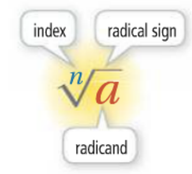
<u>Chapter 6 Radical Functions & Rational Exponents</u>

<u>Lesson 6.1 Roots & Radical Expressions (Clickers)</u>

<u>Essential Understanding</u>: Corresponding to every power, there is a root. For example, just as there are squares (second powers), there are square roots. Just as there are cubes (third powers), there are cube roots, and so on.

You use a radical sign to indicate a root. The number under the radical sign is the <u>radicand</u>. The <u>index</u> gives the degree of the root.



1 What is the real cube root of -64?

2 What is the real fourth root of -10000?

Explain why a negative real number b has no real nth roots if n is even.

Ex. What is each real-number roots?

a. $\sqrt[4]{-1}$

b. $\sqrt[3]{-8}$

c. $\sqrt{0.04}$

d. $\sqrt{(-2)^2}$

3 What is the real-numbered root:
$\sqrt[3]{-27}$

4 What is the real-numbered root:
$\sqrt{(-7)^2}$

5 What is the real-numbered root:

$\sqrt[4]{-81}$

Ex. What is the simpler form of each radical expression?

a. $\sqrt{16x^8}$

b. $\sqrt[3]{a^6b^9}$

c. $\sqrt[4]{x^8y^{12}}$

6 What is the simplified form of:

$\sqrt{81x^4}$

7 What is the simplified form of:

$\sqrt[3]{a^{12}b^{15}}$

Take note **Property** Combining Radical Expressions: Products

If $\sqrt[n]{a}$ and $\sqrt[n]{b}$ are real numbers, then $\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$.

Ex. Simplify

a. $\sqrt[5]{-5} \cdot \sqrt[5]{-2}$

b. $\sqrt[4]{7} \cdot \sqrt[5]{7}$

Ex. Simplify: $\sqrt{72x^3y^2} \cdot \sqrt{10xy^3}$

8 Simplify:

$\sqrt{3}\sqrt{5}$

9 Simplify:

$\sqrt{5x}\sqrt{2x^3}$

10 Simplify:

$\sqrt[3]{2x^4}\,\sqrt[3]{3x^2}$

Property **Combining Radical Expressions: Quotients**

If $\sqrt[n]{a}$ and $\sqrt[n]{b}$ are real numbers and $b \neq 0$, then $\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}}$.

Ex.Simplify:

a. $\frac{\sqrt{18x^5}}{\sqrt{2x^3}}$

b. $\frac{\sqrt[3]{162y^5}}{\sqrt[3]{3y^2}}$

11 Simplify:

$\frac{\sqrt{50x^6}}{\sqrt{2x^4}}$

12 Simplify:

$\frac{\sqrt[3]{189x^7}}{\sqrt[3]{7x^2}}$