

Notes: Simplifying, Multiplying, & Dividing Rationals

Simplify Rationals: You need to state what is not in the domain!

Simplify: You factor top & bottom and cancel what they have in common.

Ex1: $\frac{x^2+5x}{x^2-1} = \frac{x+5}{x}$ set bottom=0 $\sqrt{x^2 \neq 0}$ $x \neq 0$

Ex2: $\frac{x^2-4x-12}{x^2-4} = \frac{x-6}{x-2}$ set bottom=0 $x^2-4 \neq 0$ $(x-2)(x+2) \neq 0$ $x \neq 2 \& -2$

Multiply: You factor if possible. You multiply straight across & simplify.

Ex3: $\frac{5x^2y}{2xy^3} \cdot \frac{6x^3y^2}{10y} = \frac{30x^5y^3}{20xy^{4-3}} = \frac{3x^4}{2y}$

Ex4: $\frac{4x^2-4x}{x^2+2x-3} \cdot \frac{x^2+x-6}{4x} = \frac{4x(x-1)(x-2)(x+3)}{4x(x-1)(x+3)} = x-2$

Ex 5: $\frac{x+3}{2x^2-11x+5} \cdot \frac{x-5}{1} = \frac{x+3}{(2x-1)(x-5)} \cdot \frac{x-5}{1} = \frac{x+3}{2x-1}$

Divide: First you "Keep" "Change" "Flip"
 (first fraction) (\div to mult) (flip 2nd fraction)
 then you multiply like the previous
 3 examples.

EX6:

$$\frac{5x}{3x-12} \div \frac{x^2-2x}{x^2-6x+8}$$

$$\frac{5x}{3x-12} \cdot \frac{x^2-6x+8}{x^2-2x}$$

$$\frac{5x}{3(x-4)} \cdot \frac{(x-2)(x-4)}{x(x-2)} = \frac{5x(x-2)(x-4)}{3(x-4)x(x-2)} = \boxed{\frac{5}{3}}$$

EX7:

Complex Fraction: Just a Fancy Division Problem

$$\frac{3x^2-5x}{x+5} \div \frac{9x^2-25}{x+5}$$

$$\frac{3x^2-5x}{x+5} \cdot \frac{x+5}{9x^2-25} \leftarrow \text{DOTS}$$

$$\frac{x(3x-5)}{x+5} \cdot \frac{x+5}{(3x+5)(3x-5)} = \boxed{\frac{x}{3x+5}}$$