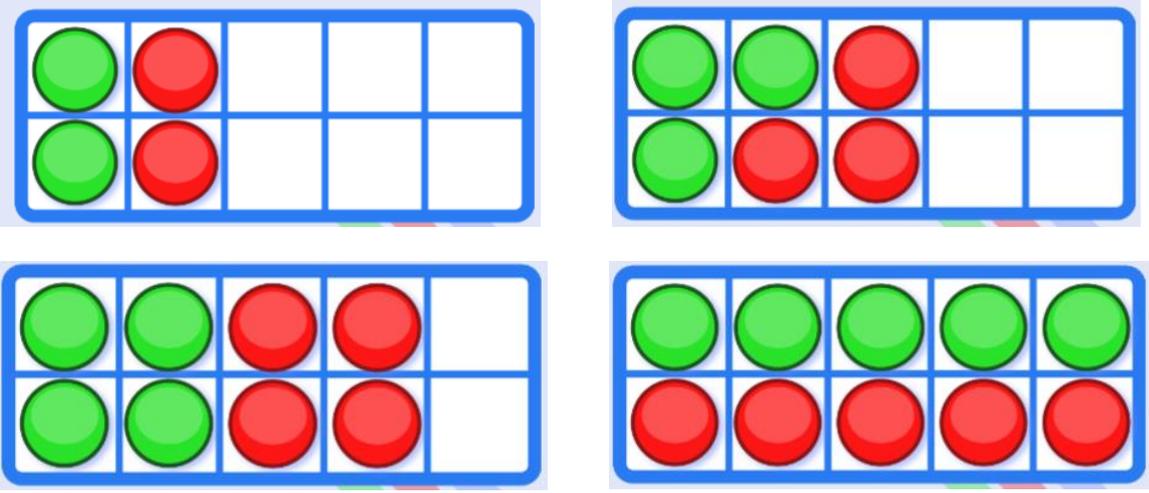
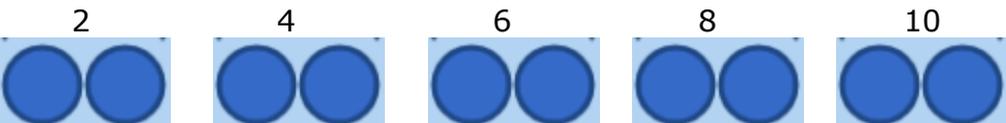
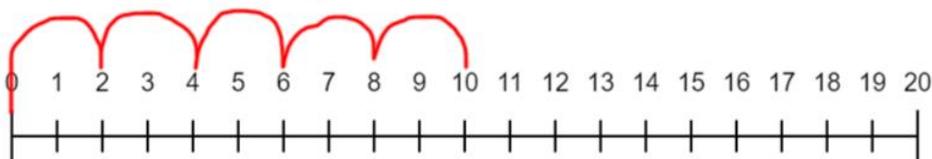


Parkwood Primary's Calculation Policy (Multiplication)

Vocabulary for Multiplication	<ul style="list-style-type: none"> • Equal to • The same as • Groups of • Lots of • Times • Arrays • Multiply • Count • Multiplied by • Repeated addition • Column • Row • Set of • Times as big • Inverse 	<ul style="list-style-type: none"> • Hundred thousand • Ten thousand • Thousands • Hundreds • Tens • Short multiplication • Long multiplication • Exchange • Once • Twice • Three times • Partition • Total • Multiple • Square • Cube 	<ul style="list-style-type: none"> • Ones • Number (made up of digits) • Digits • Inverse (opposite/from Year 3 onwards) • Estimate (from Year 3/round to estimate more accurately from Year 5 onwards) • Decimal point • Tenths • Hundredths • Thousandth • Product • Factor
FS	<p>Represent doubles</p> <p>Represent doubles on a tens frame.</p> 		
Year 1	<p>Count in twos</p> <p>Use a variety of visual representations</p> <p>5 lots of 2 5 groups of 2</p> 		
Year 1	<p>Count in fives</p> <p>Use a variety of visual representations</p> <p>4 lots of 5 4 groups of 5</p> 		

$$+2 +2 +2 +2 +2$$



$$2 + 2 + 2 + 2 + 2 = 10$$

$$5 \times 2 = 10$$

$$5 \text{ lots of } 2 = 10$$

Count in fives

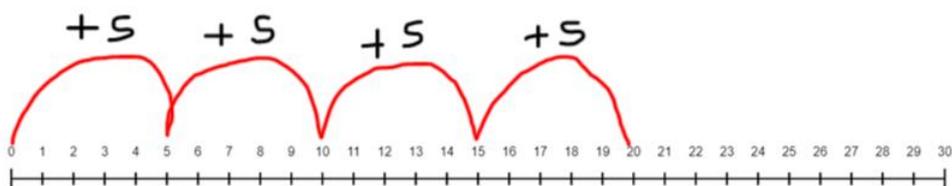
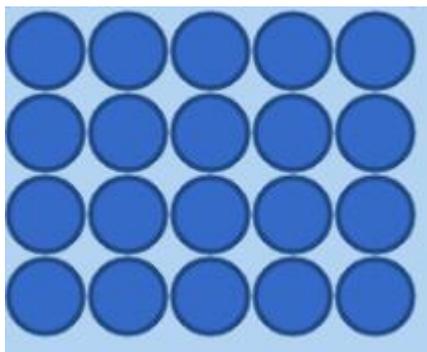
Use arrays to count in fives

$$5 + 5 + 5 + 5 = 20$$

$$4 \times 5 = 20$$

$$4 \text{ lots of } 5 = 20$$

$$4 \text{ groups of } 5$$



$$5 + 5 + 5 + 5 = 20$$

$$4 \text{ lots of } 5 = 20$$

$$4 \times 5 = 20$$

Year 2

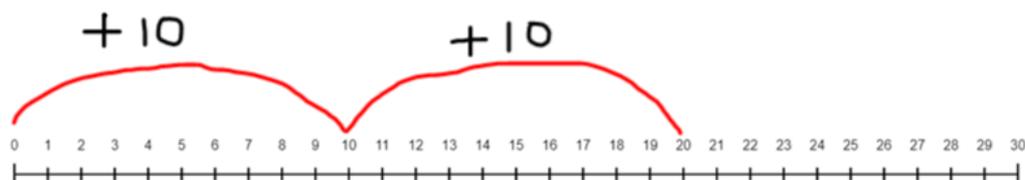
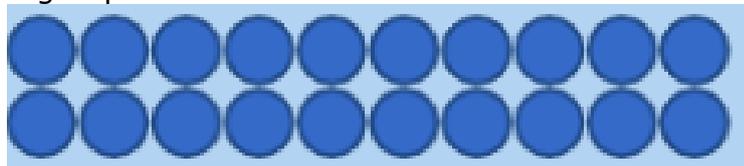
Count in tens

$$10 + 10 = 20$$

$$2 \times 10 = 20$$

2 lots of 10 = 20

2 groups of 10



$$10 + 10 = 20$$

$$2 \text{ lots of } 10 = 20$$

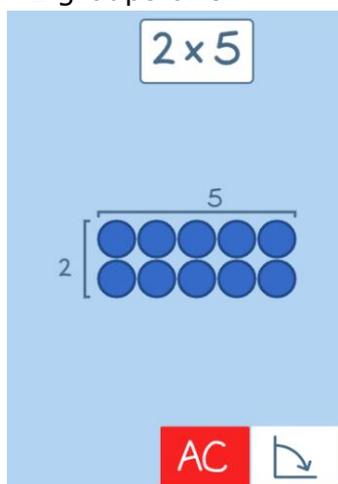
$$2 \times 10 = 20$$

Year 2

Recognise that multiplication can be done in any order (like addition)

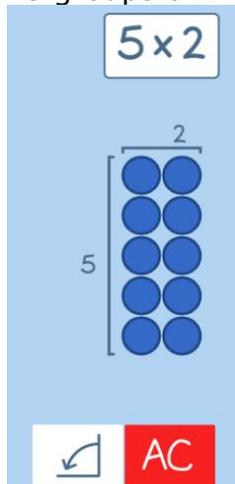
2 lots of 5 = 10

2 groups of 5



5 lots of 2 = 10

5 groups of 2

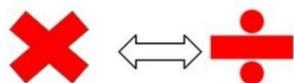
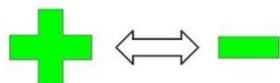


<https://www.ictgames.com/mobilePage/arrayDisplay/index.html>

From Year 3 onwards, children should be actively encouraged to make an estimate before calculating.



They should also be using the inverse as a way of checking answers from Year 3 onwards confidently (this learning begins in Year 2)



From Year 2 onwards, Times Tables Rock Stars should be actively promoted.

Recall the 3, 4 and 8 times table

Songs:

3s: Army chant

4s: Amarillo

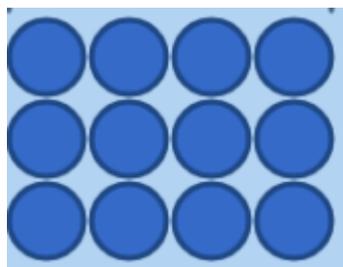
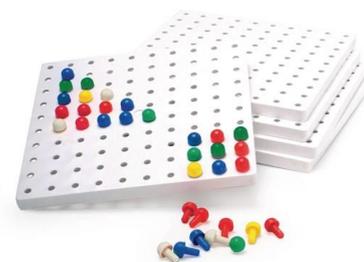
8s: If You're Happy and You Know It

Use arrays (peg boards or pictorial representations)

3 lots of 4

3 groups of 4

$3 \times 4 =$



Year 3

Multiply a two-digit number by a one-digit number using tables that they know (2, 3, 4, 5, 8, 10) with no exchanging

$$21 \times 3 =$$

$$3 \times 21 =$$

3 lots of 21

Estimate: $20 \times 3 = 60$

Tens	Ones
	■
	■
	■

T	O
2	1
x	3
<hr/>	
6	3
<hr/>	

Year 3

Multiply a two-digit number by a one-digit number using tables that they know (2, 3, 4, 5, 8, 10) with exchanging

$$24 \times 3 = 72$$

Estimate: $20 \times 3 = 60$

Tens	Ones

T	O
2	4
x	3
<hr/>	
7	2
<hr/>	
1	

From Year 2 onwards, Times Tables Rock Stars should be actively promoted.

Recall multiplication facts up to 12 x 12

Songs:

3s: Army chant

4s: Amarillo

6s: Happy Birthday

7s: He's a Jolly Good Fellow

8s: If You're Happy and You Know It

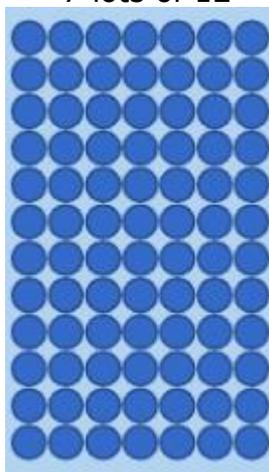
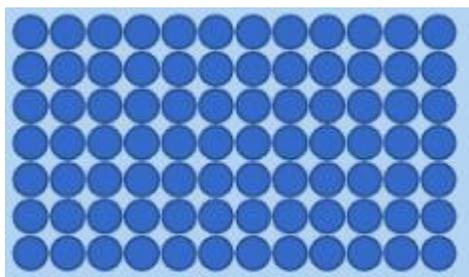
9s: Scooby Doo

12s: Heads, Shoulders, Knees and Toes

This should be done using arrays

e.g. $7 \times 12 = 84$
7 lots of 12

$12 \times 7 = 84$
7 lots of 12



Multiply a two-digit number or a three-digit number by a one-digit number (see Year 3 for two-digit number by a one-digit number) with no exchange, then one exchange and finally move on to include more than one exchange.

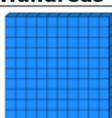
Use dienes if children are showing insecurities in their place value knowledge. As they show confidence, use place value discs as these are easier to represent the larger calculations.

$$121 \times 2 = 243$$

$$2 \times 121 = 243$$

2 lots of 121

Estimate: $100 \times 2 = 200$

Hundreds	Tens	Ones
		
		

	H	T	O
	1	2	1
x			2
	<hr/>		
	2	4	3

$$123 \times 4 = 492$$

$$4 \times 123 = 492$$

4 lots of 123 = 492

Estimate: $100 \times 4 = 400$

Hundreds	Tens	Ones
		
		
		
		

H	T	O
1	2	3
x		4
	<hr/>	
4	9	2

Hundreds	Tens	Ones
		
		
		
		

H	T	O
1	3	3
x		4
	<hr/>	
5	3	2

Hundreds	Tens	Ones
		
		
		
		

H	T	O
1	3	3
x		4
	<hr/>	
5	3	2

Once the children show good confidence with explaining the process with reference to the place value of each digit, remove the visual representation. Then introduce more challenging digits.

		H	T	O	
		4	3	7	
	x			6	
		<hr/>			
		2	6	2	2
		<hr/>			
			2	4	

Multiply whole numbers by 10, 100 and 1000

When children are introduced to multiplying by 10, 100 and 1000, they should look at calculations that they are familiar with so they recognise what happens to the digits in the place value grid as they multiply by 10, 100 or 1000.

$$4 \times 10 = 40$$

4 lots of 10
4 groups of 10



$$4 \times 10 = 40$$

Read together			Read together		
Hundred Thousands HTh 100,000	Ten Thousands TTh 10,000	Thousands Th 1,000	Hundreds H 100	Tens T 10	Ones O 1
				4	0
			4		

$$4 \times 100 = 400$$

4 lots of 100
4 groups of 100



$$4 \times 100 =$$

Read together			Read together		
Hundred Thousands HTh 100,000	Ten Thousands TTh 10,000	Thousands Th 1,000	Hundreds H 100	Tens T 10	Ones O 1
					4
			4		
				0	0

$$4 \times 1000 = 4000$$

4 lots of 1000
4 groups of 1000



$$4 \times 1000 = 4000$$

Read together			Read together		
Hundred Thousands HTh 100,000	Ten Thousands TTh 10,000	Thousands Th 1,000	Hundreds H 100	Tens T 10	Ones O 1
					4
		4			
			0	0	0

$$324 \times 10 =$$

Read together			Read together		
Hundred Thousands HTh 100,000	Ten Thousands TTh 10,000	Thousands Th 1,000	Hundreds H 100	Tens T 10	Ones O 1
			3	2	4
		3	2	4	0

When any number is multiplied by another, the answer becomes larger. This helps us to remember that when multiplying by 10, 100 or 1000, the digits move to the left in the place value grid.

Larger to the left

$\times 10$ digits move *one* column to the left

$\times 100$ digits move *two* columns to the left

$\times 1000$ digits move *three* columns to the left

$$L \quad 324 \times 100 = \quad R$$

Read together			Read together		
Hundred Thousands HTh 100,000	Ten Thousands TTh 10,000	Thousands Th 1000	Hundreds H 100	Tens T 10	Ones O 1
			3	2	4
	3	2	4	0	0

$$L \quad 324 \times 1000 = \quad R$$

Read together			Read together		
Hundred Thousands HTh 100,000	Ten Thousands TTh 10,000	Thousands Th 1000	Hundreds H 100	Tens T 10	Ones O 1
			3	2	4
	3	2	4	0	0

When dealing with decimals, it is important to emphasise the digits move, **not the decimal point**. The decimal point is static. It never moves.

$$L \quad 3.24 \times 100 = \quad R$$

Read together			Read separately	Read separately	Read separately
Hundreds H 100	Tens T 10	Ones O 1	Tenths t 0.1	Hundredths h 0.01	Thousandths th 0.001
		3	2	4	
3	2	4			

The children need to recognise that multiplying can be done in any order and be confident with which number to put in the place value chart.
 e.g. $36 \times 100 = 3600$ $100 \times 36 = 3600$
 36 must be put in the place value chart.

Multiply a two-digit number by a two-digit number (progressing to a three digit by two-digit number)

LONG MULTIPLICATION

Before tackling this, children need to be confident and fluent with HTO x O.
Begin with smaller digits within numbers.

$$42 \times 13 =$$

Estimate: $40 \times 10 = 400$

T O	T O	T O
4 2	4 2	4 2
x 1 3	x 3	x 1
-----	-----	-----
1 2 6	1 2 6	1 2 6
+ 0	+ 0	+ 0
-----	-----	-----
5 4 6	5 4 6	5 4 6

		T O							
		4 2							
 		x 1 3							

		1 2 6							
		+ 4 2 0							

		5 4 6							

(3 x 42)
(10 x 42)

By multiplying by 13 allows you to easily explain how this method works and keeps the value of the digits as the children will be easily able to identify that $10 \times 42 = 420$

		T O							
		3 4 2							
		x 1 3							

		1 0 2 6							
		+ 3 4 2 0							

		4 4 4 6							

Once the children are confident with the method, increase the value of the digits to add complexity and then introduce 3-digits multiplied by 2-digits

$$342 \times 13 = 4446$$

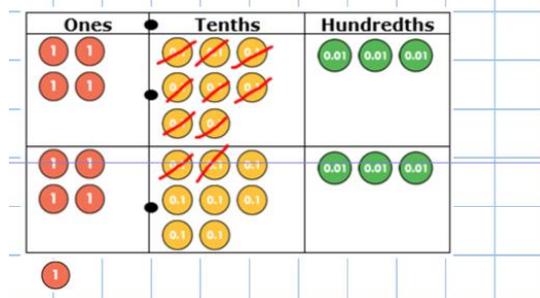
Estimate: $340 \times 10 = 3400$

Multiply a whole number by a decimal with up to two decimal places

$$4.83 \times 2 =$$

Estimate: $5 \times 2 = 10$

$$\begin{array}{r} \text{o.t.h} \\ 4.83 \\ \times 2 \\ \hline 9.66 \end{array} \quad 9.46$$



Once the children are confident with this method alongside the visual representation, the visual can be removed.

Note: never teach children that decimal points line up in column multiplication as this is inaccurate. As the children progress into their secondary education, they will need to competently navigate decimal calculations accurately. Lining up decimal points in written multiplication is inaccurate.

$$6.4 \times 7.2 =$$

$$\begin{array}{r} 6.4 \\ 7.2 \\ \hline 128 \\ 4480 \\ \hline 4608 \end{array} = 46.08$$

Foundation Stage:

Mathematics

Number ELG

Children at the expected level of development will:

- Have a deep understanding of number to 10, including the composition of each number;
- Subitise (recognise quantities without counting) up to 5;
- Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.
- Verbally count beyond 20, recognising the pattern of the counting system;
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity;
- Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

Year 1

Statutory requirements

Pupils should be taught to:

- solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Year 2

Statutory requirements

Pupils should be taught to:

- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (\times), division (\div) and equals ($=$) signs
- show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
- solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Year 3:

Statutory requirements

Pupils should be taught to:

- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Year 4:

Statutory requirements

Pupils should be taught to:

- recall multiplication and division facts for multiplication tables up to 12×12
- use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- recognise and use factor pairs and commutativity in mental calculations
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

- find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths

Year 5:

Statutory requirements

Pupils should be taught to:

- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
- establish whether a number up to 100 is prime and recall prime numbers up to 19
- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- multiply and divide numbers mentally drawing upon known facts
- divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000

- solve problems involving number up to three decimal places

Year 6

Statutory requirements

Pupils should be taught to:

- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- perform mental calculations, including with mixed operations and large numbers
- identify common factors, common multiples and prime numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why