

Addition of Whole Numbers

Addition is the process of finding the total of two or more numbers.

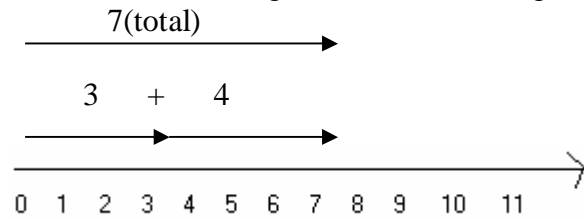
We first learn addition through counting

$$\begin{array}{r} *** + **** = ***** \\ 3 \quad 4 \quad 7 \end{array}$$

We can also look at addition on our old friend the number line.



each of these line segments is 3 units long (length does not depend upon position



Therefore, we also have $3 + 4 = 7$

There are a few special properties of addition that we need to be aware of.

Addition Property of Zero

Zero added to any number does not change the number

$$4 + 0 = 4 \quad 0 + 1 = 1$$

Commutative Property of Addition

Two numbers can be added in any order, the sum is the same

$$4 + 8 = 12 \quad 8 + 4 = 12$$

Associative Property of Addition

Grouping of addition in any order does not change the sum

$$(4 + 2) + 3 = 6 + 3 = 9$$

$$4 + (2 + 3) = 4 + 5 = 9$$

The number line and other assorted aids are fine to learn with but the basic addition of 2 one-digit numbers must be memorized. The addition of larger numbers is basically the repeated usage of the basic addition facts.

Addition Table

+	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

To use this table to add two numbers, find the first number to be added in the top row (put your finger there). Find the second number to be added in the first column (put another finger there). Now, bring your fingers together (first finger straight down and second finger straight across). The place where your fingers meet is the sum.

Addition of larger numbers

The easiest way to add larger numbers is to arrange the numbers vertically, keeping the digits of the same place value in the same column.

Add $321 + 6472$

$$\begin{array}{r} 321 \\ +6472 \\ \hline 6793 \end{array}$$

Addition with carry

If one of the columns in an addition sums to a value greater than 9 then you must perform a carry. Write down the one's digit of the sum and carry the ten's digit into the next column to the left.

Add $645 + 476$

$$\begin{array}{r} 645 \\ +476 \\ \hline \end{array} \quad 5 + 6 = 11$$

$$\begin{array}{r} 1 \\ 645 \\ +476 \\ \hline 1 \end{array} \quad 1 + 4 + 7 = 12$$

$$\begin{array}{r} 1 \\ 1 \\ 645 \\ +476 \\ \hline 1121 \end{array} \quad 1 + 6 + 4 = 11$$

When do we use Addition?

There are several types of problems that require the use of addition. One of the major clues to the use of addition is the major key words leading to addition.

Addition Key Words

Added to	3 added to 5	$3 + 5$
More than	7 more than 5	$5 + 7$
The sum of	the sum of 3 and 9	$3 + 9$
Increased by	4 increased by 6	$4 + 6$
The total of	the total of 3 and 8	$3 + 8$
Plus	5 plus 10	$5 + 10$