Algebra 2
Unit: Radical Functions
Section: Roots and Properties of Exponents

Tutorial: Rational Exponents

Screen 1

In this tutorial we will discuss rational exponents and how they can be used to help us solve problems.

Screen 2

Definition of Rational Exponents

For all positive real numbers a.

If n is a nonzero integer, then a to the one over n power is equal to the nth root of a.

If m and n are integers and n does not equal zero then a to the m over n power is equal to a to the one over n power all raised to the m power which is equal to the nth root of a all raised to the m power which is equal to the nth root of a to the m power.

Screen 3

How are rational exponents used?

Evaluate eighty-one to the one-half power.

You can rewrite this expression in radical form. In this case a is equal to eighty-one and n is equal to two.

Eighty-one to the one-half power becomes the square root of eighty-one to the first power which is nine.

We were able to find the answer to the problem by rewriting it using the definition of rational exponents.

Screen 4

Let's look at another example.

Evaluate eight to the two sixth power.

Rewrite using radicals.

Sixth root of eight all squared.

Evaluate the radical.

Sixth root of eight all squared is equal to two.

Screen 5

You may be feeling comfortable finding square roots and cube roots, but let's review how to find nth roots.

The best way to review these skills is to look at an example.

From the previous example we say that the sixth root of eight quantity squared is equal to two.

Let's work through this problem step by step.

Screen 6

We want to find the sixth root of eight quantity squared.

Move the square inside the radical. This yields sixth root of eight squared.

Break down eight squared into it's prime factorization. This yields the sixth root of two times two times two times two times two times two.

Rewrite using exponents. This yields sixth root of two to the sixth.

Notice that this is the sixth root and you have six two's inside the radical. This means that the final answer will be two.

Screen 7

Now you try.

Evaluate the following expressions. Click on Solution to check your answer.

1. Sixty-four to the five sixth power.

Solution: Thirty-two

2. Negative twenty-seven to the two-thirds power.

Solution: Nine

Screen 8

In this tutorial we learned about rational exponents and how rational exponents are used to solve problems.