Solving Quadratics by Square Roots

Algebra 1 •Section 9.6

Name: _____	Date: _____	Score: _____ / 12

Quick Review and Helpful Hints

Quadratic functions can be read through their zeros, vertex, axis of symmetry, and opening direction. Choose factoring, square roots, completing the square, or the quadratic formula based on the form you see.

▷ **Example:** Solve $x^2 - 5x + 6 = 0$.
Work: Factor the quadratic: $x^2 - 5x + 6 = (x - 2)(x - 3)$. Set each factor equal to zero.
★ **Answer:** $x = 2$ or $x = 3$

Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

1. Solve $x^2 = 49$.

2. Solve $x^2 - 16 = 0$.

3. Solve $(x - 3)^2 = 25$.

4. Solve $2x^2 = 50$.

5. Solve $(x + 4)^2 = 12$.

6. Solve $3(x - 1)^2 = 27$.

7. Solve $x^2 + 9 = 0$ over the reals.

8. Solve $(2x)^2 = 64$.

9. Solve $5x^2 - 20 = 0$.

10. Solve $(x - 7)^2 = 0$.

Word Problems

11. A square has area 121 square feet. Find its side length.

12. A dropped object has $16t^2 = 144$. Find positive t.

Answer Keys

1. $\boxed{x = \pm 7}$
2. $\boxed{x = \pm 4}$
3. $\boxed{x = 8, -2}$
4. $\boxed{x = \pm 5}$
5. $\boxed{x = -4 \pm 2\sqrt{3}}$
6. $\boxed{x = 4, -2}$
7. $\boxed{\text{No real solution}}$
8. $\boxed{x = \pm 4}$
9. $\boxed{x = \pm 2}$
10. $\boxed{x = 7}$
11. $\boxed{11 \text{ ft}}$
12. $\boxed{3}$

Step-by-Step Explanations

1. Squaring erases signs, so both 7 and -7 work — that's why the answer always carries a $\pm$.

2. Get x^2 alone first: $x^2 = 16$. Then taking the square root opens up both the positive and negative options.

3. Since the whole $(x - 3)$ is squared, undo it with a root: $x - 3 = \pm 5$, then solve each case.

4. Clear the coefficient before rooting — divide by 2 to reach $x^2 = 25$, then take both roots.

5. Root both sides to get $x + 4 = \pm\sqrt{12}$, and since $12 = 4 \cdot 3$, that simplifies to $\pm 2\sqrt{3}$.

6. Divide away the 3 first so the square stands alone, then $x - 1 = \pm 3$ gives you both answers.

7. This rearranges to $x^2 = -9$, but no real number squares to a negative — so there's nothing to find here.

8. Take the root to get $2x = \pm 8$, then split off the 2 — leaving $x = \pm 4$.

9. Move the 20 over and divide by 5 to isolate $x^2 = 4$, then root both sides for the $\pm$.

10. Zero is special: the only way a square equals zero is if the inside is zero, so $x - 7 = 0$.

11. Area is side squared, so the side is the square root — and lengths are positive, so just 11.

12. Divide by 16 to free up $t^2 = 9$. Time can't be negative, so keep only the positive root.

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