Topic 5.2 Properties of Exponents and Radicals Essential Question:

How can you solve rational equations and identify extraneous solutions?

CONCEPT

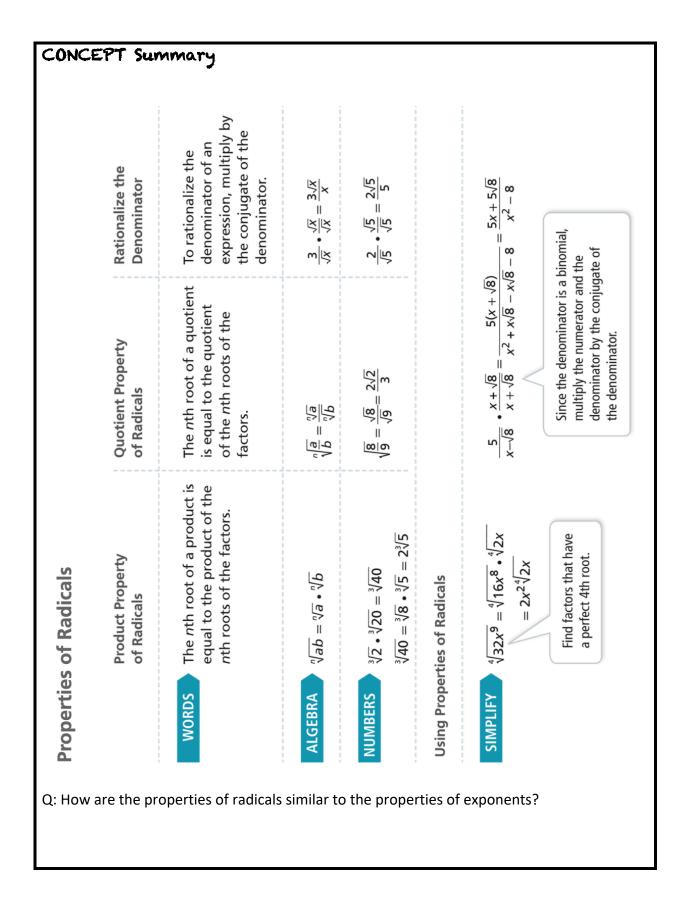
Properties of Rational Exponents

The properties of exponents apply not only to integer exponents, but to *rational* exponents as well. Now let *m* and *n* represent *rational* numbers, with *a*, *b* nonnegative real numbers.

Property	Example
$a^m \cdot a^n = a^{m+n}$	$4^{\frac{2}{3}} \cdot 4^{-\frac{1}{3}} = 4^{\frac{1}{3}}$
$\frac{a^m}{a^n} = a^{m-n}$	$\frac{3^4}{3^2} = 3^{4-2} = 3^2 = 9$
$(a^m)^n = a^{mn}$	$(7^3)^{\frac{2}{3}} = 7^2$
$(ab)^m = a^m b^m$	$(16x)^{\frac{1}{2}} = (16^{\frac{1}{2}}x^{\frac{1}{2}}) = 4x^{\frac{1}{2}}$
$a^{-m} = \frac{1}{a^m}$	$5^{-\frac{1}{2}} = \frac{1}{5^{\frac{1}{2}}}$
	$a^{m} \bullet a^{n} = a^{m+n}$ $\frac{a^{m}}{a^{n}} = a^{m-n}$ $(a^{m})^{n} = a^{mn}$ $(ab)^{m} = a^{m}b^{m}$

Q: What are some things that you notice about the properties of rational exponents?

Notes



Examples & Questions Examples 1

Part A

Q: What property of rational exponents was used?

Part B

Q: What property of rational exponents was used? Q: What would happen if you used the Power of Power Property first?

Examples 2

Q: How do you rewrite a radical as a rational exponent? Q: What is your first step when simplifying a radical?

Examples 3

Q: Why is it necessary to rewrite the expression using rational exponents in Part B, but not in Part A?

Q: Why is the factor $\frac{\sqrt[3]{3m^2}}{\sqrt[3]{3m^2}}$ used in Part C?

Examples 4

Q: Can radical terms be combined if they have the same index but different radicands? Q: How are like radicals similar to like terms? Can they be combined in the same way?

Examples 5

Part A

Q: Why is $\sqrt[3]{7}$ times $\sqrt[3]{49}$ equal to $\sqrt[3]{343}$ and not $\sqrt[3]{343}$?

Part B

Q: How could you expand the product of binomial factors with radicals?

Examples 6

Q: Why is it necessary to multiply a denominator that includes a binomial with a radical by its conjugate in order to rationalize, rather than simply multiplying by a single radical?

Practice and Problem Solving

Complete MathXL for School: Practice and Problem Solving (online) Complete MathXL for School: Enrichment (online)

Challenge: # 55 – key will be posted in Power School Learning.

Lesson Quiz 5.2