Simplifying Fractions
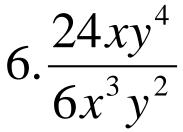
Reduce the numbers and subtract the exponents.

Where the larger one is, is where the answer goes.

Simplify each fraction:

1. $\dfrac{14}{98}$

2. $\dfrac{45}{60}$

3. $\dfrac{x^5}{x^2}$

4. $\dfrac{y^2}{y^3}$

5. $\dfrac{25x^6}{30x^3}$

6. $\dfrac{24xy^4}{6x^3y^2}$

Warm-Up

Simplify each fraction:

1. $\dfrac{14}{98} = \dfrac{1}{7}$

2. $\dfrac{45}{60} = \dfrac{3}{4}$

3. $\dfrac{x^5}{x^2} = x^3$

4. $\dfrac{y^2}{y^3} = \dfrac{1}{y}$

5. $\dfrac{25x^6}{30x^3} = \dfrac{5x^3}{6}$

6. $\dfrac{24xy^4}{6x^3y^2} = \dfrac{4y^2}{x^2}$

Simplest Form

When a rational expression's numerator and denominator have no factors in common (other than 1).

STEPS:

1) Factor

2) Simplify by Canceling and/or Reducing.

1. Simplify a Rational Expression

$$\frac{18x^2}{60x^3} =$$

$$\frac{3}{10x}$$

Reduce the numbers and subtract the exponents.

Where the larger exponent is, is where the answer goes.
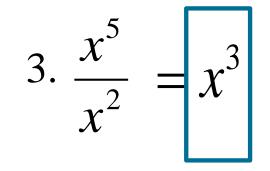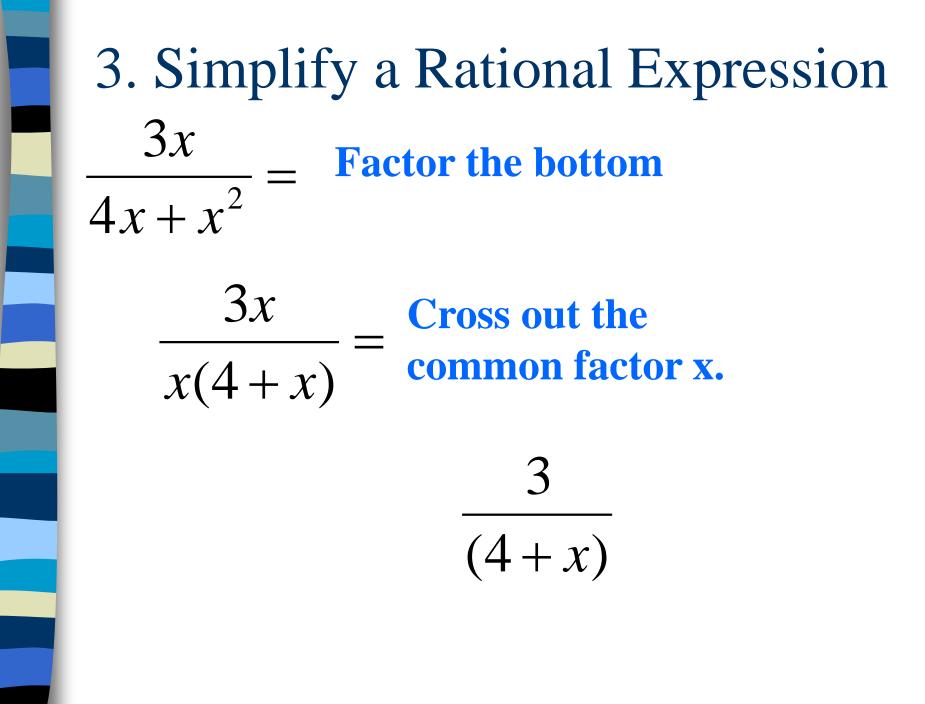
2. Simplify a Rational Expression

$$\frac{x^2 - 6x}{3x^2} =$$ **Factor the top**

$$\frac{x(x-6)}{3x^2} =$$ **Cross out the common factor x.**

$$\frac{(x-6)}{3x}$$

3. Simplify a Rational Expression

$$\frac{3x}{4x + x^2} =$$ **Factor the bottom**

$$\frac{3x}{x(4 + x)} =$$ **Cross out the common factor x.**

$$\frac{3}{(4 + x)}$$

4. Simplify a Rational Expression

$$\frac{5x - 10x^2}{15x} =$$ **Factor the top**

$$\frac{5x(1 - 2x)}{15x} =$$ **Cross out the common factors of 5 and x.**

$$\frac{(1 - 2x)}{3}$$

5. Simplify a Rational Expression

$$\frac{x^2 - 16}{3x + 12} =$$ **Factor the top and bottom**

$$\frac{(x+4)(x-4)}{3(x+4)} =$$ **Cross out the common factor (x + 4)**

$$\frac{(x-4)}{3}$$

Recognize Opposite Factors

When you have opposite factors, you will have to factor out a negative so that you can cancel.

6. Opposite Factors

$$\frac{1-x}{x^2 + 2x - 3} =$$

$$\frac{(1-x)}{(x+3)(x-1)} =$$

$$\frac{-(x-1)}{(x+3)(x-1)} =$$

Factor the bottom

(1 – x) on the top and (x – 1) on the bottom are opposites. Factor out a negative so they will cancel.

$$\frac{-1}{(x+3)}$$

Practice #1

$$\frac{x-3}{x^2-9} = \frac{x-3}{(x+3)(x-3)}$$

$$= \frac{1}{(x+3)}$$

Practice #2

$$\frac{2x - 6}{4} = \frac{\overset{1}{\cancel{2}}(x - 3)}{\underset{2}{\cancel{4}}} = \frac{x - 3}{2}$$

Practice #3

$$\frac{5x}{10x^2 - 5x} = \frac{\overset{1}{\cancel{5x}}}{\underset{1}{5x}(2x - 1)} = \boxed{\frac{1}{2x - 1}}$$

Practice #4

$$\frac{4m^3}{2m^3 + 8m^2} = \frac{4m^3}{2m^2(m+4)} = \frac{2m}{m+4}$$

REMEMBER …

Reduce the numbers and subtract the exponents.

Where the larger one is, is where the answer goes.

Practice #5

$$\frac{p^3 - p^2}{p^2} = \frac{p^2(p - 1)}{p^2} = \boxed{p - 1}$$

Excluded Values

Values for x that make the denominator = 0.

STEPS:

1) *Factor the denominator.*

2) *Set each factor in the denominator $\neq 0$.*

3) *Solve.*

EX: $\dfrac{12x^2}{6x}$ = $\dfrac{6x \neq 0}{6 \quad 6}$

$$x \neq 0$$

The excluded value is 0.

Excluded Values

$**$Find the excluded values:

EX:

$$\frac{2x}{2x+10} = \frac{2x}{2(x+5)}$$

$$2 \neq 0 \quad x + 5 \neq 0$$

$$x \neq -5$$

The excluded value is -5.