Multiplication of Rational Numbers

Multiplication of rational numbers means multiplying two or more rational numbers (numbers that can be written in the form $\frac{p}{a}$, where p and q are integers and q \neq 0).

Basic Rules to Remember:

- 1. Multiply the numerators together.
- 2. Multiply the denominators together.
- 3. Simplify the result if possible.
- 4. If signs are same (both positive or both negative), the result is positive.
- 5. If signs are different (one positive and one negative), the result is negative.

Example 1:

Multiply:

 $(-\frac{2}{3}) \times (\frac{4}{5})$

Solution:

Step 1: Multiply numerators:

 $-2 \times 4 = -8$

Step 2: Multiply denominators:

So,

$$\left(-\frac{2}{3}\right) \times \left(\frac{4}{5}\right) = -\frac{8}{15}$$

Answer: $-\frac{8}{15}$

Example 2:

Multiply:

$$\left(\frac{7}{9}\right) \times \left(-\frac{3}{14}\right)$$

Solution:

Step 1: Multiply numerators:

 $7 \times -3 = -21$

Step 2: Multiply denominators:

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9 \times 14 = 126
So,
(\frac{7}{9}) \times (-\frac{3}{14}) = -\frac{21}{126}
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Now simplify:

Divide numerator and denominator by 21:

$$-21 \div 21 = -1,$$

126 ÷ 21 = 6
Answer: $-\frac{1}{6}$

Important Points:

Multiplication is commutative for rational numbers.

That means: $a \times b = b \times a$

Multiplication is also associative: $(a \times b) \times c = a \times (b \times c)$

1 is the multiplicative identity, because any rational number × 1 = the number itself.

The product of a rational number and its reciprocal is always 1 (except when the number is 0).