

# LESSON 22 (5.6): ROOTS (PART 2)

BY THE END OF THE LESSON, YOU WILL BE ABLE TO:

- ★ Simplify radicals by using distribution and FOIL
- ★ Simplify radicals by rationalizing the denominator
- ★ Finding conjugates to rationalize denominators

LESSON 22 (5.6): ROOTS (PART 2)

REVIEW EXAMPLES

a.  $6\sqrt{2}(4 - \sqrt{5})$

b.  $(\sqrt{6} + \sqrt{3})(\sqrt{3} + \sqrt{2})$

## LESSON 22 (5.4): ROOTS (PART 2)

# DIVIDING RADICALS BY RATIONALIZING THE DENOMINATOR

We can also divide by monomials. However, we don't like square roots (or any roots) in the denominator of a fraction. So we do something called "**rationalizing the denominator**" to get rid of the root on the bottom.

## LESSON 22 (5.6): ROOTS (PART 2)

### Rationalize

We must multiply the numerator and the denominator by the same quantity so that the radicand has an exact root.

EXAMPLE 1: What can we multiply by to make the denominator a rational number?

$$\frac{\sqrt{b^4}}{\sqrt{a^3}}$$

## LESSON 22 (5.6): ROOTS (PART 2)

### EXAMPLE

What can we multiply by to make the denominator a rational number? (Hint: we are looking for a perfect 5th this time).

$$\sqrt[5]{\frac{3}{4s^2}} = \frac{\sqrt[5]{3}}{\sqrt[5]{4s^2}}$$

## LESSON 22 (5.6): ROOTS (PART 2)

### EXAMPLES

What can we multiply by to make the denominator a rational number?

a.  $\frac{6}{2\sqrt{3}}$

b.  $\sqrt[4]{\frac{5}{2x}}$

## LESSON 22 (5.6): ROOTS (PART 2)

### EXAMPLE

What can we multiply by to make the denominator a rational number?

c.  $\frac{5}{\sqrt[3]{a}}$

## LESSON 22 (5.6): ROOTS (PART 2)

What would happen if we had something like  $\sqrt{6} + \sqrt{3}$  in the denominator? What would we multiply by?

We would need to multiply by the "conjugate" of the binomial.

The **CONJUGATE** is another binomial that when multiplied by the original binomial, we get a rational number as a result.

The conjugate of  $\sqrt{6} + \sqrt{3}$  is  $\sqrt{6} - \sqrt{3}$ . TEST IT.



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Are these conjugates of each other?

a.  $(12 + \sqrt{3})(12 - \sqrt{3})$

b.  $(1 - 4\sqrt{5})(1 + 4\sqrt{5})$

Why is one "+" and the other is "-"?

LESSON 22 (5.6): ROOTS (PART 2)

Find the conjugate of each.

c.  $6 - \sqrt{5}$

d.  $\sqrt{3} - 5$

## LESSON 22 (5.6): ROOTS (PART 2)

### Simplify:

What can we multiply by to make the denominator a rational number? (Hint: use conjugates)

a. 
$$\frac{1+2\sqrt{5}}{6-\sqrt{5}}$$

b. 
$$\frac{\sqrt{3}+2}{\sqrt{3}-5}$$

## LESSON 22 (5.6): ROOTS (PART 2)

### Simplify:

What can we multiply by to make the denominator a rational number?

a.  $\frac{5\sqrt{3}+2\sqrt{7}}{4\sqrt{6}}$

b.  $\frac{5}{2+\sqrt{10}}$

LESSON 22 (5.6): ROOTS (PART 2)

Journal #22- Part b:

Worksheet!

Due at the end of math lab

Assignment #22:

Due at the beginning of BI class