Inter-relationship between the four basic maths operators

Addition → repeated addition is → Multiplication

the opposite is ↓

Subtraction → repeated subtraction is → Division

the opposite is ↓
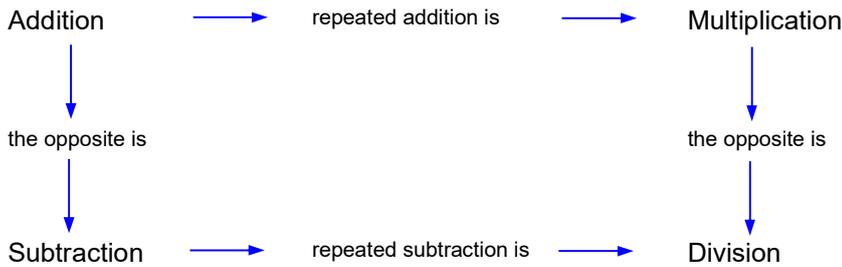
Place value

In our number system there are only ten digits that we use to represent a number of any size.
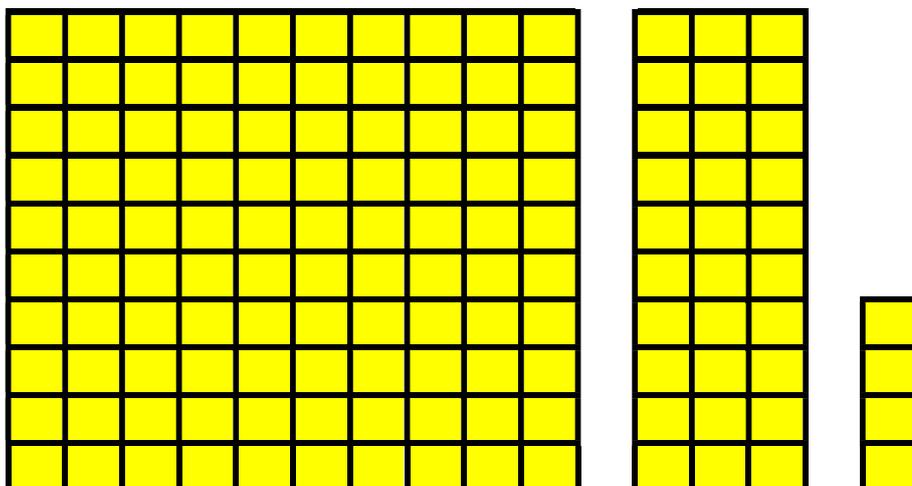
When individual digits are put together, the actual value that they represent is dependant on the relative position of those digits.

For instance, consider the number **134**:

the **1** stands for 1 lot of a hundred,
the **3** stands for 3 lots of ten,
the **4** stands for 4 units.

100	10	1
Hundreds	**Tens**	**Units**
1	**3**	**4**

Laws governing operations

Commutative Law
Addition and Multiplication are commutative.
(if numbers change places with each other it does not change the outcome) i.e.
4 + 2 is the same as 2 + 4
5 x 3 is the same as 3 x 5

Subtraction and Division are not commutative i.e.
4 – 2 is not the same as 2 – 4
4 ÷ 2 is not the same as 2 ÷ 4

Distributive Law
13 x 15 can be written as (10+3) x 15, the brackets can be removed by multiplying each number in the brackets by 15.
(10+3) x 15 = (10 x 15) + (3 x 15) = 150 + 45 = 195
Similarly, (8 + 4) ÷ 2 = 12 ÷ 2 = 6 or,
(8 ÷ 2) + (4 ÷ 2) = 4 + 2 = 6
Multiplication and Division are said to be distributive over addition and subtraction.

However the reverse in not true i.e.
2 + (4 x 5) = 2 + 20 = 22, whereas if you try to distribute the '2' over the '4' and '5' you get:
(2 + 4) x (2 + 5) = 6 x 7 = 42.

Associative law
Consider 5 + 7 + 3, the middle number can associate with either the 5 or the 3 and the outcome is the same, this is the same for multiplication. The order you evaluate a string of addition or multiplication numbers does not matter. It is usual however to work from left to right, grouping digits using number bonds if possible.

Subtraction and Division are not associative, the order of evaluation does matter. Consider 8 – 4 – 2,
(8 – 4) – 2 = 4 – 2 = 2
8 – (4 – 2) = 8 – 2 = 6
also, consider 8 ÷ 4 ÷ 2
(8 ÷ 4) ÷ 2 = 2 ÷ 2 = 1
8 ÷ (4 ÷ 2) = 8 ÷ 2 = 4

Pictorially this could be represented by the squares below.

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