

Properties and Operations of Fractions:

Where a, b, c, and d are real numbers, variables, or algebraic expressions and b, d \neq 0

Equivalent Fractions: $\frac{a}{b} = \frac{c}{d}$ if and only if $ad = bc$

Example: $\frac{1}{2} = \frac{2}{4}$ because $(1) * (4) = (2) * (2)$

Rules of Signs: $-\frac{a}{b} = \frac{-a}{b} = \frac{a}{-b}$ and $\frac{-a}{-b} = \frac{a}{b}$

Generate Equivalent Fractions: $\frac{a}{b} = \frac{ac}{bc}$, where $c \neq 0$

Example: $\frac{x}{2} = \frac{(x)(3)}{(2)(3)} = \frac{3x}{6}$

Add or Subtract with like denominators: $\frac{a}{b} \pm \frac{c}{b} = \frac{a \pm c}{b}$

Example: $\frac{1}{2} + \frac{5x}{2} = \frac{1+5x}{2}$

Add or Subtract with unlike denominators: $\frac{a}{b} \pm \frac{c}{d} = \frac{ad}{bd} \pm \frac{cb}{bd} = \frac{ad \pm cb}{bd}$

(find a common denominator by multiplying top and bottom of each part by the other part's denominator.)

Example: $\frac{1}{2} + \frac{3}{5} = \frac{(5)1}{(5)2} + \frac{(2)3}{(2)5} = \frac{(5)(1)+(2)(3)}{(5)(2)} = \frac{5+6}{10} = \frac{11}{10}$

Multiply Fractions: $\frac{a}{b} * \frac{c}{d} = \frac{ac}{bd}$ (multiply top times the top and bottom times the bottom)

Example: $\frac{3}{5} * \frac{1}{3} = \frac{(3)(1)}{(5)(3)} = \frac{(3)1}{(3)5} = \frac{1}{5}$

Divide Fractions: $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} * \frac{d}{c} = \frac{ad}{bc}$, $c \neq 0$.

(if it's division, just reciprocate the fraction you're dividing by and change it to multiplication.)

Example: $\frac{3}{5} \div \frac{1}{3} = \frac{3}{5} * \frac{3}{1} = \frac{(3)(3)}{(5)(1)} = \frac{9}{5}$