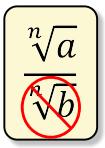
TOPIC: MULTIPLYING, DIVIDING, AND RATIONALIZING RADICAL EXPRESSIONS

Rationalizing Denominators



◆ Radicals CANNOT be left in the BOTTOM of a fraction. This is **BAD!**

► If you can't simplify the $\sqrt{\ }$ to perf. square, you must *make* it a perf. square by **Rationalizing the Denominator:**

► Multiply _____ & _____ by *something* (usually bottom $\sqrt{\ }$)

Radical simplifies to perfect square

$$\frac{\sqrt{2}}{\sqrt{8}} = \sqrt{\frac{2}{8}} = \sqrt{\frac{1}{4}} = \frac{1}{2}$$

Rationalizing Denominator

EXAMPLE: Rationalize the denominator.

$$\frac{1}{\sqrt{3}} \cdot \left(-\right)$$

Caution!
Multiplying *only* the bottom is wrong!

PRACTICE Rationalize the denominator.

(A) $-\frac{5}{2\sqrt{7}}$

(B) $\frac{6+\sqrt{x}}{-\sqrt{x}}$

TOPIC: MULTIPLYING, DIVIDING, AND RATIONALIZING RADICAL EXPRESSIONS

EXAMPLE Write the following quotients in the lowest terms.

(*A*)
$$\frac{\sqrt{18}+6}{3}$$

(*B*)
$$\frac{2\sqrt[3]{16}-4}{4}$$

EXAMPLE Write the following quotients in the lowest terms.

(*A*)
$$\frac{\sqrt{81}}{\sqrt{9}}$$

(*B*)
$$\frac{\sqrt{49x^2}}{\sqrt{x^2}}$$

TOPIC: MULTIPLYING, DIVIDING, AND RATIONALIZING RADICAL EXPRESSIONS

Rationalize Denominators Using Conjugates

◆ When the denominator has ____ terms, multiplying by same $\sqrt{\ }$ won't eliminate the $\sqrt{\ }$

► Instead, multiply by the bottom's **conjugate** (reverse _____ between terms)

One Term Denominator

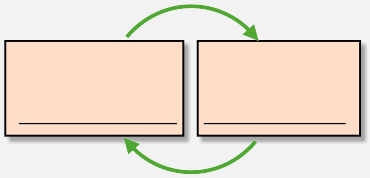
$$\frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

Two Term Denominator

EXAMPLE: Rationalize the denominator.

$$\frac{1}{2+\sqrt{3}} \cdot \frac{(\quad)}{(\quad)}$$

Conjugates



◆ Multiplying a radical by its **conjugate** ALWAYS _____ the $\sqrt{\ }$ and results in rational numbers.

PRACTICE Rationalize the denominator and simplify the radical expression.

(A)

$$\frac{\sqrt{7}}{5-\sqrt{6}}$$

(B)

$$\frac{2-\sqrt{3}}{2+\sqrt{3}}$$

SPECIAL PRODUCT FORMULAS

$$(a+b)(a-b) = a^2 - b^2$$

TOPIC: MULTIPLYING, DIVIDING, AND RATIONALIZING RADICAL EXPRESSIONS

EXAMPLE Rationalize the denominators of the following.

(*A*)

$$\frac{x+2}{\sqrt{x}+1}$$

(*B*)

$$\frac{1}{\sqrt{x}+\sqrt{y}}$$