Algebra 1: 12.6 Guided Notes **Name** _____ **Period** ____
Approximating and Rewriting Radicals

Learning Goals:
To determine the square root of perfect squares.
To rewrite radicals by extracting perfect squares.
To solve radical equations.

Vocabulary (Page 763)

The number a is a ___square root___ of b if $a^2 = b$.

So, the square root of 9 is 3 and –3 because $3^2 = 9$ and $(-3)^2 = 9$.

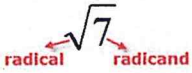
The ___principal___ or ___positive___ square root is written as ___$\sqrt{\ }$___.

So, $\sqrt{16} = 4$

The ___negative___ square root is written as ___$-\sqrt{\ }$___.

So, $-\sqrt{25} = -5$

The expression under the radical sign is called the ___radicand___.



You can use $\pm\sqrt{\ }$ to indicate the ___positive___ and ___negative___ square root.

So, $\pm\sqrt{36} = \pm 6$

Finding the Square Root of Perfect Squares

1. $\sqrt{49} =$ ___7___
2. $\pm\sqrt{36} =$ ___± 6___
3. $-\sqrt{121} =$ ___-11___
4. $\sqrt{\frac{1}{25}} =$ ___$\frac{1}{5}$___

These are all ___perfect squares___.

Note, $\pm\sqrt{0}$ is always ___0___.

In Algebra 2, you will find out how to take the square root of a negative number!

Rewriting Radicals by Extracting Perfect Squares

Why would you want to simplify radicals? Isn't rounding your answer good enough?

You simplify radicals to find an exact answer. Sometimes, accuracy is important.

When you simplify radicals, try to factor out the perfect squares…

$\sqrt{20}$

$\sqrt{4} \cdot \sqrt{5}$ *4 is a perfect square!*

$2\sqrt{5}$

$\sqrt{45}$

$\sqrt{9} \cdot \sqrt{5}$ *9 is a perfect square!*

$3\sqrt{5}$

Practice

1. $\sqrt{50}$

$\sqrt{25} \cdot \sqrt{2}$

$5\sqrt{2}$

2. $\sqrt{27}$

$\sqrt{9} \cdot \sqrt{3}$

$3\sqrt{3}$

3. $\sqrt{48}$

$\sqrt{16} \cdot \sqrt{3}$

$4\sqrt{3}$

4. $\sqrt{200}$

$\sqrt{100} \cdot \sqrt{2}$

$10\sqrt{2}$

If you want an accurate answer, it's best to leave radicals in their exact form (with the root). Sometimes, you can approximate using a calculator and rounding the answer. For example, $\sqrt{14} \approx 3.7$.

Solving Radical Equations

Solve each quadratic equation by taking the square root of each side. Round to the nearest tenth.

1. $x^2 = 40$

$\sqrt{x^2} = \pm\sqrt{40}$

$x \approx \pm 6.3$

2. $x^2 = 75$

$\sqrt{x^2} = \pm\sqrt{75}$

$x \approx \pm 8.7$

3. $x^2 - 4 = 23$

$x^2 = 27$

$\sqrt{x^2} = \pm\sqrt{27}$

$x \approx \pm 5.2$

Math Challenge!

Solve each quadratic equation by taking the square root of each side. Round to the nearest tenth.

$(x - 1)^2 = 17$

$\sqrt{(x-1)^2} = \pm\sqrt{17}$

$x - 1 = \pm\sqrt{17}$

$x = 1 \pm \sqrt{17}$

$x = 1 + \sqrt{17}$ $\quad x = 1 - \sqrt{17}$

$x \approx 5.1$ $\quad x \approx -3.1$

$(x + 8)^2 = 83$

$\sqrt{(x+8)^2} = \pm\sqrt{83}$

$x + 8 = \pm\sqrt{83}$

$x = -8 \pm \sqrt{83}$

$x = -8 + \sqrt{83}$ $\quad x = -8 - \sqrt{83}$

$x \approx 1.1$ $\quad x \approx -17.1$