

College Algebra: Module 2 Definitions and Property Sheet

1-24-15

1 Radicals and Rational Exponents (R.4)

Often times in mathematics we encounter **radical expressions**. Square roots and cube roots are examples of radical expressions. Any expression containing a radical sign is considered a radical expression. Because these show up all the time in math it is important to be able to understand how to use them and their basic properties. In this section we learn how to

1. **Simplify radical expressions** - there are a few different ways we can simplify radical expressions. I will list the different ways and the basic rules below:

- (a) Simplify radical expressions directly

$$\sqrt[n]{a^n} = |a| \text{ when } n \text{ is even and } \sqrt[n]{a^n} = a \text{ when } n \text{ is odd}$$

- (b) Simplify radical expressions using rational exponents

$$(\sqrt[n]{a})^m = \sqrt[n]{a^m} = a^{m/n}$$

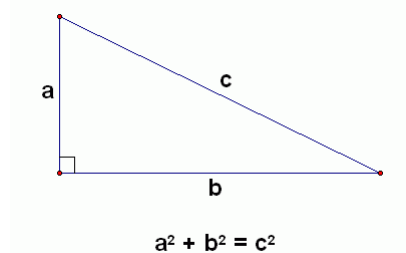
- (c) Simplify radical expressions using the properties of radicals

$$\text{Product Property: } \sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$$

$$\text{Quotient Property: } \sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$$

2. Add/Subtract Radical Expressions
3. Multiply/Divide Radical Expressions
4. Use the Pythagorean Theorem

$$a^2 + b^2 = c^2$$



Pythagorean Theorem Word Problem: A ladder leans against the side of a house. The top of the ladder is 12ft from the ground. The bottom of the ladder is 5ft from the house. Find the length of the ladder and round to the nearest tenth.

2 Factoring Polynomials (R.5)

Factoring an expression means to rewrite the expression as an equivalent product. There are 5 methods of factoring at our disposal and of the special factoring types we have 4 different forms:

1. Factoring using the Greatest Common Factor (GCF)
 - The GCF is the largest factor common to all terms in a polynomial
2. Factoring Common Binomial Factors
3. Factoring by Grouping
4. Factoring Quadratic Polynomials
5. Factoring Special Types

(a) Factoring Difference of Two Squares

$$\text{Rule: } x^2 - y^2 = (x - y)(x + y)$$

(b) Factoring Perfect Square Trinomials

$$\text{Rule 1: } x^2 + 2xy + y^2 = (x + y)^2$$

$$\text{Rule 2: } x^2 - 2xy + y^2 = (x - y)^2$$

(c) Factoring Sum/Difference of Two Perfect Cubes

$$\text{Rule 1: } x^3 + y^3 = (x + y)(x^2 - xy + y^2)$$

$$\text{Rule 2: } x^3 - y^3 = (x - y)(x^2 + xy + y^2)$$

(d) Factoring Quadratic-like Polynomials using u-Substitution