Recall:

The square root function is the inverse of the squaring function just as subtraction is the inverse of addition. For example, since , the square root of 16 is 4.

# Radical expressions

Radical expressions are composed of square roots. The symbol is called a radical, the term under the symbol is called the radicand, and the entire expression is called the radical expression.



To evaluate a square root, we want to try and find a number that when multiplied by itself, is equal to the radicand.

Here are some common ones you will see:

so

so

so

so

so

so

so

so

And so on…

To simplify a square root, we rewrite it such that there are no perfect squares in the radicand.

# The Product Rule for Simplifying Square Roots

If and are nonnegative, the square root of the product is equal to the product of the square roots of and .

Examples: Simplify the following radical expressions.

When an expression involving square root radicals is written in simplest form, it will not contain a radical in the denominator. We can remove radicals from the denominators of fractions using a process called rationalizing the denominator.

# Rationalizing the denominator

To rationalize a denominator with a single square root term in the denominator,

Examples: Write each of the following in simplest form.

To rationalize a denominator with a radical term and a constant in the denominator,

Examples: Write each of the following in simplest form.

Although square roots are the most common rational roots, we can also find cube roots, 4th roots, etc. Just as the square root function is the inverse of the squaring function, these roots are the inverse of their respective power functions.

# th Root

If is a real number with at least one th root, then the th root of , written as , is the number with the same sign as that, when raised to the th power, equals . The index of the radicand is .

Examples: Simplify each of the following.

Radical expressions can also be written without using the radical symbol. We can use rational (fractional) exponents. The index must be a positive integer.

We can also have rational exponents with numerators other than one. We raise the base to a power and take the th root.

# Rational Exponents

Rational exponents are another way to express principal th roots. The general form for converting between a radical expression with a radical symbol and one with a rational exponent is

Examples: Write each of the following as a radical and then simplify.

Examples: Rewrite each of the following with rational exponents. Then, if possible, evaluate each expression.