

Chapter 6  
Radical Functions and  
Rational Exponents

Review of Property of Exponents

Simplify:

$$(2x^3)(-3x^5) = -6x^8$$

$$(-3a^8bc^{-1})^2 = 9a^8b^2c^{-2} = \frac{9a^8b^2}{c^2}$$

$$\frac{4rs^{4t-6}}{(r-8s)^{0t^4+6}} = \frac{4rs^4}{t^2}$$

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Section 6-1  
Roots and Radical  
Expressions

Students will be able to find  $n$ th roots

For every power, there is a corresponding root.

-Squares (second power), there are square roots

-Cubes (third power), there are cube roots

-and so on

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$5^2 = 25$ , so we can say that 5 is a square root of 25.

$5^3 = 125$ , so we can say that 5 is a cube root of 125.

If  $a^n = b$ , with  $a$  and  $b$  real numbers and  $n$  a positive integer, then  $a$  is an  $n$ th root of  $b$ .

If  $n$  is odd....

there is one real  $n$ th root of  $b$ ,

$$\sqrt[n]{b}$$

$$\sqrt[3]{8} = 2$$

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

If  $n$  is even...

and  $b$  is positive, there are 2 real  $n$ th roots of  $b$ . The positive is the principal root.

$$\sqrt[n]{b} \quad -\sqrt[n]{b}$$

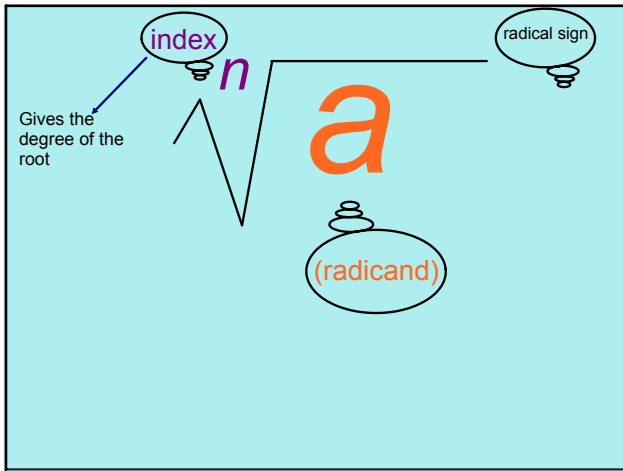
$$\sqrt{x^2} = \sqrt{25}$$

$$x = \pm 5$$

if  $b$  is negative, there are no real roots  $\sqrt[2]{-25} = \emptyset$

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Find all the real square roots of the following?

$-.81$   $\sqrt{-.81} \quad \emptyset$

$\frac{25}{49} = \frac{\sqrt{25}}{\sqrt{49}} = \frac{5}{7}, -\frac{5}{7}$

$121 = 11, -11$

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What is the real fifth root of the following?

$0 = 0$

$-1 = -1$

$32 \quad 32^{(1 \div 5)} = 2$

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The fundamental Theorem of Algebra says that  $x^4 - 1 = 0$  has four roots, only 2 of which are real. In this chapter we will focus only on real roots.

$(x^2 + 1)(x^2 - 1) = 0$

$x = \pm i$   $x = 1, -1$

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Which is a real-number root?

$\sqrt[3]{-8} = -2$

$\sqrt[6]{-1} = \emptyset$

$\sqrt{(-2)^2} = 2$   ~~$\sqrt[3]{(-2)^2} = -2$~~   $\sqrt{4} = 2$

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Simplifying Radical Expressions:

$\sqrt{81x^4} = \sqrt{9^2(x^2)^2} = 9x^2$

$\sqrt[3]{a^{12}b^{15}} = \sqrt[3]{(a^4)^3(b^5)^3} = a^4b^5$

$\sqrt[4]{x^{12}y^{16}} = \sqrt[4]{(x^3)^4(y^4)^4} = |x^3y^4|$

Absolute value symbols w/ an even root & odd exponent

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Hwk:  
pg. 360 # 2 - 18 (4th)  
  
pg. 364 - 365 # 10 - 34 (evens),  
38, 39

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