

## SUPPORTING YOUR CHILD IN MATHS



**A guide to calculation strategies for parents**



**2021 – 2022**



Progression in teaching addition strategies  
Key vocabulary

**ADD AND COUNT ON**

**ADDITION PLUS**

**MORE SUM TOTAL**

**ALTOGETHER INCREASE**

Stage 1 – Using partitioning

Partitioning can be used as a mental arithmetic strategy.  
(Partitioning is splitting numbers into parts, e.g. tens and ones; hundreds, tens and ones and so on).

E.g.  $36 + 53 \longrightarrow = (30 + 6) \text{ plus } (50 + 3)$   
 $= (30 + 50) + (6 + 3)$   
 $= 80 + 9$   
 $= 89$

As more digits are used and calculations become more complex, most children will begin to find a vertical layout a better way of tackling addition. A secure knowledge of place value is essential before moving onto vertical addition.

Stage 2 – Vertical addition with no exchanges

	T	O
	2	4
+	3	3
<hr/>		
	7	7
<hr/>		

	H	T	O
	1	2	5
+	1	3	3
<hr/>			
	2	5	8
<hr/>			

Stage 3 = Vertical addition with exchanges

E.g.     48 + 36

	T	O
	4	8
+	3	6
<hr/>		
	8	4
<hr/>		
	1	

E.g. 587 + 475

	Th	H	T	O
		5	8	7
+		4	7	5
<hr/>				
	1	0	6	2
<hr/>				
	1	1	1	

Stage 4 – Vertical addition with decimals

E.g. 346.25 + 173.17

	H	T	O	.	$\frac{1}{10}$	$\frac{1}{100}$
	3	4	6	.	2	5
+	1	7	3	.	1	7
<hr/>						
	5	1	9	.	4	2
<hr/>						
	1				1	

E.g. 26.48 + 5.375

	T	O	.	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
	2	6	.	4	8	0
+		5	.	3	7	5
<hr/>						
	3	1	.	8	5	5
<hr/>						
	1			1		

A place holder (0) is included to avoid confusion when adding when the number of decimal places is different in each number.

## Progression in teaching subtraction strategies

### Key vocabulary

**COUNT BACK TAKE AWAY**

**FEWER SUBTRACT**

**LESS THAN MINUS**

**DIFFERENCE BETWEEN**

### Stage 1 – Using partitioning

Partitioning of the number that is being subtracted can be used as a mental arithmetic strategy. (Partitioning is splitting numbers into parts, e.g. tens and ones; hundreds, tens and ones and so on).

$$\begin{aligned} \text{E.g. } 58 - 27 & \longrightarrow = 58 \text{ subtract } (20 + 7) \\ & = 58 - 20 - 7 \\ & = 38 - 7 \\ & = 31 \end{aligned}$$

$$\text{So } 58 - 27 = 31$$

### Stage 2 – Vertical subtraction without exchanging

E.g. 48 – 24

	T	O
	4	8
-	2	4
	2	4

$$\text{So } 48 - 24 = 24$$

E.g. 165 - 43

	H	T	O
	1	6	5
-		4	3
	1	2	2

$$\text{So } 165 - 43 = 122$$

Stage 3 = Vertical subtraction with exchanges

E.g. 53 - 37

	T	O
	<del>4</del> 5	13
-	3	7
	1	6

So 53 - 37 = 160

E.g. 3007 - 2865

	Th	H	T	O
	<del>2</del> 3	<del>9</del> 10	10	7
-	2	8	6	5
	0	1	4	2

So 3007 - 2865 = 142

Stage 4 – Vertical subtraction with decimals

E.g. £46.12 - £37.08

		T	O	.	<u>1</u>	<u>1</u>
	£	<del>3</del> 4	16	.	<del>0</del> 1	<del>1</del> 2
-	£	3	7	.	0	8
			9	.	0	4

So £46.12 - £37.08 = £9.04

E.g. 763.2 - 23.678

	H	T	O	.	<u>1</u>	<u>1</u>	<u>1</u>
	7	<del>5</del> 6	<del>12</del> 3	.	<del>11</del> 2	<del>9</del> 10	<del>1</del> 0
+		2	3	.	6	7	8
	7	3	9	.	5	2	2

Place holders (0) are included to avoid confusion when adding when the number of decimal places is different in each number.

So 763.2 - 23.678 = 739.522

Progression in teaching multiplication strategies  
Key vocabulary

**MULTIPLICATION PRODUCT**

**ONCE, TWICE, THREE TIMES**

**DOUBLE GROUPS OF**

**REPEATED ADDITION**

**LOTS OF ARRAY ROW**

**COLUMN MULTIPLY  
TIMES MULTIPLE**

Stage 1

In Key Stage 1, the children are taught to count in 10s, 5s and 1s. Multiplication is taught in Year 3 and built on in Key Stage 2.

In Year 2, continuing into Year 3, the children use cubes to work out multiplication calculations.

E.g.  $3 \times 4$



They will also understand multiplication as repeated addition.



4

4

4

$$4 + 4 + 4 = 12$$

$$3 \times 4 = 12$$

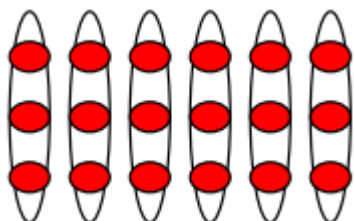
3 lots of 4

4 multiplied by 3

Children should recognise the different ways an array can be expressed and represented. For example, 36 can be expressed as 3 groups of 12 or 12 groups of 3.

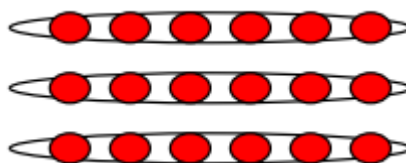
6 groups of 3

$$6 \times 3 = 18$$



3 groups of 6

$$3 \times 6 = 18$$



They will also learn how to represent arrays on a number line.

*2 jumps of 4*



*4 jumps of 2*



In order to become fluent in the fundamentals of mathematics, it is essential that children have a secure understanding of all multiplication facts up to  $12 \times 12$  and their corresponding division facts. The sooner the children learn their tables, the easier maths will become and the more confidence they will have to reason mathematically and solve more complex problems.



Children are now expected to know and instantly recall the multiplication facts to 12 x 12. At Bordon Junior School we expect all children to have instant recall of these basic facts so that they can readily and efficiently apply them to problem solving. We believe that parents have a vital and active role in the teaching and learning of multiplication facts at home. The sooner they learn and can instantly recall these facts the easier and more fun maths will become for them.



It is also important the children understand and can multiply and divide by ten with ease. When multiplying by ten, the digits move 1 place to the left. When multiplying by 100, the digits move 2 places to the left and so on.

E.g.  $43 \times 10$

	H	T	O
		4	3
			
	4	3	0

A zero is put in the ones column to keep the place value correct.

E.g.  $23 \times 100$

Th	H	T	O
		2	3
			
2	3	0	0

A zero is put in the ones and tens column to keep the place value correct.

***We avoid saying 'put a zero at the end' as when multiplying a decimal number  $27.3 \times 10$ , it would just become 27.30, rather than 2730.***

## Stage 2 – Using the area (grid) method and partitioning

Multiplication using the area model is taught as a method of organising larger multiplication and involves partitioning.

E.g.  $13 \times 7$

Partition the larger number:

x	10	3
7	$10 \times 7 = 70$	$3 \times 7 = 21$

Recombine the parts by adding:  $70 + 21 = 91$

So,  $13 \times 7 = 91$

E.g.  $23 \times 5$

x	20	3
5	$20 \times 5 = 100$	$3 \times 5 = 15$

I know  $2 \times 5 = 10$

so  $20 \times 5 = 100$

$100 + 15 = 115$

So  $23 \times 5 = 115$

E.g.  $123 \times 6$

x	100	20	3
6	$100 \times 6 = 600$	$20 \times 6 = 120$	$3 \times 6 = 18$

$$600 + 120 + 18 = 738$$

So  $123 \times 6 = 738$

E.g. 24 x 16

x	20	4	
10	20 x 10 = <b>200</b>	4 x 10 = <b>40</b>	= 240
6	20 x 6 = <b>120</b>	4 x 6 = <b>24</b>	= 144

$$240 + 144 = 384$$

### Stage 3 – Vertical multiplication

The children begin to multiply vertically by multiplying by 1-digit numbers. This is known as **short multiplication**.

#### Short multiplication

24 x 6 becomes

	H	T	O
		2	4
x			6
	1	4	4
	1	2	

Answer: 144

342 x 8 becomes

	Th	H	T	O
		3	4	2
x				8
	2	7	3	6
	2	3	1	

Answer: 2,736

2643 x 7 becomes

	TTh	Th	H	T	O
		2	6	4	3
x					7
	1	8	5	0	1
	1	4	3	2	

Answer 18,501

The children will then move onto multiplying by 2-digit numbers, known as long multiplication.

### Long multiplication

43 x 36 becomes

	Th	H	T	O	
			4	3	
x			3	6	
<hr/>					
			1	8	3 x 6
		2	4	0	40 x 6
			9	0	3 x 30
	1	2	0	0	40 x 30
<hr/>					
	1	5	4	8	
<hr/>					
		1			

Answer: 1,548

The children then move onto a more compact long multiplication where they only partition the number they are multiplying by and use short multiplication to calculate each part.

243 x 36 becomes

	Th	H	T	O	
		2	4	3	
x			3	6	
<hr/>					
	1	4	5	8	243 x 6
		<del>2</del>	<del>4</del>		
	7	2	9	0	243 x 30
	<del>7</del>				
<hr/>					
	8	7	4	8	
<hr/>					
		1			

When using the long multiplication method, first multiply the number by the ones in the number you are multiplying by – 243 x 6.

The second part of the calculation is the number multiplied by the tens in the number you are multiplying by – 243 x 30.

For this part of the calculation, a place holder is placed in the ones column because you are multiplying by a multiple of ten.

Then the two parts are totalled to find the answer.

Progression in teaching division strategies  
Key vocabulary



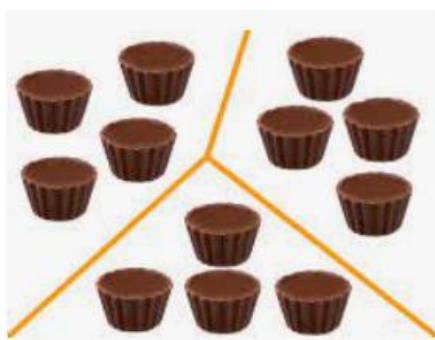
Stage 1 – using mental skills and knowledge of multiplication facts

Division is introduced in Year 3, but in Year 3 they are not expected to use formal written methods for division. The emphasis is in using their mental skills and knowledge and being able to distinguish between grouping and sharing.

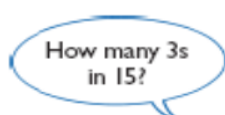
Sharing:

12 biscuits shared between 3

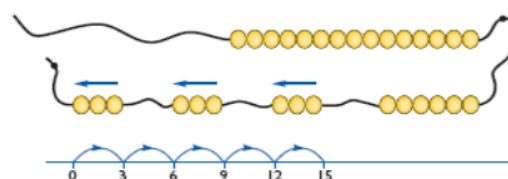
$$12 \div 3 = 4$$



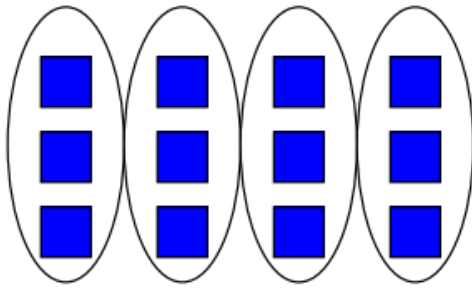
Grouping:



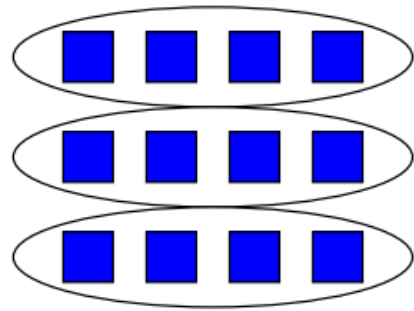
$$15 \div 3 = 5$$



## Division can be reinforced and represented using arrays



$$12 \div 3 = 4$$



$$12 \div 4 = 3$$

## Stage 2 – Short division

98 ÷ 7 becomes

$$\begin{array}{r} 14 \\ 7 \overline{) 98} \end{array}$$

1	7
2	14
4	28
8	56
10	70
5	35

The ready reckoner or jottings are really useful when dividing.

## Short division involving remainders

432 ÷ 5 becomes

$$\begin{array}{r} 086 \text{ r } 2 \\ 5 \overline{) 432} \end{array}$$

Answer: 86 remainder 2

496 ÷ 11 becomes

$$\begin{array}{r} 045 \text{ r } 1 \\ 11 \overline{) 496} \end{array}$$

Answer: 45  $\frac{1}{11}$

## Long division

560 ÷ 24 becomes

$$\begin{array}{r} 23 \text{ r } 8 \\ 24 \overline{) 560} \\ \underline{240} \quad \underline{10} \times 24 \\ 120 \\ \underline{120} \quad \underline{10} \times 24 \\ 80 \\ \underline{72} \quad \underline{3} \times 24 \\ 8 \end{array}$$

Ready reckoner for 24 x

1	24
2	48
4	96
8	192
10	240
5	120

Answer:  $560 \div 24 = 23$  remainder 8

## Further examples of long division

432 ÷ 15 becomes

$$\begin{array}{r} 28 \text{ r } 12 \\ 15 \overline{) 432} \\ \underline{300} \\ 132 \\ \underline{120} \\ 12 \end{array}$$

Answer: 28 remainder 12

432 ÷ 15 becomes

$$\begin{array}{r} 28 \frac{4}{5} \\ 15 \overline{) 432} \\ \underline{300} \quad \underline{20} \times 15 \\ 132 \\ \underline{120} \quad \underline{8} \times 15 \\ 12 \end{array}$$

Answer:  $28 \frac{12}{15} = 28 \frac{4}{5}$

$$\begin{array}{r}
 28.8 \\
 \hline
 15 \overline{) 432.0} \\
 \underline{30} \phantom{0} \\
 132 \phantom{0} \\
 \underline{120} \phantom{0} \\
 120 \phantom{0} \\
 \underline{120} \\
 0
 \end{array}$$

Answer: 28.8