

## Rationalizing the Denominator, and More Simplifying

Part of simplifying an expression is making sure there are no radicals on the denominators. This is called **rationalizing the denominator**.

**Ex 1.**

Simplify by rationalizing the denominator.

$$\frac{9}{\sqrt{6}}$$

**Ex 2.**

Simplify by rationalizing the denominator.

$$\frac{12}{\sqrt{8}}$$

**Ex 3.**

Simplify.

$$\sqrt{\frac{27}{5}}$$

**Ex 4.**

Simplify.

$$\sqrt{\frac{5}{8}} \cdot \sqrt{\frac{1}{6}}$$

**Ex 5.**

Simplify.

$$\frac{\sqrt{4x}}{\sqrt{y}}$$

**Ex 6.**

Simplify.

$$\sqrt{\frac{2x^2y}{3}}$$

**Ex 7.**

Simplify.

$$\sqrt[3]{\frac{3}{2}}$$

**Ex 8.**

Simplify.

$$\frac{\sqrt[3]{2}}{\sqrt[3]{3x^2}}$$

**Ex 9.**

Simplify.

$$(\sqrt{3} + \sqrt{21})(\sqrt{3} - \sqrt{7})$$

**Ex 10.**

Simplify.

$$(4 + \sqrt{3})(4 - \sqrt{3})$$

**Ex 11.**

Simplify.

$$\frac{6+\sqrt{2}}{\sqrt{2}-5}$$

**Ex 12.**

Simplify.

$$\frac{4}{3+\sqrt{x}}$$

**When simplifying with radicals:**

1. Use the product rule to bring radicals together. (ex:  $\sqrt{2} \cdot \sqrt{x} = \sqrt{2x}$ )
2. Pull as much as possible out of the radicals. (ex:  $\sqrt{8} = \sqrt{4 \cdot 2} = 2\sqrt{2}$ )
3. Combine like terms. (ex:  $3\sqrt{2} + 4\sqrt{2} = 7\sqrt{2}$ )
4. Rationalize denominators. (ex:  $\frac{7}{\sqrt{3}} = \frac{7 \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}} = \frac{7\sqrt{3}}{3}$ )

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**Practice**

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1. Simplify.

a)  $\frac{3}{\sqrt{24}}$

b)  $\sqrt{\frac{5}{18}}$

c)  $\sqrt{\frac{5x^3}{y}}$

$$d) \frac{\sqrt[3]{3}}{\sqrt[3]{4}}$$

$$e) (\sqrt{10} - 7)^2$$

$$f) \frac{5}{3+\sqrt{5}}$$

Q: Suppose your boyfriend/girlfriend sends you this text message:

A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,V,W,X,Y,Z.

What does the message mean?