



Help your child to become a Mathemagician: this booklet is designed to help you support your child with appropriate level maths work at home. It gives ideas for what you can do at home to help your child and outlines the main calculation methods the children are taught for all four operations, as they progress through the school.

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Addition- Reception

Mathemagician says:



Help your child to:

- count accurately 1-20,
- combine two or more groups and count to establish a total,
- 'count on' from one number,
- understand that addition can be done in any order,
- develop a correspondence between objects and numerals,
- order numbers 1-20,
- say 1 more than a number,

How can you help with this at home?

Practical demonstrations of addition using objects from home, e.g. toys, fruit, books etc.

What does addition look like in Reception?

Jane had 3 bears. She was given 2 more. How many does she have now?

Use drawings to help:



Write out the number sentence.

$$3+2 = 5$$

Addition- Year 1

Mathemagician says:



Help your child to:

- 'count on' from one number,
- combine two or more groups and count to establish a total,
- count on in 10's and multiples of 10 e.g. 20 from any 2 digit number,
- reorder addition to begin with largest number and counting on in 1's, 2's and 10's,
- partition small numbers e.g. $18 + 5 = 18 + 2 + 3$,
- round and adjust e.g.
 $5 + 9 =$
 $5 + 10 - 1 = 14$
- use doubles and near doubles
 $5 + 6 = 5 + 5 + 1$
- know addition facts to 20 e.g. $9 + 7 = 16$, $16 - 7 = 9$, $7 = 16 - 9$
- subitise: Instantly recognizing the number of objects in a small group, without counting e.g. when you can see that there are 5 coins without counting.

How can you help with this at home?

Practical demonstrations of addition using objects from home, e.g. toys, fruit, books etc.

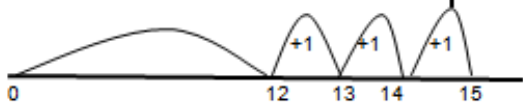
What does addition look like in Year 1?

Pictorial representation:

Some hens lay 12 eggs and 3 eggs. How many eggs did they lay altogether?



$$12 + 3 = 12 + 1 + 1 + 1$$



Then, we know that 2 and 3 is 5, so 12 add 3 is 15

Addition- Year 2

Mathemagician says:



Help your child to:

- reorder addition to begin with largest number,
- partition the number(s) being added and count on in 10's and 1's (see example below),
- counting on in 1's, 2's & 10's,
- bridging to 10,
- know doubles and near doubles,
- know addition facts to 20,
- inverse operations for facts e.g. $5 + 1 = 6$ so $6 - 5 = 1$
- compensation- rounding to the nearest 10 and then adjusting e.g. $44 + 9 = 44 + (10 - 1)$ using a number line,
- recognise that adding on 10 will leave the units number unchanged,
- subitising: Instantly recognizing the number of objects in a small group, without counting e.g. when you can see that there are 5 coins without counting.

What does addition look like in Year 2?

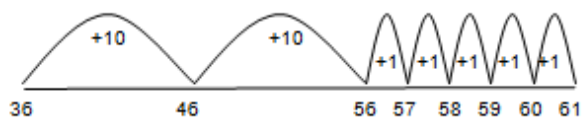
Partitioning using a number line

$$25 + 36 =$$

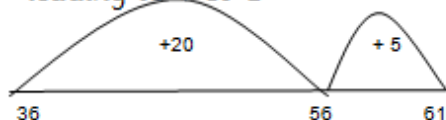
$$36 + 20 + 5 = 61$$

Partition smaller number and count on with or without a number line in

10's then 1's



leading to **T & U**



leading to **bridging to 10**

$$47 + 36 =$$

$$47 + 30 + 3 + 3 = 83$$



Addition- Year 3

Mathemagician says:



Help your child to:

- count on in multiples of 100's, 10's or 1's,
- reorder addition to begin with largest number,
- identify pairs totalling 10 or multiples of 10,
- add hundreds, tens and ones, then recombine,
- partition: count on in hundreds, tens and ones and find a total,
- partition: add 10 or 20 and adjust; e.g. $44 + 19 = 44 + 10 + (10 - 1)$,
- partition: count on in minutes and hours bridging through 60 (analogue times),
- bridge to 10 or 100 e.g. how many to get to the next 10/100,
- use known addition facts to support calculations
e.g. $3 + 6 = 9$ so $30 + 60 = 90$,
- use compensation- rounding to the nearest 10 or 100 and then adjusting
e.g. $44 + 59 = 44 + (60 - 1)$.

What does addition look like in Year 3?

$$145 + 27 =$$

Expanded vertical Layout

$$\begin{array}{r} 145 \\ + 27 \\ \hline 12 \\ 60 \quad (5+7) \\ 100 \quad (40+20) \\ \hline 172 \\ 100 \quad (100+0) \end{array}$$

Compact vertical (columnar) layout

$$\begin{array}{r} 145 \\ + 27 \\ \hline 172 \\ 1 \end{array}$$

Here we carry the 10 from the 1's column e.g. $5 + 7 = 12$ ($10 + 2$)
The carried 10 sit below the line.

Expanded vertical layout

Mathemagician says:



Addition- Year 4

Help your child to:

- count on or back in 100's 10's and 1's,
- partition: add tens and ones separately, then recombine,
- partition: add a multiple of 10 & adjust, e.g. $56 + 29 = 56 + 30 - 1$,
- partition: double and adjust e.g. $25 + 27 = 25 + 25 + 2$,
- use knowledge of place value & related calculations,
e.g. work out $140 + 150 = 290$ using $14 + 15 = 29$
- partition: count on in minutes & hours, bridging through 60 (analogue & digital times),
- use the commutative law e.g.
 $95 + 86 = 86 + 95$
- the associative law
 $25 + 17 + 18 = (25 + 17) + 18$
 $42 + 18 = 60$
or $25 + (17 + 18)$
 $25 + 35 = 60$
- bridging the 10's or 100's boundary
e.g. How many to the next 10/100?
- use decimals in the form of money £ & pence notation,
- approximate, calculate & check,
- check to see if calculations can be done mentally first,
- begin with the least significant digit.

What does addition look like in Year 4?

$$789 + 642 =$$

Expanded vertical layout

$$\begin{array}{r} 789 \\ + 642 \\ \hline 111 \\ 120 \\ 1300 \\ \hline 1431 \end{array} \quad \begin{array}{l} (9 + 2) \\ (80 + 40) \\ (700 + 600) \end{array}$$

Compact vertical (columnar) layout

$$\begin{array}{r} 789 \\ + 642 \\ \hline 1431 \\ 11 \end{array} \quad \begin{array}{l} \text{Here we carry the 10 from the 1's column e.g. } 9 + 2 = 11 \text{ (10 + 1)} \\ \text{We carry the 100 from the 10's column e.g. } 80 + 40 + 10 = 130 \text{ (100 + 30)} \\ \text{The carried 10 and 100 sit below the line.} \end{array}$$

Addition- Year 5

Mathemagician says:



Help your child to:

- count on in thousands, hundreds, tens, ones and tenths,
- partition: add thousands, hundreds, tens or ones separately, then recombine,
- add a multiple of 10 or 100 and adjust e.g. $256 + 129 = 256 + 130 - 1$
- partition: double and adjust e.g. $125 + 127 = 125 + 125 + 2$
- use knowledge of place value and related calculations, e.g. $6.3 - 4.8$ using $63 - 48$
- partition: count on in minutes & hours, bridging through 60 (analogue & digital times).

Children should be able to:

- use the compact vertical method beginning with least significant digit.
- **carry below the line**, under the appropriate column.
- refer to the carried digit as a ten, hundred or thousand
- keep PV secure in layout of Th H T U.
- use of known facts to support their addition
- approximate, calculate & check.

What does addition look like in Year 5?

What is the total of 14136, 3258 and 487?

Expanded vertical layout

$$\begin{array}{r}
 14136 \\
 3258 \\
 + 487 \\
 \hline
 21 \\
 160 \\
 700 \\
 7000 \\
 10000 \\
 \hline
 17881
 \end{array}
 \begin{array}{l}
 (6 + 8 + 7) \\
 (30 + 50 + 80) \\
 (100 + 200 + 400) \\
 (4000 + 3000) \\
 (10000 + 0)
 \end{array}$$

Compact vertical (columnar) layout

$$\begin{array}{r}
 14136 \\
 3258 \\
 + 487 \\
 \hline
 17881 \\
 12
 \end{array}$$

Here we carry the 10 from the 1's column e.g. $6 + 8 + 7 = 21$ ($20 + 1$)
 We carry the 100 from the 10's column e.g. $30 + 50 + 80 = 160$ ($100 + 60$)
 The carried 10's and 100 sit below the line.

Addition- Year 6

Mathemagician says:



Help your child to:

- count on in thousands, hundreds, tens, ones, tenths and hundredths,
- use knowledge of place value and related calculations, e.g. $680 + 430$, $6.8 + 4.3$, $0.68 + 0.43$ can all be worked out using the related calculation $68 + 43$
- use knowledge of place value and of doubles of two-digit whole numbers,
- partition: double and adjust, e.g. $4.3 + 4.5 = 4.3 + 4.3 + 0.2$
- partition: add and adjust, e.g. $4.3 + 2.9 = 4.3 + 3 - 0.1$
- partition: count on in minutes and hours, bridging through 60 (analogue and digital times, 12-hour and 24-hour clock).

Children should be able to:

- use the compact vertical method beginning with least significant digit,
- carry below the line, under the appropriate column,
- refer to the carried digit as a ten, hundred or thousand,
- keep PV secure in layout of Th H T U,
- use with decimals up to 2 places,
- when working with decimals, fill empty columns with 0 to prevent errors when lining up the digits e.g. $145.8 = 145.80$,
- approximate, calculate & check,
- interpret the display on a calculator when working with money or measures.

What does addition look like in Year 6?

Two numbers have a difference of 1.583. One of the numbers is 4.728. What is the other?

So, $\square - 4.728 = 1.583$ and $4.728 - \square = 1.583$

Expanded vertical layout

$$\begin{array}{r}
 4 \cdot 7 \ 2 \ 8 \\
 + 1 \cdot 5 \ 8 \ 3 \\
 \hline
 0 \cdot 0 \ 1 \ 1 \quad (0.008 + 0.003) \\
 0 \cdot 1 \ 0 \ 0 \quad (0.02 + 0.08) \\
 1 \cdot 2 \ 0 \ 0 \quad (0.7 + 0.5) \\
 5 \cdot 0 \ 0 \ 0 \quad (4 + 1) \\
 \hline
 6 \cdot 3 \ 1 \ 1
 \end{array}$$

Compact vertical (columnar) layout

$$\begin{array}{r}
 4 \cdot 7 \ 2 \ 8 \\
 + 1 \cdot 5 \ 8 \ 3 \\
 \hline
 6 \cdot 3 \ 1 \ 1 \\
 \hline
 1 \cdot 1 \ 1
 \end{array}$$

Here we carry the 0.01 (hundredth) from the 0.001 (thousandths) column e.g. $0.008 + 0.003 = 0.011$ ($0.01 + 0.001$). The 0.1 (tenth) from the 0.01 (hundredth) column e.g. $0.02 + 0.08 = 0.100$. The 1 from the 0.1 (tenths) column e.g. $0.7 + 0.5 = 1.2$ ($1 + 0.2$). The carried 0.01, 0.1 and 1's sit below the line.

Subtraction- Reception

Mathemagician says:



Help your child to:

- recognise subtraction as 'taking away' and 'counting back' using fingers or on a number line,
- compare two numbers to find difference e.g. as 'towers',
- complete practical examples of take away using classroom objects,
- know the number will get smaller.

How can you help with this at home?

Practical demonstrations of take away using objects from home, e.g. toys, fruit, books etc.

What does subtraction look like in Reception?

There were 9 balloons. Two popped. How many are left?

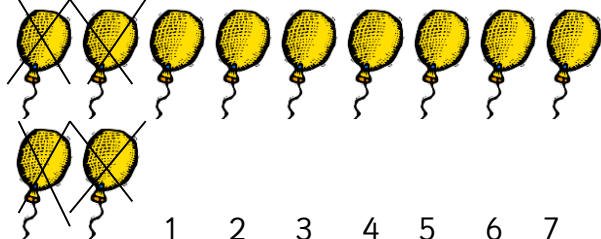
Draw pictures to take away:



$$9 - 2 = 7$$

Draw pictures to find the difference:

I've got 9 balloons. You've got 2 balloons. How many more balloons have I got?



$$9 - 2 = 7$$

Subtraction - Year 1

Mathemagician says:



Help your child to:

- recognise subtraction as 'taking away' and 'counting back',
- recognise 'Counting on' as the most efficient way of finding 'difference',
- learn their subtraction facts to 20,
- learn how to write a subtraction number sentence using symbols - & =
- check answers using the inverse e.g. if $7 - 2 = 5$ then $5 + 2 = 7$
- to be able to partition numbers e.g. $7 = 1 + 6$, $2 + 5$, $3 + 4$ etc.

How can you help with this at home?

- Recognise subtraction as 'taking away' and 'counting back'
- Use 'counting on' as the most efficient way of finding the 'difference'.
- Use known subtraction facts to 10.

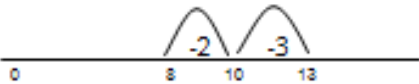
What does subtraction look like in Year 1?

Pictorial representation:



Holly has 13 grapes. She ate 5. How many did she have left?
 $13 - 5 = 8$

'Taking away'

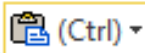


There are 37 bean bags. Kim takes 10. How many bean bags are left?

$$37 - 10$$



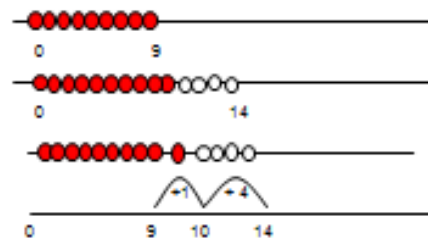
What would 37 subtract 20 be?



'Counting on' to find difference

Holly has 9 grapes. Her friend has 14 grapes. How many fewer grapes does Holly have? $14 - 9 = 5$

Initial modelling of both quantities



Subtraction - Year 2

Mathemagician says:



Help your child to:

- recognise subtraction as 'taking away' and 'counting back',
- 'count on' as the most efficient way of finding 'difference',
- partition one of the numbers into T & U in order to count on or back e.g. $55 - 27$ = partition the 27 into $20 + 5 + 2$
- know by heart subtraction facts to 20,
- use known facts e.g. $60 - 20 = 40$ because $6 - 2 = 4$
- rearrange digits to understand that a number can be represented in more than one way:
 $36 = 20 + 16$
 $81 = 70 + 11$ this will help with 'exchanging' during composition in later years,
- check using the inverse e.g. if $17 - 12 = 5$ then $5 + 12 = 17$.

What does subtraction look like in Year 2?

There are 94 bean bags in the red bucket and 67 bean bags in the blue bucket. How many more bean bags are in the red bucket?

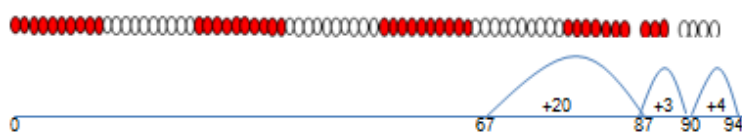
'Counting on' to find 'difference'

either on a number line and then record informally.



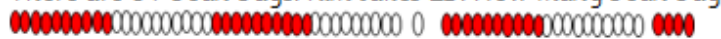
The difference between 94 and 67 is $3 + 20 + 4 = 27$ (above)

OR $20 + 3 + 4$ (below)

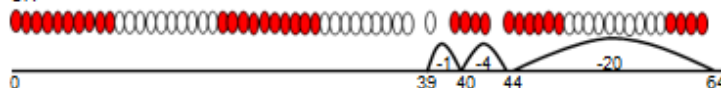


'Taking away'

There are 64 bean bags. Kim takes 25. How many bean bags are left?



OR



Partition smaller numbers and 'count back' either on a number line or record informally.

$64 - 4 - 20 - 1 = 39$ OR $64 - 20 - 4 - 1 = 39$

Subtraction - Year 3

Mathemagician says:



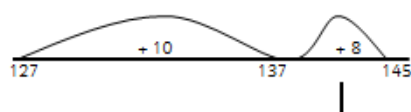
Help your child to:

- recognise subtraction as 'taking away' and 'counting back',
- partition: count on or back in hundreds, tens and ones and find the difference,
- partition: add or subtract 10 or 20 and adjust,
- recognise 'counting on' as the most efficient way of finding 'difference',
- count on or back using a number line,
- check to see if the calculation can be done mentally.

What does subtraction look like in Year 3?

Informal recording 'counting on'

What is the difference between/ (how many more than) 127 and 145?



Partitioning then 'counting on' in 10s, or multiples of 10s, and 1s using jottings

Informal recording 'counting back'

What number is 27 less than 145?



Partitioning then 'counting back' in 10s, or multiples of 10, and 1s using jottings first with an empty numberline and then later, when children can visualise the numberline, without.

Jottings: $145 - 20 = 125$

$125 - 5 - 2 = 118$

Expanded vertical layout

$147 - 27 =$

	30	
100	<u>40</u>	15
-	20	7
100	10	8

Here children partition out the numbers into 100's, 10's and 1's

This is so that they understand the value of each number.

You can see we have exchanged (not borrowed) one of the 10's to give 15 1's so that we can subtract the 7

Compact, vertical recording

	3	
1 4	<u>15</u>	
-	2 7	
1 1	8	

Once the children have a good understanding of the value of each of the numbers and they are confident with exchanging 100's for 10's and 10's for 1's they will begin to use the compact method.

Subtraction - Year 4

Mathemagician says:



Help your child to:

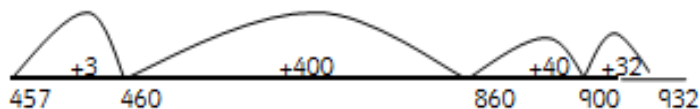
- recognise subtraction as 'taking away' and 'find the difference',
- recognise 'counting on' as the most efficient way of finding 'difference',
- use knowledge of place value & related calculations,
- count back in 100's 10's and 1's,
- partition: subtract tens and then ones, e.g. subtracting 27 by subtracting 20 then 7,
- subtract by counting up from the smaller to the larger number,
- partition: subtract a multiple of 10 & adjust, $86 - 38 = 86 - 40 + 2$,
- partition: count back in minutes & hours, bridging through 60 (analogue & digital times).

Children should be able to:

- look carefully at the calculation and ask themselves: "could it be done mentally?",
- decide if there are there any 'difficult' bits that may require a written method, if so decide on the best method to use: expanded or compact?
- begin with the least significant digit,
- use secure Place Value knowledge for the layout of HTU,
- use known addition and subtraction facts,
- check answers using an alternative or inverse method.

Informal recording

Counting on' to find 'difference' either using a number line or informal horizontal recording
 $932 - 457$



'counting back' either by partitioning or using a number line

$$932 - 457 = 932 - 400 - 50 - 7$$

$$932 - 400 = 532$$

$$532 - 30 - 20 = 482$$

$$482 - 2 - 5 = 475$$

Expanded vertical layout

	800	120	
	~~900~~	~~30~~	12
-	400	50	7
	400	70	5
			= 475

Here children partition out the numbers into 100's, 10's and 1's
 This is so that they understand the value of each number.
 You can see we have exchanged (not borrowed) one of the 100's to give 12 10's (120) so that we can subtract the 50

Compact, vertical (columnar)

	8	12	1
	9	3	2
-	4	5	7
	4	7	5

Once the children have a good understanding of the value of each of the numbers and they are confident with exchanging 100's for 10's and 10's for 1's they will begin to use the compact method.

Subtraction- Year 5

Mathemagician says:



Help your child to:

- recognise subtraction as 'taking away' and 'find the difference',
- recognise 'counting on' as the most efficient way of finding 'difference',
- count back in thousands, hundreds, tens, ones and tenths,
- partition: add thousands, hundreds, tens or ones separately, then recombine,
- subtract by counting up from the smaller to the larger number,
- subtract a multiple of 10 or 100 and adjust e.g. $186 - 138 = 186 - 140 + 2$,
- use knowledge of place value and related calculations, e.g. $6.3 - 4.8$ using $63 - 48$
- partition: count back in minutes & hours, bridging through 60 (analogue & digital times),
- approximate answers by rounding,
- check subtraction using the inverse operation of addition.

Children should be able to:

- look carefully at the calculation and ask themselves: "could it be done mentally?"
- decide if there are any 'difficult' bits that may require a written method, if so decide on the best method to use: a number line, counting on/back using informal jottings, expanded decomposition or the compact method?
- use the compact vertical method beginning with least significant digit.
- **carry below the line**, under the appropriate column.
- refer to the carried digit as a ten, hundred or thousand etc
- use secure place value knowledge for the layout of Th H T U.
- use known addition and subtraction facts.
- check answers using an alternative or inverse method.

What does subtraction look like in Year 5?

23185 - 2078 =

Expanded vertical method (decomposition)

			70		
20000	3000	100	~~80~~	15	
	- 2000	0	70	8	
20000	1000	100	0	7	

Here children partition out the numbers into 1000's, 100's, 10's and 1's

This is so that they understand the value of each number.

You can see we have exchanged (not borrowed) one of the 10's to give 15 1's (15) so that we can subtract the 8

Compact vertical (columnar) recording

2	3	1	⁷ ~~8~~	15
- 2	0	7	8	
1	1	0	7	

Once the children have a good understanding of the value of each of the numbers and they are confident with exchanging 1000's for 100's, 100's for 10's and 10's for 1's they will begin to use the compact method.

Subtraction- Year 6

Mathemagician says:



Help your child to:

- recognise subtraction as 'taking away' and 'finding the difference',
- recognise 'counting on' as the most efficient way of finding 'difference',
- count back in thousands, hundreds, tens, ones, tenths and hundredths,
- use knowledge of place value and related calculations, e.g. $680 + 430$, $6.8 + 4.3$, $0.68 + 0.43$ can all be worked out using the related calculation $68 + 43$,
- partition: subtract and adjust, eg. $6.5 - 3.8 = 6.5 - 4 + 0.2$,
- partition: count back in minutes and hours, bridging through 60 (analogue and digital times, 12-hour and 24-hour clock),
- use known addition and subtraction facts,
- approximate the answer by rounding,
- check answers using an alternative or inverse method.

- The children should be able to:
- Look carefully at the calculation and ask themselves "could it be done mentally?"
- Decide if there are there any 'difficult' bits that may require a written method, if so decide on the best method to use: a number line, counting on/back using informal jottings or expanded/compact decomposition?
- Use compact vertical method and begin with the least significant digit.
- Carry below the line, under the appropriate column.
 - Refer to the carried digit as a ten, hundred or thousand etc
 - Use secure place value knowledge for the layout of Th H T U.
- When working with decimals, fill empty columns with 0 to prevent errors when lining up the digits e.g. $145.8 = 145.80$
- Approximate, calculate & check.

What does subtraction look like in Year 6?

$$4.728 - \square = 1.583 \text{ or } 4.728 - 1.583 = \square$$

Expanded vertical layout (decomposition)

		0.6	0.12	
	4	• 0.7	0.02	0.008
-	1	• 0.5	0.08	0.003
	3	• 0.1	0.04	0.005
				= 3.145

Here children partition out the numbers into 1's, 0.1's, 0.01's and 0.001's

This is so that they understand the value of each number. You can see we have exchanged (not borrowed) one of the 0.1's to give 12 0.01's (0.12) so that we can subtract the 0.08

Compact vertical (columnar) recording

		6	1	
	4	• 7	2	8
-	1	• 5	8	3
	3	• 1	4	5

Once the children have a good understanding of the value of each of the numbers and they are confident with exchanging 1's for 0.1's, 0.1's for 0.01's and 0.01's for 0.001's they will begin to use the compact method.

Multiplication - Reception

Mathemagician says:



Help your child to:

- count in 1s, 2s, 5s and 10's,
- use pictures or objects to show groups,
- use repeated addition of objects,
- double and group objects,
- know multiplication can be carried out in any order.

How can you help with this at home?

- Begin to recognise multiplication as repeated addition of groups of the same size.
- Add groups of objects physically e.g. cars, toys, books etc.

What does multiplication look like in reception?

How many wheels do we need for these three cars?

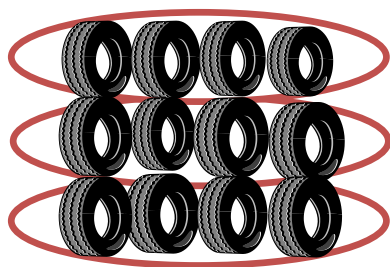
Draw pictures



$$4 + 4 + 4 = 12$$

Create groups of

3 lots of 4=12



Multiplication – Year 1

Mathemagician says:



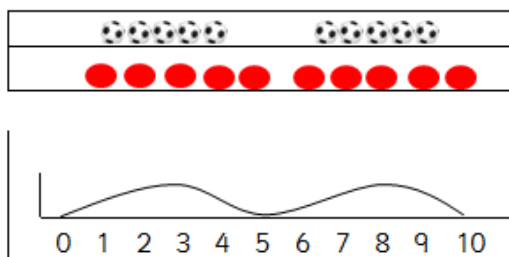
Help your child to:

- count in 2s, 5s and 10's and begin counting in 3's,
- use pictures or objects to show groups,
- use repeated addition of objects,
- double and group objects,
- know multiplication can be carried out in any order,
- use a number line to record doubles e.g. $2 + 2 = 4$.

What does multiplication look like in Year 1?

Counting in steps using a number line:

Ben had 5 football stickers on each page. He has two pages of stickers. How many does he have altogether?



Linking multiplication with repeated addition. Here the children would use pictures and bead strings to help them to show 2 jumps of 5 on a number line.

Array

Also show as a rectangular 'array' i.e. two groups of 5
or $5 + 5 = 10$



An array is a visual representation of the multiplication in rows and columns.

Multiplication – Year 2

Mathemagician says:



Help your child to:

to recognise repeated addition of groups of the same size; as an array;
counting in steps of 2, 5 or 10,

to know that repeated addition is a longer way of multiplying,

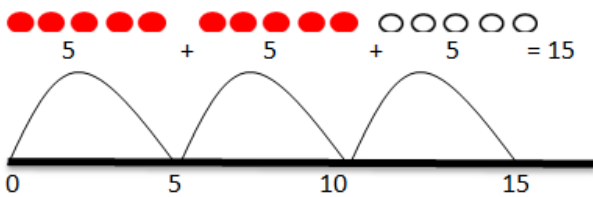
- draw and describe arrays,
- know the 2, 5 & 10 times tables and recognise these multiples,
- begin to know the 3 & 4 times tables: practise counting in 3's and 4's,
- to use the x symbol in a number sentence,
- make links between doubling and x2,
- use partitioning to double numbers e.g. double 14

$$10 \times 2 = 20 \quad 4 \times 2 = 8 \quad 20 + 8 = 28$$

What does multiplication look like in year 2?

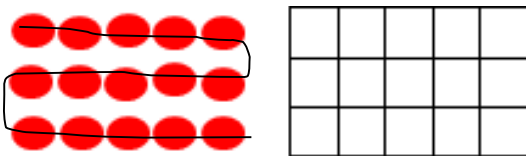
Repeated addition

$$5 \times 3 = 15$$



Using a bead string to support the use of a number line, the children repeatedly add groups of five.

Array



The bead string can also be fold, or counters could be used, to support the creation of an array. An array is a pictorial representation of the multiplication. This also helps to support the idea that multiplication can be done in any order i.e.

$$3 \times 5 = 15$$

$$5 \times 3 = 15$$

Multiplication – Year 3

Mathemagician says:



Help your child to:

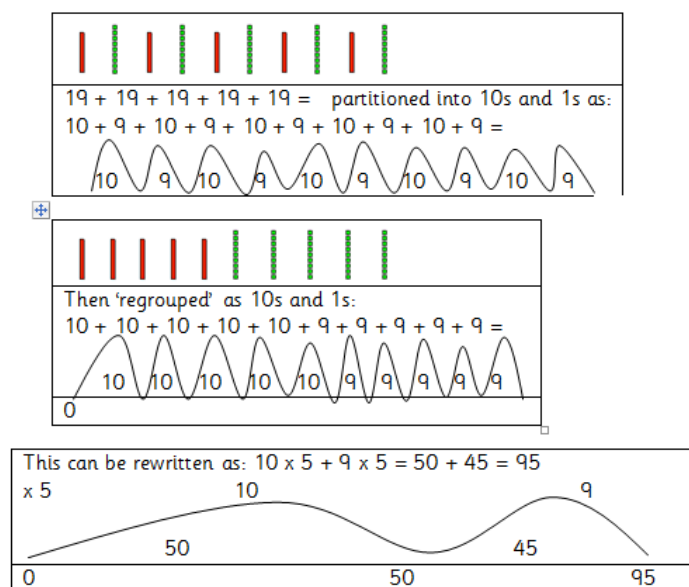
- to recognise multiplication as repeated addition of groups of the same size and as an array,
- count in steps of 2, 3, 4, 5, 8 or 10,
- to know 2, 3, 4, 5, 8 & 10 times tables,
- connect the 2, 4 and 8 multiplication tables through doubling,
- begin to learn 6 & 7 times tables,
- multiply by 10 & 100,
- partition 3-digit numbers and understand what each digit represents,
- use known facts to find unknown facts: teach children how to find facts they don't know e.g. 7×8 can be found using the facts 5×8 and 2×8 ,
- to derive related facts (e.g. using $3 \times 2 = 6$, $6 \div 3 = 2$ and $2 = 6 \div 3$) to find $(30 \times 2 = 60, 60 \div 3 = 20$ and $20 = 60 \div 3)$,
- use jottings to record partitioning e.g.

$$15 \times 5 = \quad 10 \times 5 = 50 \quad 5 \times 5 = 25 \quad 50 + 25 = 75$$

What does multiplication look like in year 3?

Multiplication using a number line

$$19 \times 5 =$$



Using straws the children create the number 19 five times.

They then regroup this into five lots of 10 and five lots of 9.

This can then be shown on the number line where the children have partitioned the 10's and the 1's.

Once the children understand the partitioning of the number to multiply they will begin to use the grid method, which later leads to more formal written methods.

Grid Multiplication

$$19 \times 5 =$$

x	19	
	10	9
5	$10 \times 5 = 50$	$9 \times 5 = 45$



Multiplication – Year 4

Mathemagician says:



Help your child to:

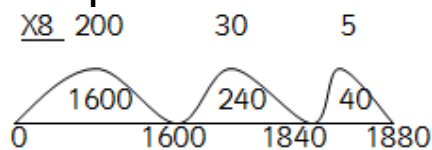
- to recognise multiplication as repeated addition of groups of the same size; as an array; as scaling (i.e. three times more than, twice as big as, ten times smaller),
- to know times table facts up to 12×12 ,
- to know that multiplication can be done in any order (commutative law),
- to understand and explain the effect of multiplying by 10 & 100,
- multiply TU x U,
- use known facts to find unknown facts: teach children how to find facts they don't know e.g. 7×8 can be found using the facts 5×8 and 2×8 ,
- to be able to use multiplication to develop knowledge of division facts,
- partition numbers to make multiplication easier,

What does multiplication look like in year 4?

The class wants to make 235 spiders for a display. How many legs do they need to make?

235×8 is approximately $235 \times 10 = 2350$.

Multiplication on a number line



Grid Multiplication

x	200	30	5
8	1600	240	40

$$1600 + 240 + 40 = 1880$$

so, $235 \times 8 = 1880$

x	8
200	1600
30	240
5	40
	1880

Expanded 'Vertical' Multipliacion

2	3	5	
x		8	
	4	0	(8 multiplied by 5 is 40)
	2	4	0 (8 multiplied by 30 is 240)
1	6	0	0 (8 multiplied by 200 is 1600)
1	8	8	0 (To give a total of 1880)

Children continue to use a number line if needed to partition the number into 100's, 10's and 1's. Models can also be used to support this.

They then link this to the grid method. Here partitioned horizontally as this links with the number line.

As multiplication can be carried out in any order this later means children can partition vertically to support the addition needed to find a total.

When children are secure with the grid method they can begin to be introduced to more formal written methods when multiplying by a 1 digit number.

Multiplication – Year 5

Mathemagician says:



Help your child to:

- counting in steps of any size to 10 and beyond,
- to know the times tables facts up to 12×12 ,
- to understand and explain the effect of multiplying by 10, 100 & 1000,
- to be able to use multiplication to develop knowledge of division facts,
- 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,
- use approximation to check answers are reasonable.

What does multiplication look like in year 5?

Grid Multiplication

56×27

56×27 is approximately $60 \times 30 = 1800$.

x	20	7	
50	1000	350	So,
6	120	42	1120
	1120	+ 392	+ 392
			<u>1512</u>
			1

Expanded 'Vertical' Multiplication

Leading to an expanded 'vertical' layout.

	2	7	
x	5	6	
	4	2	(6 multiplied by 7 is 42)
	1	2	0 (6 multiplied by 20 is 120)
	3	5	0 (50 multiplied by 7 is 350)
	1	0	0 0 (50 multiplied by 20 is 1000)
	1	5	1 2 To give a total of 1512
	1		

It is important that children are secure with the grid multiplication method before moving onto any formal written methods.

Compact 'Vertical' Multiplication

Leading to a compact 'vertical' layout (children would need to record jottings along side this calculation.)

	2	7	
x	5	6	
	1	6	2 6 multiplied by 27 is 162

$$\begin{array}{r} 1\ 3\ 5\ 0 \\ 1\ 5\ 1\ 2 \\ \hline 1 \end{array}$$

50 multiplied by 27 is 1350
To give a total of 1512

Multiplication – Year 6

Mathemagician says:



Help your child to:

- count in steps of any size to 12,
- to know the times tables facts up to 12×12 and corresponding division facts,
- to understand and explain the effect of multiplying by 10, 100 & 1000 on whole and decimal numbers,
- multiply decimals, money and measures,
- begin to use the standard compact multiplication method (if secure with grid and expanded version),
- use the column method of addition to add totals during multiplication (ensure place value is correct),

What does multiplication look like in year 6?

1328 x 43

1328 x 43 is approximately $1200 \times 40 = 48000$ (use known tables e.g. 12×4)

Grid Multiplication

As **1328 x 43 = 43 x 1328** (commutative), the layout for grid multiplication can also be presented 'vertically' as a step towards 'long multiplication' and to support addition.

x	40	3	
1000	40 000	3000	
300	12 000	900	
20	800	60	
8	320	24	
	53 120	+ 3984	

So,

53 120

+ 3 984

57 104

Expanded 'Vertical' Multiplication

Leading to an expanded 'vertical' layout.

	1	3	2	8	
x			4	3	
			2	4	(3 multiplied by 8 is 24)
			6	0	(3 multiplied by 20 is 60)
		9	0	0	(3 multiplied by 300 is 900)
	3	0	0	0	(3 multiplied by 1000 is 3000)
		3	2	0	(40 multiplied 8 is 320)
		8	0	0	(40 multiplied by 20 is 800)
	1	2	0	0	(40 multiplied by 300 is 12 000)
	4	0	0	0	(40 multiplied by 1000 is 40 000)
	5	7	1	0	4
		2	1		

To give a total of 57 104

Compact 'Vertical' Multiplication

Leading to a compact 'vertical' layout. (children would need to record jottings along side this calculation.)

	1	3	2	8
x			4	3

3	9	8	4	3 multiplied by 1328 is 3984	
5	3	1	2	0	40 multiplied by 1328 is 53 120
5	7	1	0	4	To give a total of 1880
1	1				

Division – Reception

Mathemagician says;



Help your child to:

- begin to recognise sharing equally: share objects, fruit, counters etc,
- use repeated addition of 'groups' of the same size i.e. grouping of objects,
- count forward and back in steps of 1, 2 and 10.

How can you help with this at home?

- Use pictures to record.
- Group objects physically.

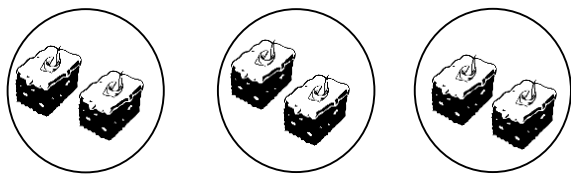
What does division look like in Reception?

Can we share out these cakes fairly? How shall we do it?

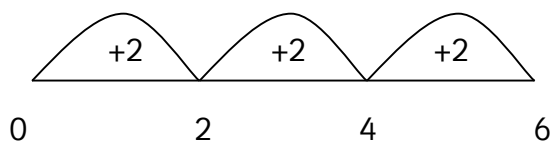
Physical sharing and pictorial representation



If we put two cakes on each plate, how many plates do we need?



Record grouping on a number line



Division – Year 1

Mathemagician says;



Help your child to:

- begin to recognise sharing equally: share objects, fruit, counters etc,
- use repeated addition of 'groups' of the same size i.e. grouping of objects,
- count forward and back in steps of 1, 2 and 10.

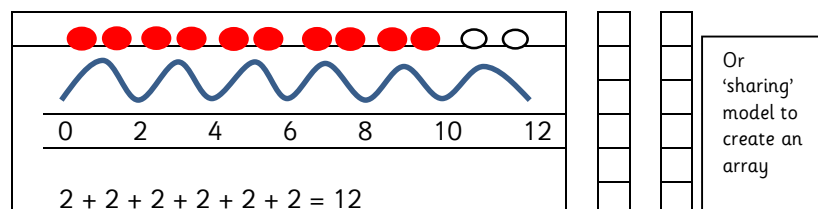
How can you help with this at home?

- Use pictures and number lines to record.
- Introduce the idea of 'leftovers'.

What does division look like in Year 1?

Equal Sharing

Show 12 sweets. Share the sweets equally between two i.e. one for you and one for me – we've used 2 of the sweets. Another one for you and one for me – we've used 2 more of the sweets etc.



$$2 + 2 + 2 + 2 + 2 + 2 = 12$$

Grouping

We have 12 sweets. If each child has 2 sweets, how many children will have 2 sweets? i.e. two for you – that's one group of two – that's one person - modelled on bead string and record on a number line as above.

Division – Year 2

Mathemagician says:



Help your child to:

- recognise division as sharing equally,
- share practically e.g. sweets, cars, cards etc,
- use repeated addition to divide,
- group objects and numbers,
- count forward and back in steps of 1, 2, 5 and 10,
- learn division facts for the 2, 5, 10 times tables,
- use the X and $\div$ symbols,
- continue to extend the idea of 'leftovers'.

What does division look like in Year 2?

How many sticks of 4 cubes can you make from 20 cubes?

OR If 20 cubes are shared equally between 4 people, how many cubes do they each get?



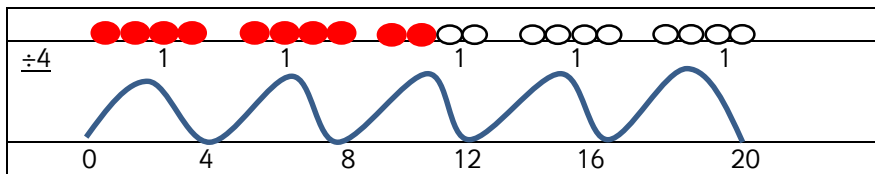
GROUPING

Show 20 cubes. Divide the cubes into groups of 4 i.e. one group of 4, two groups of 4 and so on.... And another group of 4 cubes etc.

$$4 + 4 + 4 + 4 + 4 = 4 \times 5 = 20$$

$$20 \div 4 = 5$$

20 divided into groups of 4 equals 5.



EQUAL SHARING

As above.

We have 20 cubes. Share the cubes equally between each person – we've used 4 of the cubes.

Another one for each person etc.

$$4 + 4 + 4 + 4 + 4 = 4 \times 5 = 20 \text{ so}$$

$$20 \div 4 = 5$$

20 shared equally between 4 equals 5.

Division – Year 3

Mathemagician says;



Help your child to:

- recognise division as sharing equally,
- use repeated addition or **subtraction** of groups of the same size i.e. grouping,
- know division facts for the 2, 3, 4, 5, 8 and 10 times tables,
- begin to learn division facts for the 6 and 7 times tables,
- to understand that some numbers will leave a remainder 'leftover' and represent this using the 'r' notation. E.g. $26 \div 5 = 5 \text{ r}1$
- use the $\times$ and $\div$ symbols,
- begin to add or take away multiples of the number, e.g. ten lots of ... or 5 lots of... using times table facts the children know,
- encourage children to partition numbers to help them make use of multiples, e.g. $26 \div 2 = 20 + 6$ $2 \times 10 = 20$ $2 \times 3 = 6$
then use these facts on the number line.

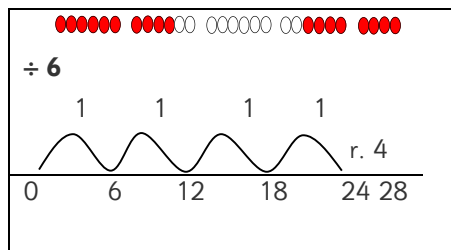
What does division look like in Year 3?

Miss West needs 28 paper cups. She has to buy them in packs of 6 How many packs does she have to buy?

GROUPING

$28 \div 6$ in this context: '28 cups divided into groups of 6'.

So, $28 \div 6 = 4 \text{ remainder } 4$



A bead string is used to model the sharing and this is then represented on a number line.

EQUAL SHARING

There are 28 paper cups to share equally between 6 people. So if everyone has one paper cup, that's one group of 6 paper cups. Another one for each person etc.

So, $6 + 6 + 6 + 6 + 4 = 6 \times 4 + 1 = 28$

OR so $28 \div 6 = 4 \text{ r.}4$

28 shared equally between 6 equals 4 remainder 4.

It is important that children begin to understand the context of the problem to know what to do with the remainder i.e. in this instance Miss West will need to buy 5 packs of cups to ensure that she has enough as 4 pack would only give her 24 cups.

Division – Year 4

Mathemagician says:



Help your child to:

- recognise division as sharing equally,
- use repeated addition of groups of the same size i.e. grouping,
- know division facts for the times tables up to 12×12 ,
- to understand and explain the effect of dividing by 10 and 100,
- to understand the link between fractions and division e.g. $\frac{1}{2}$ of 20 is the same as $20 \div 2$, or $\frac{1}{4}$ of 20 is the same as $20 \div 4$,
- to find remainders and represent this using the 'r' notation.

What does division look like in Year 4?

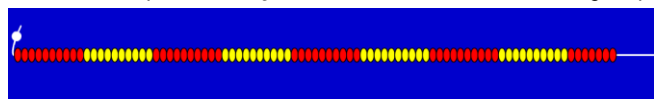
There are 87 shopping days until Christmas. How many weeks is that?

$$87 \div 7$$

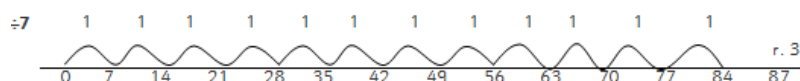
So, '87 divided into groups of 7' is approximately $70 \div 7 = 10$.

GROUPING

Use the interpretation of $87 \div 7$ as '87 divided into groups of 7'



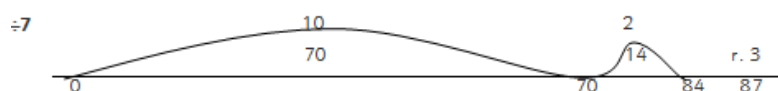
Recorded on a number line alongside bead bar or string.



So, '87 divided into groups of 7 equals 12 remainder 3'

$$87 \div 7 = 12 \text{ r. } 3 \quad \text{or} \quad 12 \frac{3}{7}$$

Then begin to divide into '**groups of the divisor**' using groups of 10, 5 and 2 wherever possible:



Chunking

$$\begin{array}{r} 8 \ 7 \ \div 7 \\ - 7 \ 0 \ 10 \\ 1 \ 7 \\ - 1 \ 4 \ 2 \\ 3 \end{array}$$

$$\text{so, } 87 \div 7 = 12 \text{ r. } 3 \text{ or } 12 \frac{3}{7}$$

If children's understanding is secure, e.g. during summer term. Then chunking would be introduced alongside the number line.

Division – Year 5

Mathemagician says:



Help your child to:

- know division facts for the times tables up to 12×12 ,
- to understand and explain the effect of dividing by 10, 100 and 1000,
- represent remainders using the 'r.' notation,
- to understand the link between fractions and division e.g. $\frac{1}{2}$ of 20 is the same as $20 \div 2$, or $\frac{1}{4}$ of 20 is the same as $20 \div 4$,
- become confident finding multiples of the divisor on a number line before moving onto 'chunking'. N.B. Children need to be secure with subtraction, particularly exchanging, in order to be successful with chunking,
- to understand how remainders are shown on the calculator: understanding that remainders will be treated as a fraction e.g.

$$22 \div 5 = 4 \text{ r}2$$

The calculator will treat this as a fraction: $\frac{2}{5}$ since 5 is the divisor. It will then represent this as a decimal fraction ($\frac{2}{5} = 0.4$) giving a calculator answer of 4.4,

- to know that multiplication is the inverse of addition and use this to check calculations.

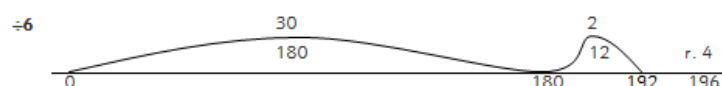
What does division look like in Year 5?

$$196 \div 6$$

i.e. '196 divided into groups of 6' is approximately $180 \div 6 = 30$

GROUPING

Leading on from Year 4, divide into '**groups of the divisor**' using multiples of groups of 10, 5 and 2 wherever possible and record on a number line.



So, '196 divided into groups of 6 equals 32 remainder 4' i.e. $196 \div 6 = 32 \text{ r}4$ or $32 \frac{4}{6}$ or $32 \frac{2}{3}$

Chunking

When children's understanding is secure, vertical recording can be used. Vertical recording would be demonstrated alongside number line recording.

Where necessary dividing by 'groups of the divisor' using groups of 10, 5 and 2 (see above) and then using 'multiple groups of 10, 5 and 2 (see below)

$$\begin{array}{r} 1 \ 9 \ 6 \\ \div 6 \end{array}$$

$$\begin{array}{r} - 18030 \\ 16 \\ \hline - 122 \\ 4 \end{array}$$

so, $196 \div 6 = 32 \text{ r.} 4$ or $32 \frac{4}{6}$ or $32 \frac{2}{3}$

Division – Year 6

Mathemagician says;



Help your child to:

- recognise division as sharing equally,
- use repeated addition or **subtraction** of groups of the same size i.e. grouping,
- know division facts for the times tables up to 12×12 ,
- to understand and explain the effect of dividing by 10, 100 and 1000 of decimals and whole numbers,
- represent remainders using the 'r.' notation,
- to understand the link between fractions and division e.g. $\frac{1}{2}$ of 20 is the same as $20 \div 2$, or $\frac{1}{4}$ of 20 is the same as $20 \div 4$,
- to understand how remainders are shown on the calculator: understanding that remainders will be treated as a fraction

$$22 \div 5 = 4 \text{ r} 2$$

The calculator will treat this as a fraction: $\frac{2}{5}$ since 5 is the divisor. It will then represent this as a decimal fraction ($\frac{2}{5} = 0.4$) giving a calculator answer of 4.4,

- to decide whether to round up or down after division depending upon the context,
- to know that multiplication is the inverse of addition and use this to check calculations,
- Children will need to be confident finding multiples of the divisor on a number line before moving onto 'chunking' and to be secure with subtraction, particularly exchanging, in order to be successful with chunking.

What does division look like in Year 6

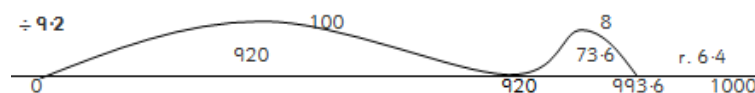
Each paper clip is made from 9.2 centimetres of wire. What is the greatest number of paper clips that can be made from 10 metres of wire?

$$10\text{m} \div 9.2\text{cm} = 1000 \div 9.2$$

'10m or 1000cm of wire divided into lengths (groups) of 9.2cm' is approximately $1000 \div 10 = 100$

GROUPING

Leading on from Year 4 and Year 5, divide into 'groups of the divisor' using multiples of groups of 10, 5 and 2 wherever possible and record on a number line.



So, '1000 divided into lengths of 9.2 equals 108 paper clips with 6.4cm of wire remaining.

Chunking

When children's understanding is secure, vertical recording can be used. Vertical recording would be demonstrated alongside number line recording.

1	0	0	0	
				$\pm$
-	9	2	0	100
	9	2	0	
-	4	6		5
	4	6		
-	2	7	6	3
	2	7	6	
		6	4	
so, $1000 \div 9.2 = 108$				
r.6.4				

For Year 5 and Year 6: When children are secure with 'chunking' and tables facts, **short division** is introduced for single digit divisors.

For example, $196 \div 6$

'196 divided into groups of 6' is approximately $180 \div 6 = 30$

$$\begin{array}{r}
 32 \text{ r.} 4 \\
 6 \overline{) 196} \\
 \underline{18} \\
 16 \\
 \underline{12} \\
 4
 \end{array}$$

Vocabulary

