same

$\sqrt{n}$

index

$\sqrt[2]{n}$

radical sign

called radicand
= #under radical sign

9.1. Honors Geometry

DATE: 3/12

Target 8A. Simplify square roots, perform operations and solve quadratic equations

To find the square root of a number, you must figure out what number squared gave you that number.

Definition: If $a^2 = b$ and $b \geq 0$, then $a = \sqrt{b}$.

Ex: $\sqrt{4} = 2$ since $2^2 = 4$

$\sqrt{25} = 5$ since $5^2 = 25$

NOTE: The 2, 5 are called principal roots; $\sqrt{4} = \pm 2$, $\sqrt{25} = \pm 5$

$(-2)^2 = (-2)(-2) = 4$

Perfect squares

Examples (up to 400)

1, 4, 9, 16, 25, 36
1^2 2^2 3^2 4^2 5^2 6^2

49, 64, 81, 100, 121, 144, 169, 196, 225,
7^2 8^2 ...

256, 289, 324, 361, 400 ...

Is 0.25 a perfect square?

Non-examples

3, 5, π, e, ...

Write each number as the product of two whole-number factors where one

Write each number as the product of two whole-number factors where one of the factors is a perfect square. *(Hint: When **simplifying**, look for the biggest perfect square!)*

12	27	50	48	72	54
$4 \cdot 3$	$9 \cdot 3$	$25 \cdot 2$	$16 \cdot 3$	$9 \cdot 3$	$9 \cdot 6$

two factors, one is perfect square (actually the largest)

To ***simplify*** a radical means when all of the following are true:

1) No decimals, fractions, or perfect squares are left under the radical sign
2) No radicals in the denominator

Examples: Simplify each expression.

1) $\sqrt{48}$ $\sqrt{16}=4$

$\sqrt{16\cdot 3}$

$4\sqrt{3}$

2) $3\sqrt{2}\bullet 4\sqrt{8}$

$12\sqrt{16}$

$12\cdot 4$

48

3) $\sqrt{2}\div\sqrt{3}$ $\sqrt{9}=3$

$\frac{\sqrt{2}}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}}=\frac{\sqrt{6}}{\sqrt{9}}$

$=\frac{\sqrt{6}}{3}$

4) $2\sqrt{108}+\sqrt{27}$

5) $-\sqrt{18}+3\sqrt{32}-\sqrt{75}$

4) $2\sqrt{108}+\sqrt{27}$

$\sqrt{36}=6$

$\sqrt{9}=3$

$2\cdot\sqrt{36\cdot 3}+\sqrt{9\cdot 3}$

$2\cdot 6\sqrt{3}+3\sqrt{3}$

$12\sqrt{3}+3\sqrt{3}$

$15\sqrt{3}$

5) $-1\sqrt{18}+3\sqrt{32}-\sqrt{75}$

$-1\sqrt{9\cdot 2}+3\sqrt{16\cdot 2}-1\sqrt{25\cdot 3}$

$-1\cdot 3\sqrt{2}+3\cdot 4\sqrt{2}-1\cdot 5\sqrt{3}$

$-3\sqrt{2}+12\sqrt{2}-5\sqrt{3}$

$9\sqrt{2}-5\sqrt{3}$

Take a look at the examples we have done. What do you notice is the difference between adding/subtracting and multiplying radicals? Explain in your own words.

Take a look at the examples we have done. What do you notice is the difference between adding/subtracting and multiplying radicals? Explain in your own words.

- Multiplying: $3\sqrt{2} \cdot 2\sqrt{5} = 6\sqrt{10}$, so multiply coefficients with coeff. and radicands get mult. with radicands
- Adding/subtracting: $3\sqrt{2} + 5\sqrt{2} = 8\sqrt{2}$, $3\sqrt{2} - 1\sqrt{2} = 2\sqrt{2}$, so add/subtract coefficients only when radicands are same!

There are different ways of solving a quadratic equation.