Addition of Real Numbers

Whole Numbers

When adding, start at the first number then move to the right, on the number line, the number of units you are adding to the first number. The result is the number that you end on.

Example: 3 + 4 = 7

Integers

When adding, start at the first number then move to the right, on the number line, the number of units you are adding to the first number. UNLESS it is a negative number, then you have to move to the left – remember negative sign change direction. The result is the number that you end on.

If the 2 numbers have the same sign, add the numbers & carry over the sign.

If the 2 numbers have different signs, subtract the smaller absolute value from the larger absolute value & carry over the sign from the larger number.

Tips:

+number + +number = +number
-number + -number = -number
+number + -smaller number = +number
-number + +smaller number = -number

Examples:

12 + 4 = 16
-12 + -4 = -16
12 + -4 = 8
-12 + 4 = -8

Decimals

1) Write the decimals so that the decimal points line up vertically.
2) Add as for whole numbers.
3) Place the decimal point in the sum or difference so that it lines up vertically with the decimal points in the problem.

Reminders:

- a whole number has the decimal at the end
- 0s can be placed after the last decimal place value so the numbers have the same number of decimal places.

Example:

$$\begin{array}{r} 3.245 \\ +23.86 \\ \hline 27.105 \end{array}$$

Fractions

Let a, b, c, d be nonzero integers.

With common denominators: $\frac{a}{b}+\frac{c}{b}=\frac{a+c}{b}$

Without common denominators: $\frac{a}{b}+\frac{c}{d}=\frac{ad+cb}{bd}$ and then you MUST reduce OR you can find the LCM for b & d before adding, which is the Least Common Denominator (LCD) for the 2 fractions.

Least Common Multiple, LCM, is the smallest number that contains all the factors of the numbers: LCM of 3, 4, 5, 12, and 15 is 60 (= 3 · 4 · 5)
To find the LCM:

1. Write all the numbers in their prime factorization
2. Write the product that contains each unique factor.

Examples:

$$\frac{15}{7}+\frac{1}{7}=\frac{16}{7}$$

$$\frac{2}{3}+\frac{3}{5}\xrightarrow{LCD=3*5=15}\frac{2}{3}*\frac{5}{5}+\frac{3}{5}*\frac{3}{3}\xrightarrow{\text{Multiply Numerators and Denomintors}}\frac{10}{15}+\frac{9}{15}\xrightarrow{\text{Now Add}}\frac{19}{15}$$

Properties

Commutative Property (ordering) a + b = b + a

Changing the order of two addends does not change their sum.

4 + 2 = 6 and 2 + 4 = 6

Associative Property (grouping) (a + b) + c = a + (b + c)

Changing the grouping of addends does not change their sum.

3 + (4 + 2) → 3 + 6 → 9 and (3 + 4) + 2 → 7 + 2 → 9

Addition Property of 0 (identity) a + 0 = 0 + a = a

The sum of 0 and any number is that number.

8 + 0 = 8 and 0 + 8 = 8

Additive Inverse (Opposites): a + (-a) = (-a) + a = 0

The sum of a number and its additive inverse (opposite) is the identity (0).

3 + -3 = 0 and -3 + 3 = 0