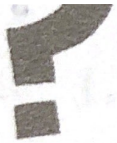

Still Struggling

Only *factors* can be canceled, not *terms*. For example, $\frac{x^2}{x+4}$ is already in lowest terms.

Simplify the rational expression.

- $\dfrac{6x^2y}{15xy}$

The first step in simplifying a rational expression is to factor its numerator and denominator, and then we divide out any common factor.

$$\frac{6x^2y}{15xy} = \frac{(3xy)(2x)}{(3xy)(5)} = \frac{2x}{5}$$

- $\dfrac{x^2+2x-8}{x^2-3x+2} = \dfrac{(x+4)(x-2)}{(x-1)(x-2)} = \dfrac{x+4}{x-1}$
- $\dfrac{x^2-4}{x^2+5x+6} = \dfrac{(x-2)(x+2)}{(x+3)(x+2)} = \dfrac{x-2}{x+3}$

Property	Example(s)
Multiplying Fractions	
$\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$	• $\frac{5}{4} \cdot \frac{1}{3} = \frac{5}{12}$
Multiply the numerators and denominators.	• $9(\frac{3}{4}) = \frac{9}{1} \cdot \frac{3}{4} = \frac{27}{4}$
Dividing Fractions	
$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c}$	• $\frac{1}{2} \div \frac{1}{3} = \frac{1}{2} \cdot \frac{3}{1} = \frac{3}{2}$
Change to a multiplication problem by inverting ("flipping") the second fraction.	• $\frac{3}{4} \div \frac{2}{5} = \frac{3}{4} \cdot \frac{5}{2} = \frac{15}{8}$
Adding Fractions (with like denominators)	
$\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b}$	• $\frac{1}{5} + \frac{2}{5} = \frac{1+2}{5} = \frac{3}{5}$
When the denominators are the same, add/subtract the numerators.	• $\frac{6}{7} - \frac{2}{7} = \frac{6-2}{7} = \frac{4}{7}$
Adding Fractions (with unlike denominators)	
$\frac{a}{b} + \frac{c}{d} = \frac{ad+bc}{bd}$	• $\frac{1}{4} + \frac{3}{5} = \frac{1(5)+4(3)}{4(5)}$
When denominators are not alike, rewrite each fraction so that they have a common denominator.	$= \frac{5+12}{20} = \frac{17}{20}$
Simplifying Fractions	
$\frac{ab}{cb} = \frac{a}{c}$	• $\frac{24}{36} = \frac{2(12)}{3(12)} = \frac{2}{3} \cdot \frac{12}{12}$
If the numerator and denominator have a common factor, it can be divided out (also called *canceled*).	$= \frac{2}{3}(1) = \frac{2}{3}$

Factor the expression.

- $x^2 - 4 = x^2 - 2^2 = (x - 2)(x + 2)$
- $9x^2 - 1 = (3x)^2 - 1^2 = (3x - 1)(3x + 1)$
- $\frac{1}{4}x^2 - y^2 = \left(\frac{1}{2}x\right)^2 - y^2 = \left(\frac{1}{2}x - y\right)\left(\frac{1}{2}x + y\right)$

1. $4x(5y - 2x + 3) = 20xy - 8x^2 + 12x$

2. $-3y(8x - 9y - 1) = -24xy + 27y^2 + 3y$

3. $(x - 3)(x - 4) = x^2 - 4x - 3x + 12 = x^2 - 7x + 12$

4. $(x - 6)(x + 6) = x^2 - 6x + 6x - 36 = x^2 - 36$

5. $(2x + 9)(x - 1) = 2x^2 - 2x + 9x - 9 = 2x^2 + 7x - 9$

6. $24x^2y + 12xy^2 - 30xy = 6xy(4x) + 6xy(2y) + 6xy(-5)$
$= 6xy(4x + 2y - 5)$

7. $x^2 + 5x - 14 = (x + 7)(x - 2)$

8. $x^2 + 5x + 4 = (x + 4)(x + 1)$

Combine like terms.

$$14x^2y + 8y + 3x + 2x^2y - 5y + 7x$$

We begin by rewriting the expression so that like terms are next to each other. After that, we simply add their coefficients.

$$14x^2y + 8y + 3x + 2x^2y - 5y + 7x = (14x^2y + 2x^2y) + (8y - 5y) + (3x + 7x) = 16x^2y + 3y + 10x$$

We use the Distributive Property a lot in algebra. This property allows us to write expressions both in *expanded form* and in *factored form*.

$$\underset{\text{Factored form}}{a(b \pm c)} = \underset{\text{Expanded form}}{ab \pm ac}$$