

# Algebra II

6-1

## Roots of Real Numbers

What does  $\sqrt{4}$  mean? *what number multiplied by itself, equals 4*

Name the parts of  $\sqrt{x}$ .

*index*  $\sqrt{x}$  *radical*  
*radicand*

$$\sqrt{49} = 7$$

Does  $\sqrt{49} = -7$ , too? *No, by definition*

$$-\sqrt{49} = -7$$

$$\sqrt{-49} = \emptyset$$

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

$$\sqrt{(-2)^2} = \sqrt{4} = 2$$

$$\sqrt[3]{25} = 5$$

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

$$(2)(2)(2) = 8$$

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

$$\sqrt[4]{81} = 3$$

$$\sqrt[4]{-81} = \emptyset$$

*even index  $\rightarrow$  no negative allowed on the inside.*

## True / False

- 1)  $x$  is always positive. False  $x = -1$
- 2)  $-x$  is always negative. False  $-x = -(-1) = 1$
- 3)  $x^2$  is always positive. False
- 4)  $x^2$  is never negative. True
- 5)  $x^3$  is never negative. False  $(-1)^3 = -1$

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

$$\sqrt[3]{x^3} = x$$

$$\sqrt[4]{x^4} = |x|$$

$$\sqrt[4]{x^{12}} = |x^3|$$

$$\sqrt[3]{x^9} = x^3$$

When do we need absolute value? even index

Simplify each expression. If the expression does not represent a real number, say so. (pg 262)

1) a)  $\sqrt{16} = 4$

b)  $-\sqrt{16} = -4$

c)  $\sqrt{-16} = \emptyset$

d)  $\sqrt[4]{16} = 2$   
 $2(2)(2)(2)$

13) a)  $\sqrt{a^2} = |a|$

b)  $\sqrt[2]{a^4} = |a^2|$

c)  $\sqrt[4]{a^4} = |a|$

d)  $\sqrt[3]{a^6} = |a^3|$

Solve.

15)  $x^2 = 144$

$\sqrt{x^2} = \sqrt{144}$

$|x| = 12$

$x = \pm 12$

$\{\pm 12\}$

$\xrightarrow{\text{or}} x^2 - 144 = 0$   
 $(x+12)(x-12) = 0$   
 $\{\pm 12\}$

For what values is each of the following true?

27)  $\sqrt[3]{(x+5)^2} = x+5$

$|x+5| = x+5$

$[-5, \infty)$

Assignment:

Pg. 262

1-34 all