

Study Guide

Simplifying Radicals 02/29/2012

Radicals: Simplifying

A radical sign looks like a check mark with a line across the top. The radical sign is used to communicate square roots. The numbers -3 and 3 are the square roots of 9 because both -3 and 3 squared equal 9. The definition of a square root is: if $x^2 = y$, then x is a square root of y . Simplifying radicals assesses the ability to perform operations with radicals.

In order to simplify radicals, it is important to understand the product property of square roots. We already know the square root of 81 is 9. We can also determine this by the following method:

$$\sqrt{81} = \sqrt{9} \cdot \sqrt{9} = 3 \cdot 3 = 9$$

Simplify the square roots below:

$$\sqrt{40} = \sqrt{4} \cdot \sqrt{10} = 2\sqrt{10}$$

$$\sqrt{60} = \sqrt{4} \cdot \sqrt{15} = 2\sqrt{15}$$

$$\sqrt{200} = \sqrt{100} \cdot \sqrt{2} = 10\sqrt{2}$$

When simplifying with variables, we can do the following:

$$\sqrt{40x^3y^2} = \sqrt{4} \cdot \sqrt{10} \cdot \sqrt{x^2} \cdot \sqrt{x} \cdot \sqrt{y^2} = 2xy\sqrt{10x}$$

$$\sqrt{32a^5c^3} = \sqrt{16} \cdot \sqrt{2} \cdot \sqrt{a^2} \cdot \sqrt{a^2} \cdot \sqrt{a} \cdot \sqrt{c^2} \cdot \sqrt{c} = 4a^2c\sqrt{2ac}$$

Also, the same method can be used to simplify radicals taking the 3rd, 4th, 5th,...etc. roots.

$$\sqrt[4]{16x^5y^6} = \sqrt[4]{2^4 \cdot x^4 \cdot x \cdot y^4 \cdot y \cdot y^2} = 2xy^2\sqrt[4]{x}$$

$$\sqrt[3]{54a^5b^7} = \sqrt[3]{3^3 \cdot 2 \cdot a^3 \cdot a^2 \cdot b^3 \cdot b^4} = 3ab^2\sqrt[3]{2a^2b}$$