

Algebra 1 • Unit 8 Worksheet

Quadratic Equations

Name: _____

Date: _____

Part A • Solving by Reasoning

1. Solve each WITHOUT a general formula. Use square roots, factoring, or reasoning.

a. $x^2 = 49$. $x =$ _____

b. $(x - 3)^2 = 16$. $x =$ _____

c. $x^2 - 5 = 20$. $x =$ _____

d. $2(x + 1)^2 = 50$. $x =$ _____

e. ★ Why does the answer to (a) have TWO values? Why might a student write only $x = 7$?

Part B • Factoring and the Zero Product Property

2. Use factoring and the Zero Product Property to solve.

a. $x^2 - 8x + 15 = 0$. $x =$ _____

b. $x^2 + 4x = 0$. $x =$ _____

c. $x^2 - 16 = 0$. $x =$ _____

d. Han "solved" $x^2 = 4x$ by dividing both sides by x : $x = 4$. What solution did Han LOSE? Why is dividing by x dangerous?

Part C • Completing the Square

3. Solve $x^2 + 6x - 7 = 0$ by completing the square. Show every step.

$x =$ _____

4. Rewrite $x^2 - 10x + 18$ in VERTEX form by completing the square.

Vertex form: _____ Vertex: (____, ____)

Part D • The Quadratic Formula

5. Solve $2x^2 - 5x + 1 = 0$ using the quadratic formula. Show the substitution into $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

$x =$ _____

6. For each, use the DISCRIMINANT ($b^2 - 4ac$) to predict the number of solutions WITHOUT solving.

a. $x^2 + 6x + 5 = 0$. Discriminant = _____. Number of real solutions: _____

b. $x^2 + 4x + 4 = 0$. Discriminant = _____. Number of real solutions: _____

c. $x^2 + x + 1 = 0$. Discriminant = _____. Number of real solutions: _____

d. What does the SIGN of the discriminant tell you graphically?

Part E • Two-Method Problems

7. Solve $x^2 - 6x + 5 = 0$ using BOTH (i) factoring and (ii) the quadratic formula. Do you get the same answer?

Factoring	Quadratic Formula

Solutions: $x =$ _____ and _____

8. Decide WHICH method is most efficient for each — and JUSTIFY your choice. (No need to fully solve.)

a. $x^2 = 81$. Best method:

b. $x^2 - 7x + 12 = 0$. Best method:

c. $x^2 + 6x + 4 = 0$. Best method (factoring doesn't give integers):

d. $3x^2 - 5x + 7 = 0$. Best method:

Part F • Modeling and Applications

9. A rectangular garden has length 3 ft longer than its width. Its area is 70 sq ft.

a. Set up an equation in one variable (let w = width).

b. Solve. Show your method.

c. The quadratic gives TWO solutions for w . Which one makes sense in context, and why?

10. A ball thrown from height 4 ft has height $h(t) = -16t^2 + 48t + 4$. When does it hit the ground?

$t \approx$ _____ seconds

Part G • Reasoning About Solutions

11. The equation $x^2 - 4x + c = 0$ has exactly one solution.

a. What must c be? (Use the discriminant.)

b. What is the (one) solution? Explain how you found it.

12. Are these always rational, always irrational, or could be either?

a. Sum of two rational numbers:

b. Sum of two irrational numbers:

c. Product of a rational and an irrational (nonzero) number:

d. Solutions of a quadratic with integer coefficients can be irrational. Give an example.
