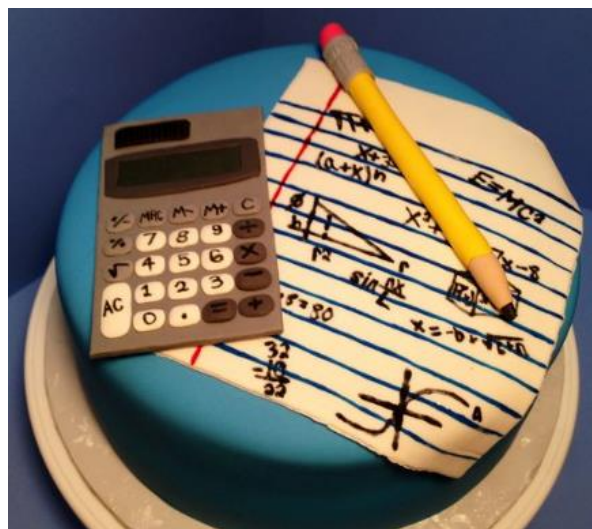# Cakes and Calculations

Parental self-help guide for supporting your child with maths in KS2

This booklet has been designed to support you while supporting your child at home with their mathematical learning. It is often the case that many methods and strategies taught today are different from those previously used. It is therefore vital that the methods taught in school can be reinforced at home to avoid confusion.

This booklet contains the teaching stages of each of the 4 operations: addition, subtraction, multiplication and division. It also includes key vocabulary to support each method, as being able to talk about their method with an increasing vocabulary and explain, reason and justify the strategies used is critical in developing your child's mathematical thinking.

In school, children will experience these operations through practical, oral, mental and written work. Each of the methods are progressive in their level of difficulty so will be accessed by your child at the relevant stage of their developmental learning across KS2.

Children must be able to select the most efficient and reliable method when calculating with each of the 4 operations by the end of KS2 - whether this is a mental calculation with a jotting or a formal written method.

*Thanks in advance for all of your ongoing support!*

Addition:

Addition Vocabulary

increase · add · total · plus · addition · more · count on · sum · altogether

The word 'sum' means to add so we can only use this word when adding. We can use the terms 'number sentence' and 'calculation' when referring to other operations.

Children will continue to use their own representations and informal jottings to support **mental strategies (introduced Year 2)** throughout KS2 - particularly with regards to time. For example, using a number line:

$$43 + 24 = 67$$

+20   +4

+10 +10 +1 +1 +1 +1

43   53   63   64   65   66   67
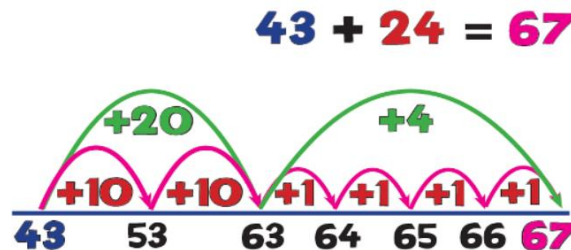
As children develop in confidence they will master their method from counting on in steps of ten and then ones (shown in red) to multiples of ten and units (shown in green).

Partitioning (Year 2) is key to developing your child's understanding of what numbers represent within a calculation. They should be able to partition in a number of ways, not just the usual tens and units. For example:

$$23 = 20+3 = 10+10+3 = 10+13$$

$$43 + 24 = 67$$
$$40 + 20 = 60$$
$$3 + 4 = 7$$
$$\overline{67}$$

The children then progress to using a vertical **expanded column addition method (Year 3)**. The children need to be aware of how to line the digits up correctly within the columns in order to maintain the place value e.g. hundreds, tens and units.

$$37 + 52 = 89$$

$$\begin{array}{r} 30 + 7 \\ 50 + 2 \\ \hline 80 + 9 = 89 \end{array} +$$

← 1st without carrying

2nd with carrying →

$$353 + 268 = 621$$

$$\begin{array}{r} 300 + 50 + 3 \\ 200 + 60 + 8 \\ \hline 600 + 20 + 1 = 621 \\ 100 \quad 10 \end{array}$$

This is then developed into the **compact written method (Year 4)**. Again only once your child is confident with the method will carrying be introduced.

Any digits which are carried should be placed below the line

Subtraction:
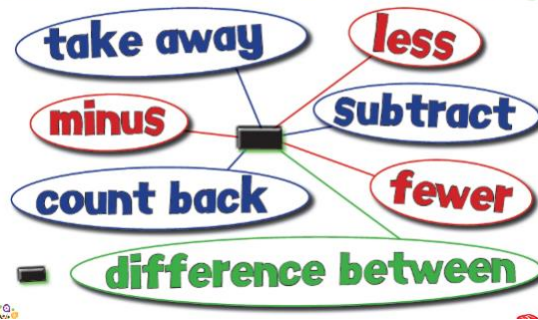
Subtraction can be seen as taking away and finding the difference. Children will continue to be taught to use a **number line (introduced Year 2)** to find the difference, especially for finding change and when numbers are close together, e.g. 1004 – 982 =

$$75 - 37 = 38$$
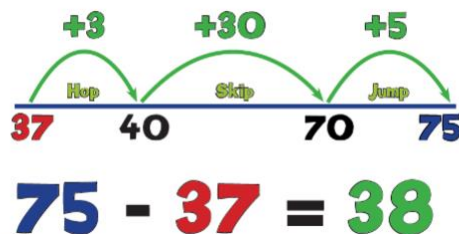
The **expanded column subtraction method (Year 3)** relies on children having a good understanding of place value and partitioning. Only once your child is confident with this method will 'decomposition' be introduced.

This should only be referred to as 'exchanging', as 'borrowing' can lead to confusion as nothing is ever given back.


When the numbers are put back together to form the answer, this is called 'recombining'.

When the children have a good understanding of the process they will then work towards using a **compact written method (Year 4)**. In this case, the exchanging is still placed above the number.
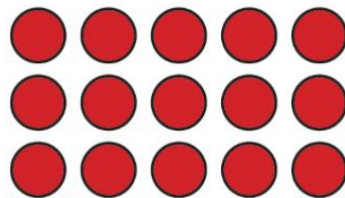
Multiplication:

Multiplication Vocabulary

groups of · product · times · multiple · double · lots of · multiply · X · repeated addition
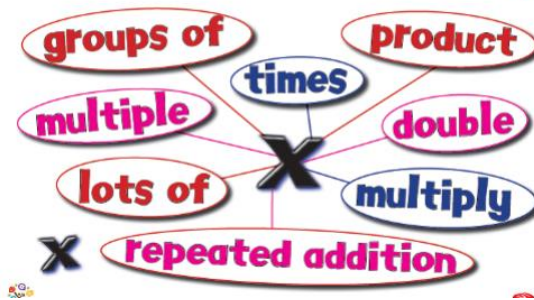
In school, we develop their understanding of multiplication using an **array (introduced Year 2)**, which counts the rows and columns. This helps children to understand that multiplication can be done in any order – 3x5 is the same as 5x3.

3 x 5 = 15 or 5 x 3 = 15

Children build on their knowledge from KS1 by consolidating their knowledge of times tables and number patterns, as well as partitioning. They will begin by using informal jottings on a **number line (Year 2)** to understand multiplication as repeated addition.

+5   +5   +5

0   5   10   15
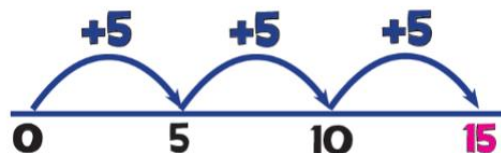
5 x 3 = 5 + 5 + 5 = 15

This can then be further developed through the use of larger numbers and larger jumps **(Year 3)**. Again, children will need to use knowledge of partitioning and times tables facts.

10x5   5x5

0   50   75

10 x 5 = 50
5 x 5 = 25
75

15 x 5 = 75
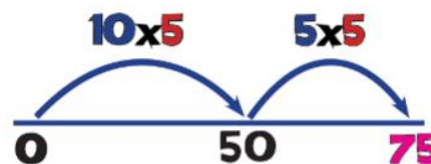
The next step is to introduce the **grid method for short multiplication (Year 4)**. The numbers are partitioned and each multiplied. Each amount is then added to find the answer.

$$15 \times 5 = 75$$

x	10	5
5	50	25

10 x 5 → (points to 50)   5 x 5 → (points to 25)

$$50 + 25 = 75$$

The example below shows the same grid method but goes one step further because it is used for **long multiplication (Year 4)**. For this calculation, both numbers need to be partitioned.

$$43 \times 65 = 2795$$

x	40	3
60	2400	180
5	200	15

40 x 60 → (points to 2400)   3 x 60 → (points to 180)

40 x 5 → (points to 200)   3 x 5 → (points to 15)

$$2400 + 180 + 200 + 15 = 2795$$

While modelling (demonstrating), we use our knowledge of times tables facts to multiply. For example, 4 x 5 = 20 so 40 x 5 = 200 (10x bigger) so 40 x 50 = 2000 (100x bigger). The children would use column addition as a method to total the final answer.

Once a child has a secure knowledge of place value it is possible to progress onto the **compact method for multiplication (short) (Year 5)**. In this method digits are 'carried' as in column addition.

```
  H  T  U
  1  4  7
x     4
-----------
  5  8  8
     1  2
```

The next step is to introduce children to the **long method for multiplication (Year 5)**. It is important that the children are confident in their understanding of digit place value, the concept of making a number 10x bigger (1 place value to the left) and compact addition with carrying before attempting to be successful with this approach.
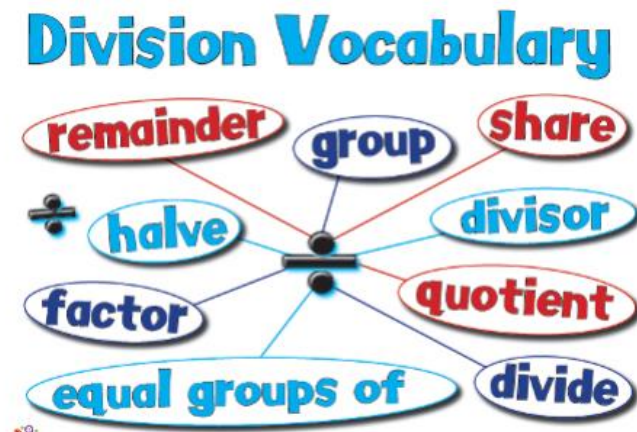
```
    756
x    32
--------
   1512
+ 22680
--------
  24192
```
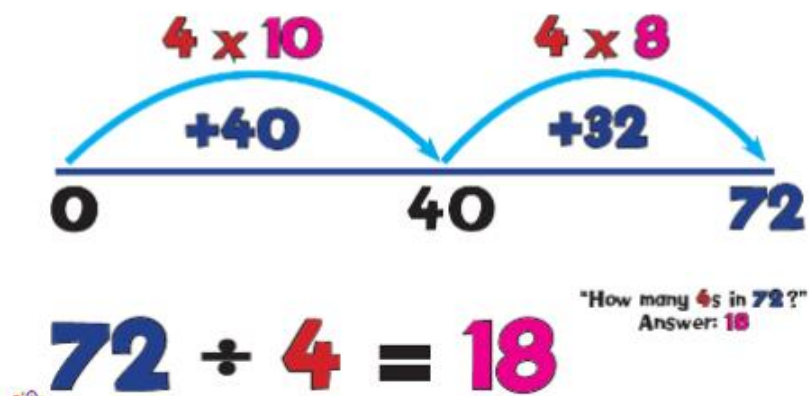
Division:

Children will begin by using the key vocabulary of 'equal groups' and 'sharing'. Formal written methods for division are based on the concept of grouping.

Division Vocabulary

remainder   group   share

÷   halve   divisor

factor   quotient

equal groups of   divide

Initial learning is based on using knowledge of number patterns and times tables facts. Children will record their method using an informal jotting on a **number line (Year 3)**.
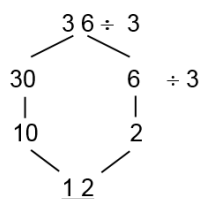
+5   +5   +5   +5

0   5   10   15   20

20 ÷ 5 = 4

"How many 5s in 20?"
Answer: 4
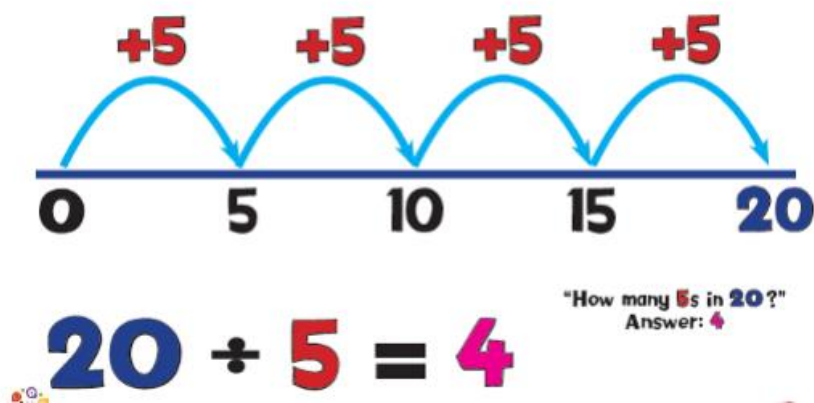
This strategy will develop further, with the children looking for larger jumps based on their knowledge of times tables.
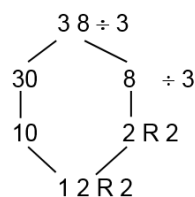
4 x 10   4 x 8

+40   +32

0   40   72

72 ÷ 4 = 18

"How many 4s in 72?"
Answer: 18

This then develops into the **informal partitioning method (Year 4)**.
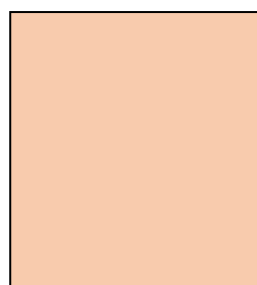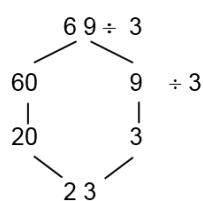
TU ÷ U, no remainder, no carrying, e.g. 36 ÷ 3

$$36 ÷ 3$$

30   6   ÷ 3

10   2

<u>1 2</u>

TU ÷ U, remainder but no carrying, e.g. 38 ÷ 3

$$38 ÷ 3$$

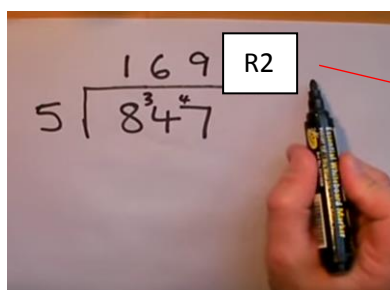30   8   ÷ 3

10   2 R 2

<u>1 2 R 2</u>

To progress further, the children will move into an **expanded method for short division (Year 4)**.

Initially this is demonstrated alongside informal partitioning (above) in order to draw out the links.
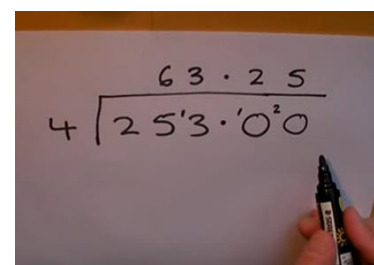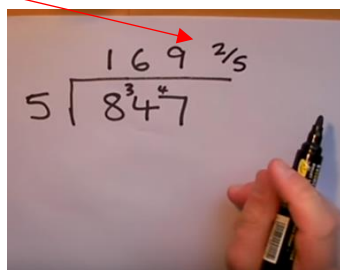
TU ÷ U, no remainder and no carrying, e.g. 69 ÷ 3

$$69 ÷ 3$$

60   9   ÷ 3

20   3

<u>2 3</u>

The next step is to introduce the children to a **compact method for short division (Year 5)**.

==Once children develop in confidence and understanding==

==the remainder can be written as a fraction or decimal.==

Long division (Year 6) is only introduced once the children are fully secure in their knowledge of times tables facts, subtraction with decomposition and compact multiplication.

```
        21
216 | 4536
      432↓
      216
      216
        0
```

```
        17 r 19
31 | 546
     31↓
     236
     217
      19
```

==Children **must** be aware that they should always begin calculating with the units except when using division as a written method when the reverse is necessary.==