Algebra 1-6: Square Roots & Radicals Day I

Warm-Up

Find the value of each without a calculator.

1. $\sqrt{25}$ = 5
2. $\sqrt{144}$ = 12
3. $\sqrt{81}$ = 9
4. $\sqrt{9}$ = 3
5. $\sqrt{49}$ = 7
6. $x^2 = 25$ → $x \cdot x = 25$ → $x = 5$, $x = -5$ → $x = \pm 5$ ($5 \cdot 5 = 25$, $-5 \cdot -5 = 25$)
7. $x^2 = 144$ → $x \cdot x = 144$ → $x = \pm 12$ ($12 \cdot 12 = 144$, $-12 \cdot -12 = 144$)
8. $x^2 = 81$ → $x \cdot x = 81$ → $x = \pm 9$
9. $x^2 = 9$ → $x \cdot x = 9$ → $x = \pm 3$
10. $x^2 = 49$ → $x = \pm 7$

Find the value of each with a calculator.

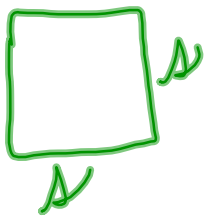
11. $\sqrt{6} \approx 2.45$
12. $\sqrt{11} \approx 3.32$
13. $x^2 = 6$ → $x \cdot x = 6$ → $\sqrt{x^2} = \sqrt{6}$ → $x = \pm\sqrt{6}$
14. $x^2 = 11$ → $x \cdot x = 11$ → $\sqrt{x^2} = \sqrt{11}$ → $x = \pm\sqrt{11}$

since $\sqrt{11}\sqrt{11} = 11$, $-\sqrt{11} \cdot \sqrt{11} = 11$

Vocabulary	Definition	Example
Square	- something times itself - power of 2	$x \cdot x = x^2$ $6 \cdot 6 = 6^2$
Square Root	- opposite of squaring - $6 = \sqrt{36}$ 6 is the square root of 36	
Radical Sign	$\sqrt{}$	
Perfect Square	* No decimal when you take the square root "36" is a perfect square	$\sqrt{36} = 6$

Extra Key Points

- When taking the square root to solve an equation, there are 2 solutions. $x^2 = 49$ $x = \pm 7$
- Area of a Square = s^2 (or lw or bh)



- $\frac{\sqrt{x}}{\sqrt{6}} \cdot \frac{\sqrt{x}}{\sqrt{6}} = \frac{x}{6}$

$\sqrt{36} = 6$

$\sqrt{12} \cdot \sqrt{12} = 12$

$\sqrt{40} \cdot \sqrt{40} = 40$

Exact Solution	Approximate Solution
→ never round	→ rounded decimals
→ $5, \sqrt{3}, \frac{1}{2}$	→ ≈ 1.3 , ≈ 5.678

Example Problems

1. **Find the area of a square with a side length of 7 in.**

$A = s^2$

$A = 7^2 = 49$

$49\ in^2$

Area is always in square units

2. **Find the side length of a square with an area of 16 cm^2.**

$A = s^2$

$\sqrt{16} = \sqrt{s^2}$

$s = \pm 4$

$4\ cm$

• distance is always (+)!

3. Find the **exact** and **approximate** side length of a square with an area of 20 ft^2.

$A = s^2$

$\sqrt{20} = \sqrt{s^2}$

$s = \pm\sqrt{20}$

$\sqrt{20}$ ← exact

4.47 ← approx

$\sqrt{20} = 4.472...$

4. List all the **perfect squares** ~~(must form a _____)~~, from least to greatest up to 144.

List of

$1^2 = 1$
$2^2 = 4$
$3^2 = 9$
$4^2 = 16$
$5^2 = 25$
$6^2 = 36$
$7^2 = 49$
$8^2 = 64$
$9^2 = 81$
$10^2 = 100$
$11^2 = 121$
$12^2 = 144$

$\sqrt{10} \approx 3.1$

5. Estimate $\sqrt{10}$ without a calculator. Check with a calculator.

(Hint: Find the 2 perfect squares that 10 is between.)

$\sqrt{9} < \sqrt{10} < \sqrt{16}$

$3 < 3.1 < 4$

Multiply.

6. $(\sqrt{6})^2$

$\sqrt{6} \cdot \sqrt{6} = 6$

$\sqrt{36}$

7. $2\sqrt{5}\sqrt{5}$

$2 \cdot 5 = 10$

8. $3\sqrt{7} \cdot 2\sqrt{7}$

$3 \cdot 2\sqrt{7}\sqrt{7}$

$6 \cdot 7 = 42$

Evaluate.

9. $\sqrt{(2^2 + 5^2)}$

$= \sqrt{2^2 + 5^2}$

$= \sqrt{4 + 25}$

$= \sqrt{29}$ Exact

10. $9\sqrt{121}$

$9 \cdot 11$

99

11. $-\sqrt{81}$

-9