Simplify Radicals

Powers	Factors	Words	Roots
$x^3 = 64$	$4 \cdot 4 \cdot 4 = 64$	4 is a cube root of 64.	$\sqrt[3]{64} = 4$
$x^4 = 625$	$5 \cdot 5 \cdot 5 \cdot 5 = 625$	5 is a fourth root of 625.	$\sqrt[4]{625} = 5$
$x^5 = 32$	$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 32$	2 is a fifth root of 2.	$\sqrt[5]{32} = 2$
$a^n = b$	$a \cdot a \cdot a \cdot \ldots \cdot a = b$	a is a *n*th root of b.	$\sqrt[n]{b} = a$
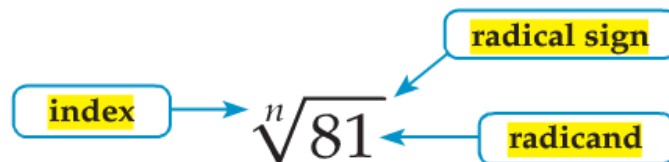
*Note: For even roots (*n* is an even number) then there are two roots. There is a positive and a negative root.

Principal root—the positive root if there are two roots

Example 1: Finding roots with just numbers

    a. $\sqrt{16}$ b. $\sqrt[3]{27}$

Example 2: Finding roots with numbers and letters

    a. $\sqrt{16y^4}$ c. $\sqrt[5]{243a^{20}b^{25}}$

    b. $\pm\sqrt{(x^2 - 6)^8}$ d. $-\sqrt{-16x^4y^8}$

       HOMEWORK   1) $\pm\sqrt{121x^4y^{16}}$

2) $\pm\sqrt{225a^{16}b^{36}}$

8) $\sqrt{(a^2 + 4a)^{12}}$

3) $-\sqrt{16c^4d^2}$

9) $\sqrt[3]{8a^6b^{12}}$

4) $\sqrt{81a^{16}b^{20}c^{12}}$

10) $\sqrt[3]{27x^6y^9}$

5) $\sqrt{400x632\,y^{40}}$

11) $\sqrt[3]{64b^3c^9}$

6) $\sqrt{(x + 15)^4}$

12) $\sqrt[4]{16a^4b^8}$

7) $\sqrt{(x + 6)^{16}}$