Operations on Rational Numbers

Addition or Subtraction of Rational Number

Rational Numbers with the Same Denominator

To add/subtract rational numbers with the same denominator, simply add/subtract their numerators keeping the common denominators as such.

Let us understand with some examples:

Example: Add 4/7 and 13/7?

Solution:

Given Rational Numbers are 4/7 and 13/7

Adding them we get 4/7+13/7

= (4+13)/7

= 17/7

Therefore, the Sum of 4/7 and 13/7 is 17/7.

Rational Numbers with the Different Denominator

Follow these simple steps

Step 1: Find the LCM of the denominators.

Step 2: Write the equivalent rational numbers with the LCM as their common denominator.

Step 3: Add/Subtract them as rational numbers with same denominators.

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Let us understand with some examples:

Example: Add 4/5 and 7/9?

Solution:

Clearly, the denominators are different and we need to figure out the LCM of Denominators.

LCM (5, 9) is 45

Express the Given Rational Numbers with a Common Denominator using the LCM obtained.

4/5 = 4*9/5*9 = 36/45

7/9 = 7*5/9*5 = 35/45

Add the Numerators of the Rational Numbers while keeping the Denominator unchanged to get the sum of Rational Numbers.

= 36/45+35/45

= 71/45

Therefore, the sum of 4/5 and 7/9 is 71/45.

Example: Example: Subtract 2/3 from 4/5?

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Solution:

Subtracting 4/5 from 2/3

= 4/5-2/3

= 4/5+(-2/3)

= 4*3/5*3+ (-2*5/3*5)

= 12/15+(-10/15)

= (12-10)/15

= 2/15

Therefore, 4/5 -2/3 = 2/15.

Multiplication of Rational Numbers

The product of two rational numbers is a rational number whose numerator is the product of the two numerators and whose denominator is the product of the two denominators. If p/q and r/s are two rational numbers, then

$$\frac{p}{q} \times \frac{r}{s} = \frac{p \times r}{q \times s} = \frac{\text{Product of numerator}}{\text{Product of denominator}}$$

Let us understand with an example:

Example: Find the product of $\frac{-8}{9} \times \frac{5}{7}$.

Solution: $\frac{-8}{9} \times \frac{5}{7} = \frac{-8 \times 5}{9 \times 7} = \frac{-40}{63}$

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Division of Rational Number

We know that division is the inverse of multiplication, i.e., if a and b are two integers, then a ÷ b = a $\times\frac{1}{b}$. It means we multiply the dividend by the multiplicative inverse of the divisor.

We apply the same rule for division of rational numbers. If $\frac{p}{q}$ and $\frac{r}{s}$ are two rational numbers.

Then $$\frac{p}{q} \div \frac{r}{s} = \frac{p}{q} \times \frac{s}{r} = \frac{p \times s}{q \times r}\left(\frac{r}{s} \neq 0\right)$$

Let us understand with an example:

Example: Divide $\frac{3}{5}$ by $\frac{4}{9}$.

Solution: $\frac{3}{5} \div \frac{4}{9} = \frac{3}{5} \times \frac{9}{4} = \frac{3 \times 9}{5 \times 4} = \frac{27}{20}$