Parent Guide to KS2 Addition

Addition Vocabulary

increase add total

plus addition

more count on

sum altogether
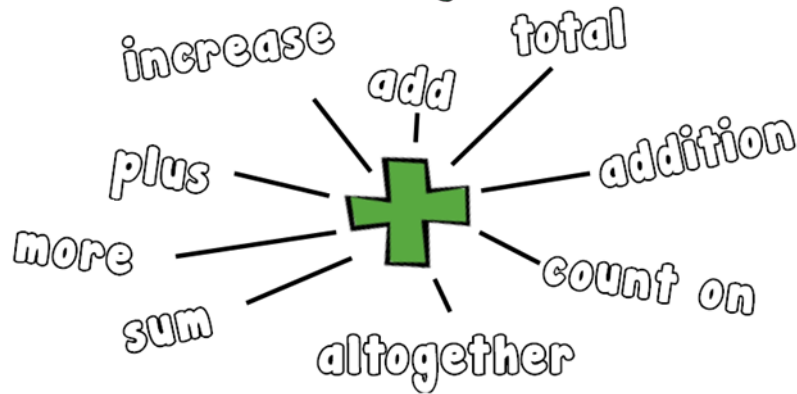
The word sum means to add so we only use this word when adding. When talking about the other operations we would use the terms number sentence or calculation.

By the end of Key Stage 2, pupils should be able to apply the methods to using decimals as well as whole numbers. Pupils will continue to develop their own representations using informal jottings to support their mental strategies.
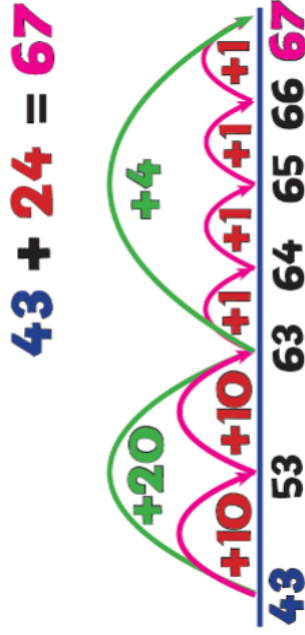
Addition Calculation

4   +   2   =   6
   (add)   (equals)

sum   total

Number Lines

This example shows how we would model counting on a number line. As pupils develop confidence they will count on in steps of 10 and then 1s as shown in green.

$$43 + 24 = 67$$

+20 +4
+10 +10 +1 +1 +1 +1

43   53   63   64   65   66   67

Partitioning

Partitioning is key to developing the standard written methods. Pupils should be able to partition a number in many ways, not just the usual tens and units. For example: 23 = 20 + 3 = 10 + 13 = 10 + 10 + 3

$$43 + 24 = 67$$

$$40 + 20 = 60$$
$$3 + 4 = 7$$
$$67$$

Partition each number and add the tens and ones before adding the two totals together.

Expanded Column Addition

For this method, pupils must line up the digits correctly, thinking about the place value of each digit e.g. hundred, tens or ones (previously called units). To begin, the ones (7+8) are added and recorded below. Then the tens (80 +40) and then the hundreds (600 + 200).
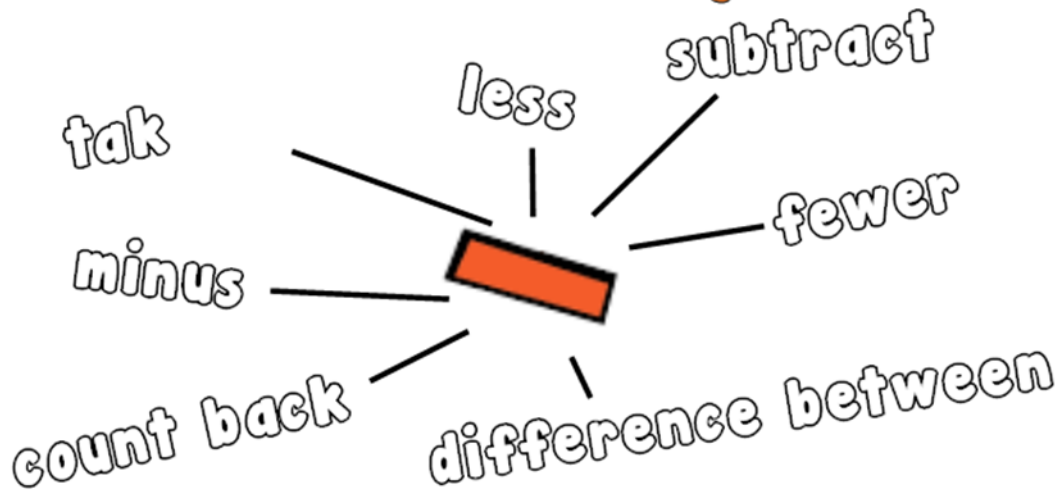
The three new totals made are then added again starting with the ones column to find the final answer. It is important to know the value of each digit they are adding so it is 30 add 40 or 8 tens add 4 tens and not 8 and 4.

```
  H T U
    6 8 7
  + 2 4 8
  -------
      1 5
    1 2 0
    8 0 0
  -------
    9 3 5
```

Formal Written Method of Addition

The expanded method is then developed into a compact written method where carrying is introduced. 7 + 8 = 15 so we carry the ten to the tens column and place 1 (ten) underneath the line in the tens column. 80 + 40 = 120 so again the hundred is carried to the hundreds column and written below the line. The additional ten below the tens column is also added.

```
  H T U
    6 8 7
  + 2 4 8
  -------
    9 3 5
    1 1
```

Parent Guide to KS2 Subtraction

Subtraction Vocabulary

tak

less

subtract

minus

fewer

count back

difference between

Subtraction can be seen as taking away and finding the difference.

Pupils will continue to be taught to use number lines to find the difference especially for finding a change when numbers are close together e.g. 1004 – 982, however formal written methods will also be introduced.

Subtraction Calculation

6 (subtract) − 2 = 4

(equals)

difference

Expanded Column Subtraction

The standard written method relies on pupils having a good understanding of place value and partitioning. Each number in the calculation is partitioned and recorded underneath each other. Again, start with the ones.

In this case it is not possible to subtract 6 from 3 (3 - 6) as 3 is smaller than 6. We exchange/take 1 ten from the tens column into the ones column to make 13. So now, we can take 6 away from 13 to leave 7.

We now have 10 in the tens column and again we cannot take 50 away so we need to exchange from the hundreds column to make 110, which leaves 60. Finally, 300 can be subtracted from the 600. We recombine (add) the answer to make 367.

$$723 - 356 = 367$$

Formal Written Method of Subtraction

When pupils have developed a good understanding of the process they will work towards using a compact method of decomposition method where partitioning is no longer required. In this case, the exchanging is placed above the number.


3 – 6 cannot be done so we exchange from the next column (in this case the tens) to make 13 – 6 = 7 which leaves 1 in the tens column (black numbers above).

1 – 5 cannot be done in the tens so exchanging again makes 11 – 5 = 6. (pink numbers)

Finally 6 – 3 = 3 in the hundreds column.

Parent Guide to KS2 Multiplication

Multiplication Vocabulary

multiply   times   product

multiple   double

lots of   groups of

repeated addition

X
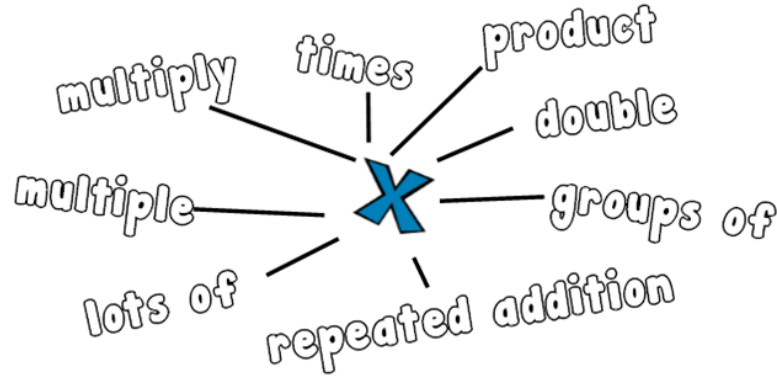
Multiplication is where you take one number and add it together a number of times (repeated addition).
Example: 5 multiplied by 4 (5 x 4) = 5 + 5 + 5 + 5 = 20

Here the number 5 was added together 4 times, which is why multiplication is sometimes called "times".

Signs for Multiplication
The most common sign for multiplication is the " x " sign, but sometimes people use a " * " sign or other symbols. Here are some ways to indicate 5 multiplied by 4.

5 x 4   5 * 4   5 times 4

Factors and Products
Sometimes when teachers talk about multiplication they will use the terms factors and products. Factors are the numbers you are multiplying together. Products are the answers.
(factor) x (factor) = product
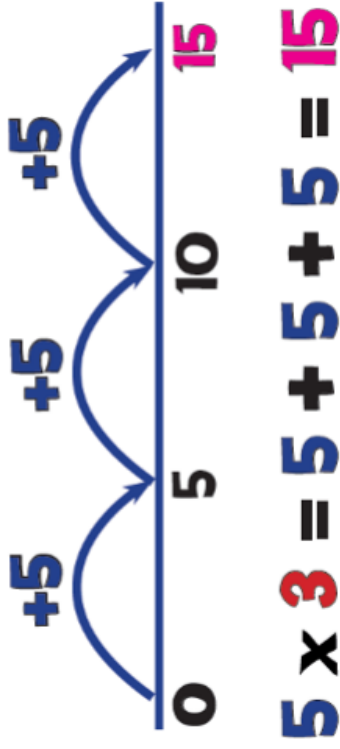
Multiplication Calculation

6 x (multiply) 2 = (equals) 4
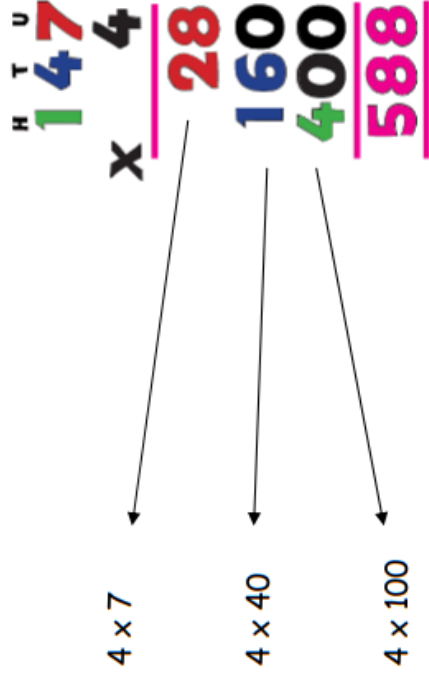product

Repeated Addition using a Number Line

We can represent multiplication as jumps on a number line repeatedly adding groups of the same amount.

+5 +5 +5

0   5   10   15

$5 \times 3 = 5 + 5 + 5 = 15$

5 times 3 means 5, 3 times.

Grid Method for Long Multiplication (Used in Year 4)

In this method the numbers are partitioned and multiplied and then the numbers are added together to find the answer.

$43 \times 65 = 2795$

x	40	3
60	2400	180
5	200	15

40×60
3×60
40×5
3×5

$2400 + 180 + 200 + 15 = 2795$

Expanded Column Multiplication

The expanded method involves multiplying each digit and stacking the amounts underneath individually. A secure knowledge of place value is important for this method to be successful.
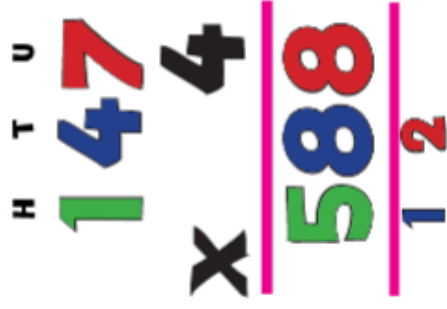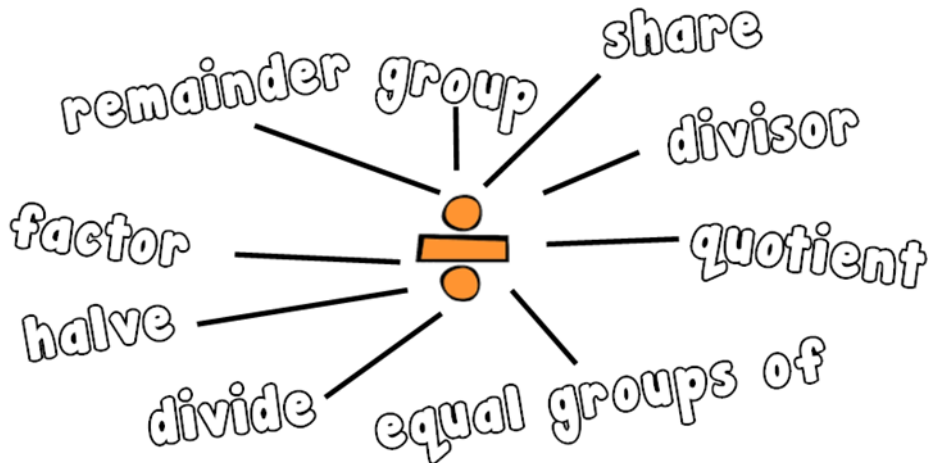
```
  H  T  U
     4  7
  x     4
-----------
     2  8
  1  6  0
  4  0  0
-----------
  5  8  8
```

4×7

4×40

4×100
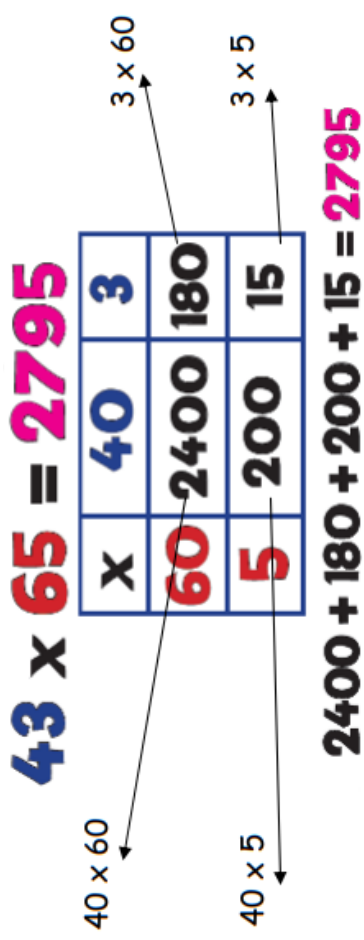
Formal Written Method of Multiplication

This compact method of multiplication is where the tens and hundreds are carried as in column addition. For example,
$4 \times 7 = 28$. The 8 is written below the ones column and the 20 carried into the tens column.

```
  H  T  U
     4  7
  x     4
-----------
  5  8  8
     2
```

Parent Guide to KS2 Division

Division Vocabulary

remainder group share

factor divisor

halve quotient

divide equal groups of

Pupils will be encouraged to discuss their mathematical learning and will begin by using the vocabulary of 'equal groups' and 'sharing'.

Formal written methods of division are based on the concept of grouping.
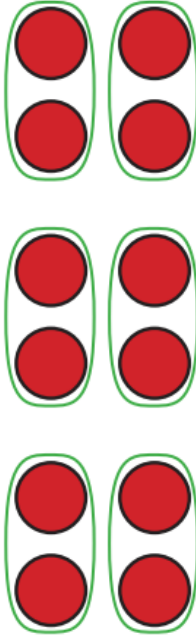
Division Calculation

$$8 \div 4 = 2$$

(divide) (equals)

quotient

Grouping

Grouping is a key model of division, which uses the pupil's knowledge of multiplication facts. $12 \div 2$ means how many 2s can I fit into 12?

$$12 \div 2 = 6$$

How many groups of 2 can I fit into 12? Answer: 6

Grouping on a Number Line

This step is based on knowledge of number patterns and times tables facts. The pupils will record their method using an informal jotting on a number line.

$$20 \div 5 = 4$$

How many 5s in 20? Answer: 4

Short Division

Starting with the digit on the left (blue number) ask how many 4s are there in 1. If you cannot use this number move it to the next column and ask the same question again.
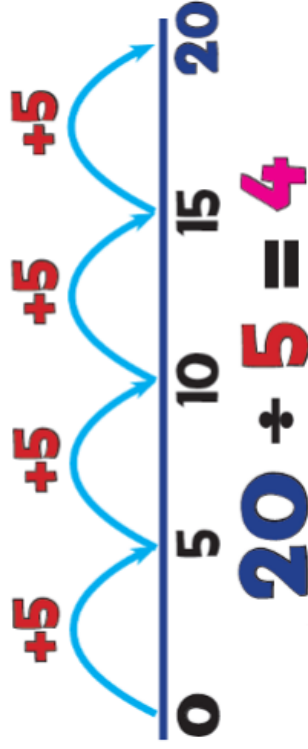
$$136 \div 4 = 34$$

Long Division (Chunking)

This method asks you to take away groups of 37 (number on the outside of the bus stop). In this case groups of 10 x 37 were subtracted each time until the remaining number could not be subtracted. Add up the group (pink 10, 10 and 6) and put on the top and the remainder is the left over at the bottom (2).

```
        26 r21
37 ) 983
   - 370    (37 x 10)
     613
   - 370    (37 x 10)
     243
   - 222    (37 x 6)
      21
```

$$983 \div 37 = 26r21$$

Long Division (Traditional)

15 into 3 doesn't go, so look at the next digit.

15 goes into 36 two times, so put a 2 above the 6.
$$15 \times 2 = 30$$

Take that 30 away from the 36 to get your remainder.
$$36 - 30 = 6$$

```
      2
15 ) 3640
   - 30
      6
```

Next, carry the 4 down to make 64.

15 goes into 64 four times, so put a 4 above the 4.
$$15 \times 4 = 60$$

Take 60 from the 64 to get your remainder.
$$64 - 60 = 4$$

```
      24
15 ) 3640
   - 30↓
      64
    - 60
       4
```

Carry the 0 down to make 40.

15 goes into 40 two times, so put a 2 above the 0.
$$15 \times 2 = 30$$

Take 30 from the 40 to get your remainder.
$$40 - 30 = 10$$

```
      242
15 ) 3640
   - 30
      64
    - 60
      40
    - 30
      10
```

Parent Guide to KS2 Times Tables

In Key Stage 2, before any written methods can be securely understood, pupils need to have a secure and fluent knowledge of the multiplication tables facts, which can be recalled instantly. The learning of tables facts begins with counting up in different steps but by the end of Year 4 it is expected that most pupils can instantly recall facts up to 12 x 12.

The progression in facts is as follows:

Year 1	Count in multiples of 2, 5 and 10. Recall and use all doubles to 10 and corresponding halves.
Year 2	2x TABLE 5x TABLE 10x TABLE
Year 3	3x TABLE 4x TABLE 8x TABLE
Year 4	6x TABLE 7x TABLE 9x TABLE 11x TABLE 12x TABLE
Years 5 & 6	Revision of all times tables and division facts up to 12x12.

Multiplication Tables Check

All Year 4 pupils will have their multiplication skills formally tested in the summer term of Year 4 from 2020. **The purpose of the "Multiplication Tables Check" is to determine whether Year 4 pupils can recall their multiplication tables fluently** (being able to answer times tables questions accurately and quickly, without having to work out the answers).

Pupils will be tested using an on-screen check (on a computer or a tablet), where they will have to answer 25 multiplication questions against the clock with 6 seconds per question. Questions will be selected from the 121 number facts that make up the multiplication tables from 2 to 12, with a particular focus on the 6, 7, 8, 9 and 12 times tables as they are considered to be the most challenging.

It is important that pupils are fluent and confident in recall of key number facts. The foundations that they learn in Key Stage 1 are vital in making sure they are able to work efficiently in all written methods for all four operations.

Pupils should know:
- Numbers bonds for all numbers to 20
- Number Pairs to 100 (e.g. 70 + 30, 10 + 90)
- Times table facts up to 12 x 12 as well as corresponding division facts

Multiplication Square

The numbers in red show the square numbers where a number is multiplied by itself two times, for example; 1 x 1 = 1, 2 x 2 = 4 etc.

x	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144