Multiplication of rational numbers

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Multiplying two rational numbers means multiplying their numerators together and their denominators together.

If Rational number $1 = \frac{a}{b}$ Then, $(\frac{a}{b}) \times (\frac{c}{d}) = (\frac{a \times c}{b \times d})$ Example 1: Multiply: $\frac{2}{3} \times \frac{4}{5}$ Solution: $= (\frac{2 \times 4}{3 \times 5}) = \frac{8}{15}$ Answer: $\frac{8}{15}$ Example 2: Multiply: $\frac{-3}{7} \times \frac{14}{9}$ Solution: $= (\frac{-3 \times 14}{7 \times 9}) = \frac{-42}{63} = \frac{-2}{3}$ (After simplifying) Answer: $\frac{-2}{3}$

Properties of Multiplication of Rational Numbers

i. Closure Property:

The product of any two rational numbers is always a rational number.

Example: $(\frac{2}{5}) \times (\frac{3}{4}) = \frac{6}{20} = \frac{3}{10}$ (still rational)

ii. Commutative Property:

Order doesn't matter in multiplication. $(\frac{a}{b}) \times (\frac{c}{d}) = (\frac{c}{d}) \times (\frac{a}{b})$

iii. Associative Property:

Grouping doesn't affect the result. $[(\frac{a}{b}) \times (\frac{c}{d})] \times (\frac{e}{f}) = (\frac{a}{b}) \times [(\frac{c}{d}) \times (\frac{e}{f})]$

iv. Multiplicative Identity:

Any rational number multiplied by 1 remains unchanged. $\frac{a}{b} \times 1 = \frac{a}{b}$

v. Multiplicative Inverse (Reciprocal):

 $\frac{a}{b} \times \frac{b}{a} = 1 \text{ (where } a \neq 0, b \neq 0)$