use **four** of the cards to complete these calculations. 47 ÷ ☐ = ☐ ☐ × ☐ = 40.7

To use a formal written method of multiplication to multiply number up to 2 decimal places (grid method). Decimal numbers x 1 digit number	Children represent calculations using the place value counters and base ten equipment. They partition the decimal number and multiply by the multiplier. They then find the total. **4.92 x 3 = 14.76**  	Children continue to multiply decimal numbers by partitioning the decimal number. They draw pictorial representations and use jottings to find the total. **4.92 x 3 = 14.76**  	**<u>Formal method</u>** Using the grid method, children will be able to multiply decimals with up to two decimal places by a single digit number. They should know that the decimal points line up under each other and zeros are added as place holders. Children will use estimation to check answers to calculations. **4.92 x 3 is approximately 5 x 3 = 15.** **4.92 x 3** | X | 4 | 0.9 | 0.02 | | --- | --- | --- | --- | | **3** | 12 | 2.7 | 0.06 |  Children will move onto using the condensed method. 
To use a formal written method of multiplication (short multiplication). Multi-digit numbers x 1 digit number	Children represent calculations using the place value counters and base ten equipment. They solve in a columnar form and begin by multiplying the ones, then the tens then the hundreds then the thousands before finding the total.  **2741 x 6 = 16,446**	Children represent the calculation by drawing pictorial representations. They partition the multiplicand then multiply each part by the multiplier. They understand the place value and can confidently exchange between columns. This leads to the condensed method. **2741 x 6 = 16,446**   	**<u>Formal Method</u>** In year 6 children are expected to multiply multi digit numbers by a 1 digit number. The children continue to use the condensed method of short multiplication but with larger numbers. The number is carried underneath between columns. Children will use estimation to check answers to calculations. **342 x 7 is approximately 300 x 7 = 2100.**  To solve word problems involving multiplication. ***Arnie earns £985 a month. How much does he earn in half a year?***

To use a formal written method of multiplication to multi-digit x 2-digit number (long multiplication).	Children represent calculations using the place value counters using the grid method. **124 x 26 = 3224**   **124 x 26 = 3224** They then solve calculations in a columnar form and begin by partitioning. They multiply the multiplicand by the tens. 124 x 20=2480 They then multiply the multiplicand by the ones. 124 x 6 = 744 	Children will first use their knowledge of place value to partition the multiplicand and multiplier. They then show their understand pictorially in a grid method. **124 x 26 = 3224**  **124 x 26 = 3224** Children then move towards the columnar method by representing each stage with jottings. Children are encouraged to multiply the ones first. 	**Formal Method** In year 6 children are expected to multiply multi digit numbers by a 2 digit number. The children are introduced to long multiplication. The number is carried underneath. **124 x 26 = 3224** **Step 1:** Multiply the multiplier by the multiplicand. Start with the ones, multiply 6 by 4 (24). Write the 4 in the ones column and carry the 20 below the line. **Step 2:** Multiply the 6 by 20 (120) and add the 2 (122). Cross off the carried 20. Write the 4 in the tens column and carry the 100 below the line. **Step 3:** Multiply the 6 by 100 (600) and add the 100 (700). Cross off the carried 100. Write the 7 in the hundreds. **Step 4:** Move to the tens column on the multiplier and start a new line. Multiply the 20 by 4 (80) and record. **Step 5:** Multiply the 20 by 20 (400) and record. Then multiply the 20 by the 100 (200) and record. **Step 6:** Total the numbers. To solve word problems and number puzzles involving multiplication. ***Jack made cookies for a bake sale. He made 345 cookies. The recipe says that he should have 17 raisins in each cookie. How many cookies does he need?*** 

	Finally, they then find the total.