6.4 notes - n^{th} roots

Objectives: Simplifying radicals

Squaring a number and taking the square root are ______________________________ – they 'undo' one another.
Similarly:

The inverse of raising a number to the n^{th} power is finding the n^{th} root.

Examples:

Powers	**Factors**	**Roots**
$x^3 = 64$	$4 * 4 * 4 = 64$	$\sqrt[3]{64} = 4$
$x^4 = 625$		
$x^5 = 32$		

!!!!! **Remember:** Unless we insert the radical sign when solving an equation, we always default to

____.

Check it out:

1. $\sqrt[4]{16}$

2. $\sqrt[3]{27}$

3. $\sqrt[3]{-27}$

4. $\sqrt{16x^4}$

5. $\sqrt[5]{-32}$

6. $\sqrt[4]{-81}$

7. $\sqrt[3]{-8x^{12}}$

8. $\sqrt{-16}$

9. $\sqrt[4]{81x^4y^8}$

10. $\sqrt[5]{243x^{20}y^{25}}$

11. $\sqrt{(x^2-6)^8}$

Summary: $\sqrt[n]{a}$

If the index of the root **(n) is even** and the radicand **(a) is positive,** the principal root is

____.

If the index of the root **(n) is even,** and the radicand **(a) is negative** there is _______________________________.

If the index of the root **(n) is odd,** the principal root can be **positive or negative,** based on

____.

Sometimes n^{th} roots are preceded by signs.

If something other than the principal root is desired, the radical sign will be preceded by signs.

Ex. Simplify.

a) $\sqrt{25} =$

b) $-\sqrt{25} =$

c) $\pm\sqrt{25} =$

Practice.

13. $\pm\sqrt{36x^{12}}$

14. $-\sqrt{(y+7)^{16}}$

15. $\sqrt[6]{d^{24}x^{36}}$

16. $-\sqrt[4]{625y^8}$

17. $\sqrt[5]{-32x^5y^{10}}$

18. $\pm\sqrt{\frac{9m^4}{25}}$

19. $\sqrt[3]{27x^6}$

20. $\sqrt[4]{16(x-3)^{12}}$

21. $\sqrt{x^2+10x+25}$