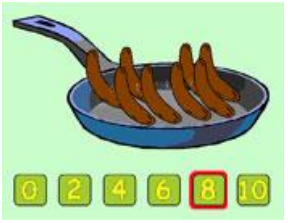
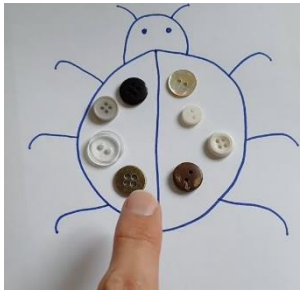
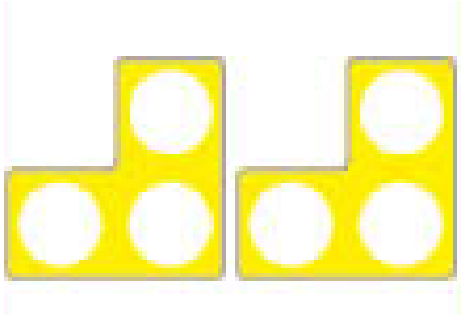
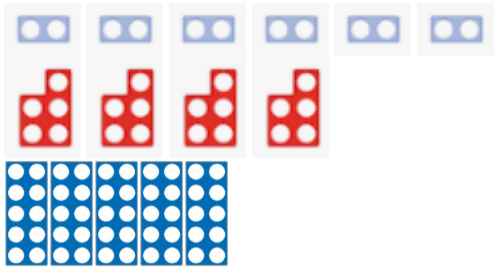
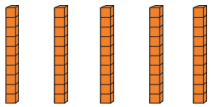
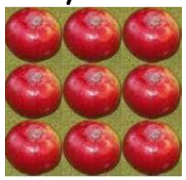
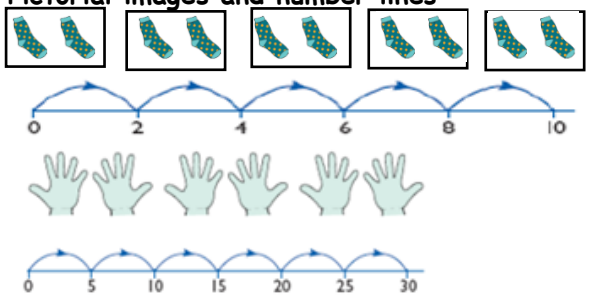
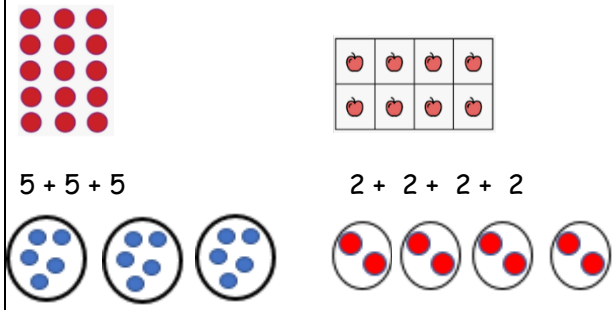
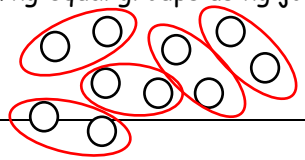
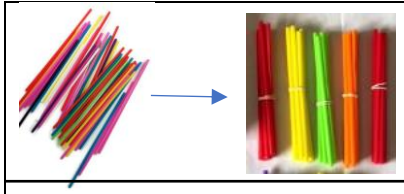
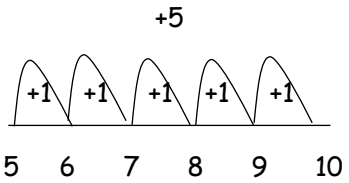
Reception: Spring – Summer term	Multiplication	
Vocabulary: ones, groups, lots of, doubling, repeated, groups of, lots of, times, Pairs, equal groups, unequal groups		
Concrete	**Pictorial**	**Abstract**
Daily routines and mathematical discussions Paired talk, counting in pairs when lining up	**Number talk** Plan number talk opportunities and take advantage of incidental opportunities for number talk when looking at books and images.	**No formal written method.**
Thinking about pairs of items and counting in multiples.  Counting pairs of socks.	 Mia and Jake are going on a bike ride, each bike has 2 wheels, how many wheels are there in total?	**Begin to explore with own symbols and marks (jottings)** Children to be given a mathematical concept and asked to make marks to represent this (mathematical jottings)
Counting in groups (repeating addition) 	**Songs and Rhymes** When singing songs, drawing attention to the multiplication happening. 10 fat sausages introduce counting in 2s. 	**Begin to explore with own symbols and marks (jottings)**
Doubling  Doubling using items		

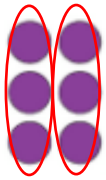
YEAR 1	Multiplication	
Vocabulary: ones, groups, lots of, doubling, repeated addition, array, row, column, equal groups of, lots of, times, pattern, times as (big, long, wide etc), longer, bigger, higher.		
Concrete	**Pictorial**	**Abstract**
Using concrete objects to reinforce counting and equal groups of. **Counting in 2s, 5s and 10s:** **Numicon**  **Cubes**  **Arrays**  **Grouping equally:** Organising objects into equal groups to support counting in 2s, 5s and 10s.	**Counting in 2s, 5s and 10s:** **Pictorial images and number lines**  **Arrays:**  **Grouping equally:** Making equal groups using jottings. 	**Written** No formal written method. Children record their mathematics using pictorial representations, arrays, number lines and mathematical statements. **Mental methods** **Counting:** Rote count in 2s, 5s or 10s up to 100.

<table>
<tr>
<td>  </td>
<td>5 x 2 = 10
5 equal groups of 2
2 + 2 + 2 + 2 + 2 (repeated addition)</td>
<td></td>
</tr>
<tr>
<td>Doubling:

Numicon
 

Cubes:
 

Tens frame:
  </td>
<td>Doubling:
Pictorial images:
Six spots on each wing. How many altogether?
 
Number lines:
 

Arrays:
 
3 + 3</td>
<td>Doubling:
Instantly recall doubles to 20
1 + 1 6 + 6
2 + 2 7 + 7
3 + 3 8 + 8
4 + 4 9 + 9
5 + 5 10 + 10</td>
</tr>
</table>

YEAR 2	Multiplication (2, 5 and 10, rote count only in 3s)

Vocabulary:
Multiplication, multiply, multiple, times, equal groups of, lots of, repeated addition, equal, same, number sentence, calculation, number, numeral, digit, pattern, commutativity, inverse, array, row, column, multiplication tables/facts, once, twice, three, ten…times a big, repeated addition.

See Year 1 for doubles.

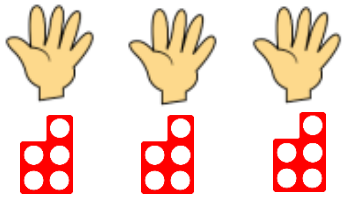
Concrete

Understand equal groups

There are 4 equal groups of 5 pencils.

Add equal groups: repeated addition

How many fingers altogether?



5 + 5 + 5 = 15

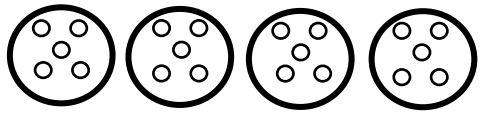
Counting on:

5 + 5 + 5 = 15

Arrays

Pictorial/jottings

Understand equal groups



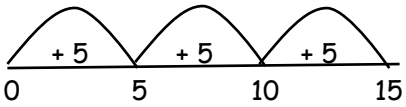
There are 4 equal groups of 5.

Add equal groups: repeated addition

5 + 5 + 5 = 15

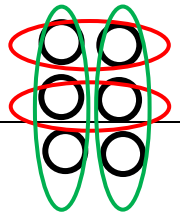
Counting on:

3 x 5 = 15



Arrays

There are 2 in each row.
There are 3 rows.
3 lots of 2.



Abstract

No formal written method

Mental

Children to **instantly** recall the **2**, **5** and **10** times tables.

Children to understand, **show** and **use** the **inverse** relationship between **multiplication** and **division** e.g.

4 x 10 = 40	4 x □ = 40
10 x 4 = 40	□ x 10 = 40
40 ÷ 10 = 4	40 ÷ □ = 40
40 ÷ 4 = 10	□ ÷ 4 = 40

Counting on

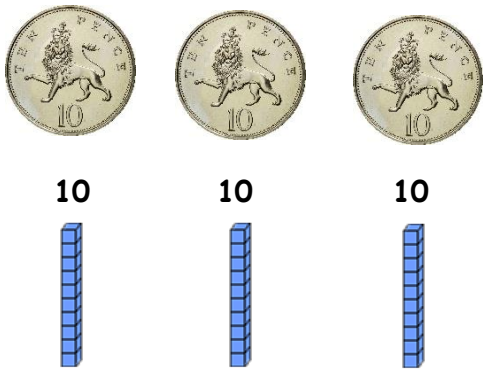
7 x 5 =

By counting on in the fives pattern using fingers to keep track.

There are 2 apples in each row.
There are 3 rows.
2 + 2 + 2 = 6
There are 6 apples altogether.

2 + 2 + 2 = 6
3 x 2 = 6
2 x 3 = 6
(commutativity)

Groups of



3 equal groups of 10 = 30
3 lots of 10 = 30
3 x 10 = 30

Jottings

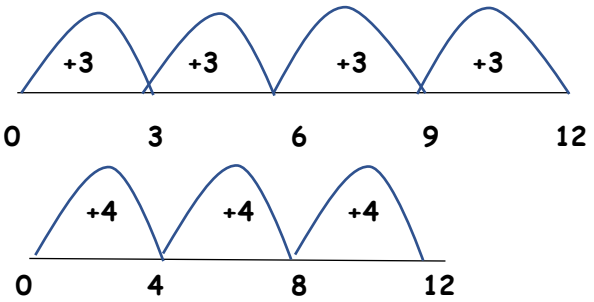
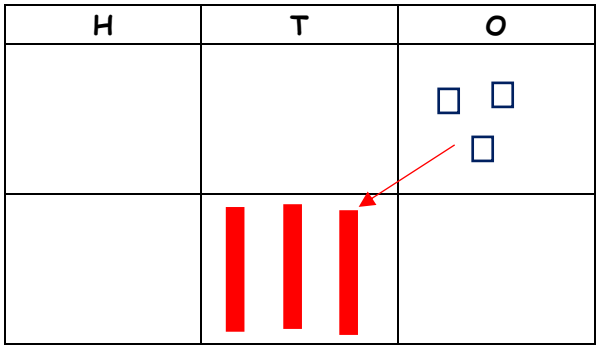
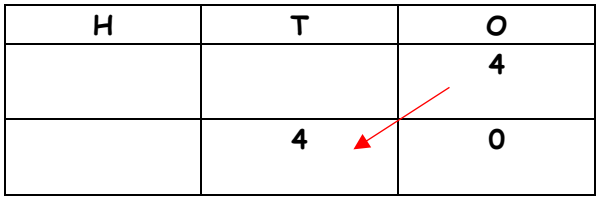
10 10 10

3 x 10 = 30

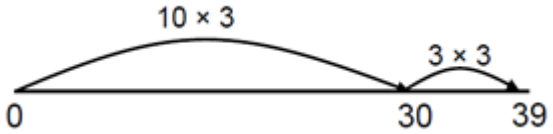
(3 equal groups of 10)

Bar model: Visual representation

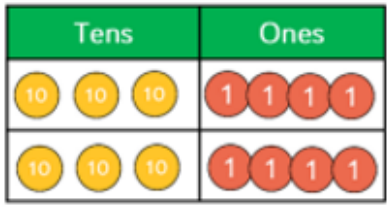
30		
10	10	10

YEAR 3	Multiplication (2, 5, 10, 3, 4, 8)	
Vocabulary: partition, inverse, product, scaling, equal groups of; lots of, array, multiply, multiplied by, times (see previous year groups)		
Concrete	**Pictorial**	**Abstract**
Multiplication tables: (2, 5, 10, 3, 4, 8) 4 x 3 3 x 4 	**Multiplication tables:** 	**Multiplication tables:** (instant mental recall)
X10 and X100 10 x 3  (Move 2 places when x 100) Also show 2 digit number x 10 e.g. 34 x 10.	**X10 and X100** 10 x 4  (Move 2 places when x 100)	No written method – leads to a mental method.
Counting on: (or diennes/numicon/place value counters) 13 x 3	**Counting on:** 13 x 3 May count on in 1 x 3 instead of 3 x 3 to start.	**Counting on:**

30p 3p 3p 3p = 39p



2 digit x 1 digit no exchanging:
34 x 2 = 68
Using diennes or place value counters



2 digit x 1 digit no exchanging:
34 x 2 = 68

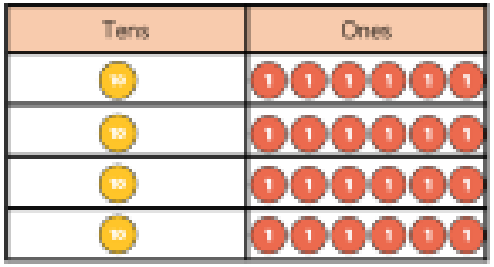
Tens	Ones
|||	○ ○ ○ ○
|||	○ ○ ○ ○

2 digit x 1 digit no exchanging:
Written – leading to a mental method.

34 x 2 = 68

30 x 2 = **60**
4 x 2 = **8**
60 + 8 = 68

2 digit x 1 digit exchanging:
16 x 4



2 digit x 1 digit exchanging:
16 x 4

Tens	Ones

2 digit x 1 digit exchanging:
(Expanded method)

16
x 4
24 (4 x 6)
40 (4 x 10)
64

Alternative grid method (if needed)
26 x 5

	5
20	100
6	30
	130

Mental methods

Instantly recall the multiplication tables for the 2, 5, 10, 3, 4 and 8 times table by the end of year 3.

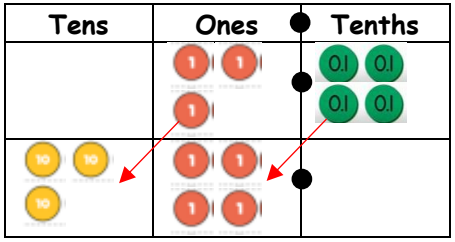
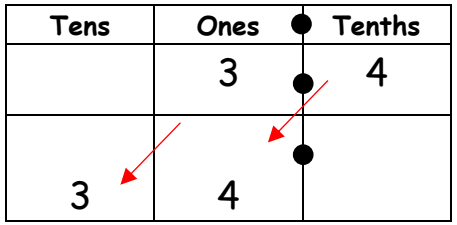
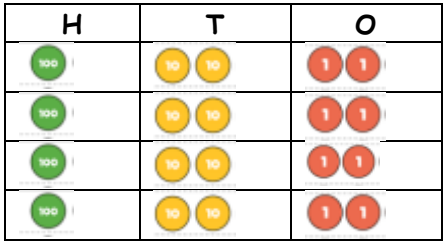
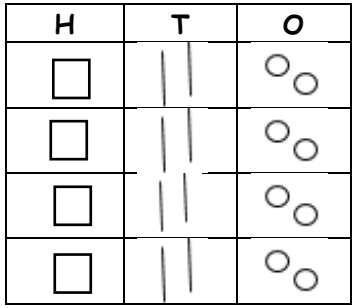
X10 and x 100:
10 x 5 = 50

Doubling again (x4 and x8)
Use doubling to connect 2, 4 and 8 multiplication tables
7 x 4 = 28
7 x 2 = **14**
14 x 2 = 28

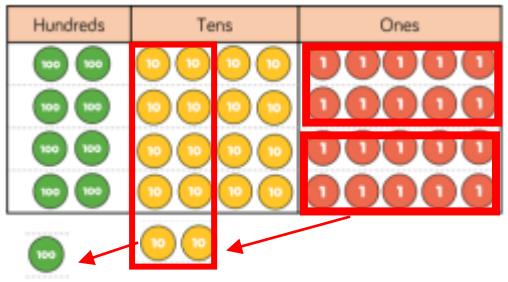
Continue to understand the inverse relationship between multiplication and division

Write the related number sentences
6 x 3 = 18 3 x 6 = 18

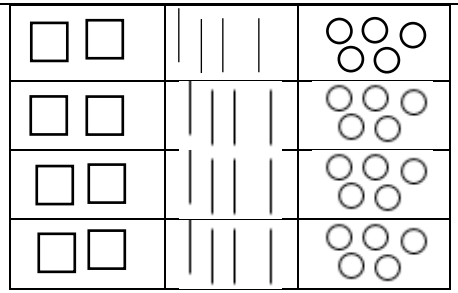
10 x 34 = 340 100 x 3 = 300 **<u>Using known facts and place value:</u>** If 2 x 3 = 6 Then 20 x 3 = 60; 2 x 30 = 60; 20 x 30 = 600 **<u>Doubling:</u>** Recall doubles of all numbers to 20, doubles of multiples of 5 to 100 and doubles of multiples of 100 to 500 24 x 2 = 48 20 x 2 = **40** 4 x 2 = **8** **40 + 8** = **48**	**7 x 8** = **56** 7 x 2 = **14** **14** x 2 = **28** **28** x 2 = 56 **<u>Partitioning:</u>** No exchanging 32 x 3 30 x 3 = **90** 2 x 3 = **6** **90 + 6** = 96	18 ÷ 3 = 6 18 ÷ 6 = 3 Use this knowledge to solve missing number problems involving multiplication. 3 x ___ = 15 24 ÷ ___ = 8 ___ ÷ 4 = 5

YEAR 4	Multiplication (up to 12 x 12)	
Vocabulary: repeated addition, product, lots of, groups of, times, factor, multiple, prime; multiplicand - a quantity which is to be multiplied by another (the multiplier) x multiplier = product;		
Concrete	**Pictorial**	**Abstract**
X10, X100 and x1000: (see Year 3 for multiplying whole numbers by 10 and 100) **Place value counters:** 3.4 x 10  Also x 1000 Understand that x 1000 = 10 x 10 x 10	**X10, X100 and x1000:** 3.4 x 10  	**X10, X100 and x1000:** No written method – leads to a mental method.
2 digit and 3 digit numbers x 1 digit: **(no exchanging)** (for 2 digit x 1 digit see year 3) 122 x 4 = 488  	**2 digit and 3 digit numbers x 1 digit:** **(no exchanging)** (for 2 digit x 1 digit see year 3) 122 x 4 = 488  	Written – leading to a mental method. **2 digit and 3 digit numbers x 1 digit:** **(no exchanging)** (for 2 digit x 1 digit see year 3) 122 x 4 = 488 100 x 4 = **400** 20 x 4 = **80** 2 x 4 = **8** **400 + 80 + 8 = 488**
2 digit and 3 digit numbers x 1 digit: **(exchanging)** (for 2 digit x 1 digit see year 3)	**2 digit and 3 digit numbers x 1 digit:** **(exchanging)** (for 2 digit x 1 digit see year 3) 245 x 4 = 980 H T O	**2 digit and 3 digit numbers x 1 digit:** **(exchanging)** (for 2 digit x 1 digit see year 3) 245 x 4 = **Expanded** leading to **Compacted**

245 x 4 = 980



9 hundreds 8 tens 0 ones



H	T	O	
2	4	5	
X		4	
	2	0	(5 x 4)
1	6	**0**	(40 x 4)
+ 8	**0**	**0**	(200 x 4)
9	8	0	

H	T	O
2	4	5
x		4
9	8	0
1	2	

Alternative grid method (if needed)

127 x 6 = 762

x	100	20	7
6	600	120	42

600 + 120 + 42 = 762 (add the partial products)

Mental Methods

Number facts:
Count in multiples of 6, 7, 9, 25 and 1000
Instantly recall the multiplication tables up to 12 x 12.
Multiply mentally using place value, known and derived facts, including: multiplying by 0 and 1

X10, x 100 and x1000:
10 x 5 = 50
10 x 34 = 340
100 x 3 = 300
1000 x 5 = 5000

Partitioning: (using distributive law)
53 x 6
50 x 6 = **300**
3 x 6 = **18**
300 + 18 = 318

Doubling:
Derive doubles of multiples of 50 to 1000 and multiples of 1000

35 x 8 (double, double and double again)
Double 35 is 70, double 70 is 140, double 140 is 280.

Using known facts and place value:
Multiply by 10 and then halve to x 5:
73 x 10 = 730
So 73 x 5 = Half of 730 = **365**

24 x 10 = 240
So 24 x 9 = **216** (by subtracting 24 from 240)

800 x 6
8 x 6 = 48 So 800 x 6 = **4800**

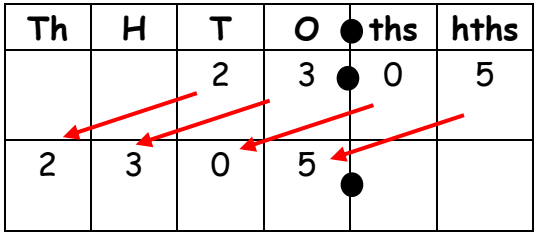
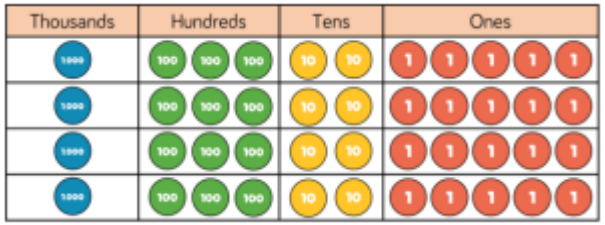
Using factors
Recognise factor pairs.

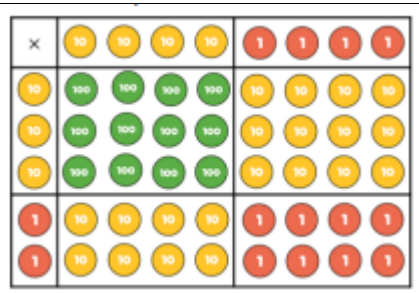
15 x **6** = 15 x **3 x 2**
15 x 3= 45
45 x 2 = 90

Continue to understand the inverse relationship between multiplication and division
Write the related number sentences
6 x 7 = 42 7 x 6 = 42
42 ÷ 7 = 6 42 ÷ 6 = 7

Use this knowledge to solve missing number problems involving multiplication.

3 x ___ = 15 25 + 10 = 5 x ___
15 < ___ x 2 ___ x ___ > 20

YEAR 5	**Multiplication**	
Vocabulary: product, lots of, groups of, times, as much, factor, common factors, multiple, prime, prime number, prime factors, composite numbers, square, cube (see previous year groups)		
Concrete	Pictorial	Abstract
X10, X100 and x1000: (as year 4 but extend to decimals to 2 places) Use place value chart with counters if needed (see year 4)	**X10, X100 and x1000:** e.g. 23.05 x 100  	**X10, X100 and x1000:** No written method – leads to a mental method.
Up to 4 digit numbers x 1 digit: (start with no exchanging leading to exchanging) 1325 x 4  (if needed)	**Up to 4 digit numbers x 1 digit:** No jottings	**Up to 4 digit numbers x 1 digit:** Th H T O 1 3 2 5 X 4 5 3 0 0 1 1 2
2 digit x 2 digit (area model) **LINKS TO GRID MODEL IF NEEDED** 44 x 32 = 1408	**2 digit x 2 digit (area model)** No jottings	**2 digit x 2 digit (area model)**



×	40	4
30	1,200	120
2	80	8

1200
120
80
+ 8
1408
1

WRITTEN METHODS (not area model)
Progressive – start with no or limited exchanging leading to exchanging.

2 digit x 2 digit numbers:

Expanded

31
X 25
5 (5x 1)
150 (5 x 30)
20 (20 x 1)
600 (20 x 30)
775

Compacted

31
x 25
1 55
6 20
7 55

Initially ,some children may need to break this down further:

31 x 5 = 155
31 x 20 = 620
155 + 620

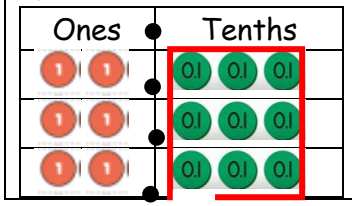
3 digit x 2 digit numbers:

Th H T O
1 3 2
x 1 3
3 9 6 (132 x 3)
1 3 2 0 (132 x 10)
1 7 1 6
1

4 digit x 2 digit numbers:

TTh Th H T O
3 2 5 0
x 2 6
1 9 5 0 0 (3250 x 6)
1 3
6 5 0 0 0 (3250 x 20)
1
8 4 5 0 0
1

Multiply numbers with up to one decimal place by one-digit whole number.
Exchanging:
2.3 x 4



Multiply numbers with up to one decimal place by one-digit whole number.

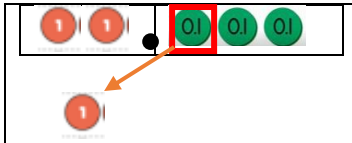
No jottings

Multiply numbers with up to one decimal place by one-digit whole number.

2.3 x 4 = 9.2

2.3
x 4
1.2
8.0
9.2

2.3
x 4
9. 2
1



Start with no exchanging leading onto exchanging.

Alternative grid method:

X	4
2.0	8.0
0.3	1.2

8.0 + 1.2 = 9.2

Leads on to a mental method (see below)

Mental Methods

Number facts:

Continue to recall multiplication facts for multiplication tables up to 12 x 12.

Derive and use related facts.

7 groups of 8 multiply 12 by 9

the product of 80 and 40 0.6 multiplied by 4

Use knowledge of counting in multiples to count in decimals steps (one decimal place)

0.6, 1.2, 1.8, 2.4 …

8.4, 7.7, 7, 6.3 …

X10, x 100 and x1000:

Multiply whole and decimal numbers by 10, 100 and 1000 where the answers are up to 2 decimal places.

Using Known facts and place value

13 x 19

13 x 20 = 260 so 13 x 19 = 247 (subtract 26 from 260)

3 x 14

recognise 3 x 14 is equivalent to 6 x 7

Doubling and halving:

Derive doubles of decimals (to one decimal place) using knowledge of place value

Double 0.4 = 0.7 x 2 =

Double 3.8 = 5.6 + 5.6 =

3.7 x 4 (double and double again)

Double 3.7 is 7.4, double 7.4 is 14.8

76 x 50 (multiply by 100 and halve)

76 x 100 = 7600

Half of 7600 is 3800

Using factors

25 x 12 = 25 x 2 x 6

25 x 2 = 50

50 x 6 = 300

Partitioning:

1.2 x 7 = 8.4

1 x 7=**7**

0.2 x 7 = **1.4**

7 + 1.4 = 8.4

3.5 x 7

3 x 7 = **21**

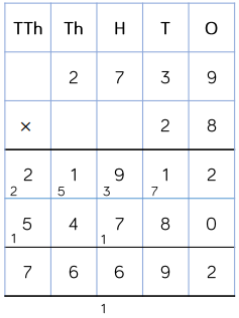
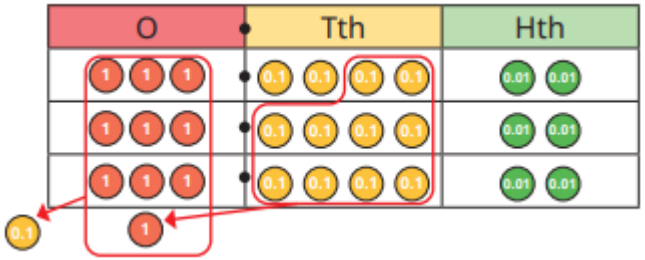
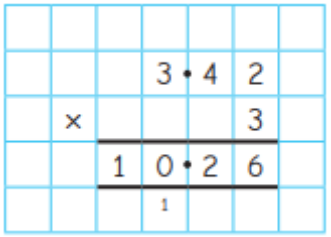
0.5 x 7 = **3.5**

21 + 3.5 = 24.5

Estimating and checking:

Check 86 x 9 by using an equivalent calculation.

Multiply by 10 and adjust (860 - 86) or partition (80 x 9 added to 6 x 9)

YEAR 6	**Multiplication**	
Vocabulary: multiply, multiplication, factor, product, multiple, times, groups, inverse, squared, cubed, multiplier, multiplicand, scaling		
Concrete	Pictorial	Abstract
Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication	**Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication**	**Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication** 
Multiply numbers with up to two decimal places by one-digit and two-digit whole numbers. 3.42 x 3 	**Multiply numbers with up to two decimal places by one-digit and two-digit whole numbers.**	**Multiply numbers with up to two decimal places by one-digit and two-digit whole numbers.** 
Mental Methods		

Number facts

Use knowledge of counting in multiples to count in decimal steps (two decimal places)
0.09 0.18 0.27 0.36 ….
0.48 0.44 0.4 0.36 …

Derive doubles of decimals (to two decimal places) using knowledge of place value
Double 0.47 is ☐ 0.73x2=☐
Double 3.08 is ☐ 2.59+2.59=☐

Continue to recall multiplication facts for multiplication tables up to 12 × 12 fluently, and derive and use related facts
30 multiplied by 800 multiply 0.12 by 6 the product of 0.08 and 4 0.4 multiplied by 0.5

Identify common factors, common multiples and prime numbers
find the highest common factor of 18 and 24
find the lowest common multiple of 6 and 15
identify whether 87 is a prime number
list the prime factors of 84 (84 = 2x42 = 2x2x21 = 2x2x3x7)
use the tests of divisibility to identify factors and multiples

continue to use square and cube numbers
What is…12^2? 6^3?

Using known facts and place value:

17 x 98
17 x 100 = 1700 so 17 x 98 is 1666 (subtract 17 x 2 from 1700)

15 x 18 - recognise 15 x 18 is equivalent to 30 x 9

Partitioning

6.04 x 3 (6 x 3= 18; 0.04 x 3= 0.12 so 18 + 0.12 = 18.12)
With jottings
0.43 x 6 (0.4 x 6 = 2.4; 0.03 x 6 = 0.18 so 2.4 + 0.18 = 2.58)

Doubling and halving:

0.24 x 40 (double and double again, then multiply by 10)
Double 0.24 is 0.48, double 0.48 is 0.96, 0.96 x 10 = 9.6

With jottings
68 x 25 (multiply by 100, then halve and halve again)
68 x 100 = 6800 Half of 6800 is 3400 Half of 3400 is 1700

Factors

1.5 x 16 = 1.5 x 2 x 8
1.5 x 2 = 3 3 x 8 = 24

with jottings
32 x 24 = 32 x 3 x 8
32 x 3 = 96; 96 x 8 = 800 - (4 x 8) = 768

Estimating

Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.
5872 x 54 is approximately 6000 x 50

Continue to use appropriate strategies to check answers
Check 496 x 5 by using an equivalent calculation
Multiply by 10 and halve or use a known fact and adjust (500 x 5) – (4 x 5)