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Study Guide and Intervention

7NS2.4

Square Roots

The square root of a number is one of two equal factors. The radical sign $\sqrt{\ }$ is used to indicate the positive square root.

Examples **Find each square root.**

1. $\sqrt{1}$ Since $1 \cdot 1 = 1$, $\sqrt{1} = 1$.
2. $-\sqrt{16}$ Since $4 \cdot 4 = 16$, $-\sqrt{16} = -4$.
3. $\sqrt{0.25}$ Since $0.5 \cdot 0.5 = 0.25$, $\sqrt{0.25} = 0.5$.
4. $\sqrt{\frac{25}{36}}$ Since $\frac{5}{6} \cdot \frac{5}{6} = \frac{25}{36}$, $\sqrt{\frac{25}{36}} = \frac{5}{6}$.

Example 5 **Solve $a^2 = \frac{4}{9}$.**

$a^2 = \frac{4}{9}$ Write the equation.

$\sqrt{a^2} = \sqrt{\frac{4}{9}}$ Take the square root of each side.

$a = \frac{2}{3}$ or $-\frac{2}{3}$ Notice that $\frac{2}{3} \cdot \frac{2}{3} = \frac{4}{9}$ and $\left(-\frac{2}{3}\right)\left(-\frac{2}{3}\right) = \frac{4}{9}$.

The equation has two solutions, $\frac{2}{3}$ and $-\frac{2}{3}$.

Exercises

Find each square root.

1. $\sqrt{4}$

2. $\sqrt{9}$

3. $-\sqrt{49}$

4. $-\sqrt{25}$

5. $\sqrt{0.01}$

6. $-\sqrt{0.64}$

7. $\sqrt{\frac{9}{16}}$

8. $-\sqrt{\frac{1}{25}}$

ALGEBRA Solve each equation.

9. $x^2 = 121$

10. $a^2 = 3{,}600$

11. $p^2 = \frac{81}{100}$

12. $t^2 = \frac{121}{196}$

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7NS2

Estimating Square Roots

Most numbers are not perfect squares. You can estimate square roots for these numbers.

Example 1 **Estimate $\sqrt{204}$ to the nearest whole number.**

- The first perfect square less than 204 is 14.
- The first perfect square greater than 204 is 15.

$196 < 204 < 225$ Write an inequality.

$14^2 < 204 < 15^2$ $196 = 14^2$ and $225 = 15^2$

$14 < \sqrt{204} < 15$ Take the square root of each number.

So, $\sqrt{204}$ is between 14 and 15. Since 204 is closer to 196 than 225, the best whole number estimate for $\sqrt{204}$ is 14.

Example 2 **Estimate $\sqrt{79.3}$ to the nearest whole number.**

- The first perfect square less than 79.3 is 64.
- The first perfect square greater than 79.3 is 81.

$64 < 79.3 < 81$ Write an inequality.

$8^2 < 79.3 < 9^2$ $64 = 8^2$ and $81 = 9^2$

$8 < \sqrt{79.3} < 9$ Take the square root of each number.

So, $\sqrt{79.3}$ is between 8 and 9. Since 79.3 is closer to 81 than 64, the best whole number estimate for $\sqrt{79.3}$ is 9.

Exercises

Estimate to the nearest whole number.

1. $\sqrt{8}$ **2.** $\sqrt{37}$ **3.** $\sqrt{14}$

4. $\sqrt{26}$ **5.** $\sqrt{62}$ **6.** $\sqrt{48}$

7. $\sqrt{103}$ **8.** $\sqrt{141}$ **9.** $\sqrt{14.3}$

10. $\sqrt{51.2}$ **11.** $\sqrt{82.7}$ **12.** $\sqrt{175.2}$

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