

8.4 Multiplying & Dividing Rational Expressions

Obj: to multiply and divide fractions.

- Rational means fraction.
- Remember how to factor!!!
- Factor first, then cancel.
- You can not cancel anything that is added or subtracted to anything else. It must be factored in order to cancel!!!

Factoring Review

$$x^2 - 81$$
$$(x+9)(x-9)$$

$$3x^2 - 18x$$
$$3x(x-6)$$

$$x^3 - 27$$

$$x^3 - 5x^2 + 11x - 55$$

$$x^2 - 4x - 5$$
$$(x-1)(x-4)$$

$$2x^2 - x - 15$$
$$(2x+5)(x-3)$$

$$2x^2 + 22x + 48$$

Factor first, then cancel!!!!
Do not cancel anything added or subtracted to something else. It must be factored to cancel!!!!

$$\frac{x+3}{3+x} = 1 \quad \frac{x-3}{3-x} = \frac{x-3}{x+3}$$

$$\frac{2x}{6x^4 - 18x^3} = \frac{2x}{6x^3(x-3)} = \frac{1}{3x^2(x-3)}$$

$$\frac{x^2 - 10x + 24}{x^2 - 16} = \frac{(x-4)(x-6)}{(x-4)(x+4)} = \frac{x-6}{x+4}$$

Examples:

$$\frac{4x^3y}{5} \cdot \frac{10y}{7x^2w} = \frac{4y^2}{7xw}$$

$$\frac{3x-15}{x^2-25} = \frac{3(x-5)}{(x-5)(x+5)} = \frac{3}{x+5}$$

$$\frac{7}{x^2-9x+20} \cdot \frac{x^2-4x}{14}$$

$$\frac{7}{(x-5)(x-4)} \cdot \frac{x(x-4)}{14} = \frac{x}{2(x-5)}$$

Examples:

$$\frac{x^2 + 2x - 8}{12 - 4x} \cdot \frac{5x^2 - 45}{3x^2 + 11x - 4}$$

Examples:

$$\frac{x^3 - 27}{8x^3} \cdot \frac{20x - 4x^2}{x^2 - 8x + 15}$$

Examples:

$$\frac{6y^2 - 13y - 5}{-3x - x^2} \cdot \frac{2xy + 6y + 5x + 15}{4y^2 - 25}$$

Dividing:

When dividing, multiply by
the reciprocal.

$$\frac{3}{4t} \div \frac{5x}{18} = \frac{3}{4t} \cdot \frac{18}{5x} = \boxed{\frac{27}{10xt}}$$

$$\frac{2xy^3}{15y} \div \frac{4x^3y^3}{27y^2w} = \frac{\cancel{2}xy^3}{15\cancel{y}} \cdot \frac{27y^2w}{4x^3\cancel{y^3}} = \boxed{\frac{9yw}{10x^2}}$$

Examples:

$$\frac{4ab^3}{3a^2 - a - 10} \div \frac{6a^5b^7}{3a^2 + 17a + 20}$$

Examples:

$$\frac{x^2 + 2x - 3}{x^2 - 2x + 1} \div \frac{x^2 + 5x + 6}{2 - x - x^2}$$

