Honors Algebra 2

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Contents

CHAPTER ONE

Radical and Polynomial Operations

Unit 1

Lesson 1: Rational Exponents **Sep 07 2021 Tue (16:52:35)**

In this lesson, I go over how you:

- Convert radical expressions to rational exponents.
- Convert rational exponents to radical expressions.

Definition 1 (Simplifying radical expressions)**.** Rational expressions can be written as radical exponents.

$$t^{\frac{3}{4}} = t^{\frac{3}{4}} \times t^{\frac{3}{4}} \times t^{\frac{3}{4}}.$$
$$\sqrt[4]{t^3} = \sqrt[4]{t} \times \sqrt[4]{t} \times \sqrt[4]{t}.$$
$$t^{\frac{3}{4}} = \sqrt[4]{t^3}.$$

Definition 2 (Simplifying radical expressions)**.** Radical expressions can be written as rational exponents.

$$\sqrt[5]{x^3} = \sqrt[5]{x} \times \sqrt[5]{x} \times \sqrt[5]{x}.$$
$$x^{\frac{3}{5}} = x^{\frac{1}{5}} \times x^{\frac{1}{5}} \times x^{\frac{1}{5}}.$$
$$x^{\frac{3}{5}} = \sqrt[5]{x^3}.$$

Unit 1

Lesson 2: Properties of Rational Exponents Sep 14 2021 Tue (09:54:31)

Now you know that when like variables are multiplied, their exponents are added. But what happens when variables are divided:

Property 1 (Quotient of Power Property)**.** So, when you divide powers of the same base, subtract the exponents:

$$\frac{a^m}{a^n} = a^{m-n}$$

$$\frac{a^5}{a^3} = \frac{\cancel{a} \times \cancel{a} \times \cancel{a} \times a \times a}{\cancel{a} \times \cancel{a} \times \cancel{a}} = a^2 = a^{5-3}.$$

Example 1 (Example 1)**.** Express the quotient of $\frac{r^{\frac{6}{7}}}{r^{\frac{2}{7}}}$ as a radical:

$$\frac{r^{\frac{6}{7}}}{r^{\frac{2}{7}}} = r^{\frac{6}{7}-\frac{2}{7}} = r^{\frac{4}{7}} = \sqrt[7]{r^4}.$$

Property 2 (Quotient of Power Property)**.** To raise a power to a power, multiply the exponents:

$$(a^m)^n = a^{m \times n}.$$

EXAMPLE:

$$(a^2)^3 = (a \times a) \times (a \times a) \times (a \times a) = a^6.$$

Example 2 (Raising a Power to a Power)**.**

$$\left(c^{\frac{1}{2}}\right)^{\frac{1}{4}} c^{\frac{1}{2} \times \frac{1}{4}} c^{\frac{1}{8}} \sqrt[8]{c}.$$

Property 3 (Negative Rational Exponents)**.** You have learned all about positive integer exponents and rational, or fractional, exponents. Let's take a look at another type: **Negative Integer Exponents**.

$$4^{-1} = \frac{1}{4^1} = \frac{1}{4}$$
$$4^{-2} = \frac{1}{4^2} = \frac{1}{16}$$
$$4^{-3} = \frac{1}{4^3} = \frac{1}{64}.$$

Example 3 (Negative Rational Exponents)**.**

$$9^{-\frac{1}{2}} = \frac{1}{9^{\frac{1}{2}}} = \frac{1}{\sqrt{9}} = \frac{1}{3}.$$

Unit 1

Lesson 3: Solving Radical Equations **Sep 14 2021 Tue (16:54:18)**

Definition 3 (Radical Equations)**.** Here is what a **Radical Equation** looks like:

$$T = 2\pi\sqrt{\frac{L}{32}}.$$

Example 4 (Radical Equations 1)**.** Let's solve $\sqrt{(5x+4)} = 7$:

$$\begin{aligned}
\sqrt{(5x+4)} &= 7\\
(\sqrt{5x+4})^2 &= (7)^2\\
5x+4 &= 49\\
5x &= 45\\
\frac{5x}{5} &= \frac{45}{5}\\
x &= 9.
\end{aligned}$$

Now, let's check our work:

$$\begin{aligned}
\sqrt{5x+4} &= 7\\
\sqrt{5(9)+4} &= 7\\
\sqrt{45+4} &= 7\\
\sqrt{49} &= 7\\
7 &= 7.
\end{aligned}$$

Let's try another one:

Example 5 (Radical Equations 2)**.** Let's solve $\sqrt{x-3}+4 = 1$:

$$\begin{aligned}
\sqrt{x-3}+4 &= 1\\
\sqrt{x-3} &= -3\\
(\sqrt{x-3})^2 &= (-3)^2\\
x-3 &= 9\\
x &= 12.
\end{aligned}$$

Now, let's check our work:

$$\begin{aligned}
\sqrt{x-3}+4 &= 1 \\
\sqrt{12-3}+4 &= 1 \\
\sqrt{9}+4 &= 1 \\
3+4 &= 1 \\
7 = 1 \text{ No Solution :(.}
\end{aligned}$$

We call this situation extraneous solution.

Quick Review of Factoring

Let's look at factoring by group.

First, you want the split the middle term into factors of 15 that combine to equal 2.

Then, just factor by GCF.

$$\begin{aligned}
x^2+2x-15 \\
x^2-3x+5x-15 \\
(x^2-3x)+(5x-15) \\
x(x-3)+5(x-3) \\
(x+5)(x-3).
\end{aligned}$$