

Solving Quadratic Equations: practice solutions, Grade 9 – download the PDF

Written solutions to the chapter problems. Check each step, then correct yourself.

1 Square root method, first steps



a) $x = \pm\sqrt{49} = \pm 7$. The solutions are **7** and **-7**.

b) Divide by 5: $x^2 = 9$, so $x = \pm 3$. Check: $5 \cdot 9 = 45$. The solutions are **3** and **-3**.

2 A square plus a shift



Take square roots: $x + 4 = \pm 5$.

If $x + 4 = 5$ then $x = 1$; if $x + 4 = -5$ then $x = -9$. Check $x = -9$: $(-5)^2 = 25$. The solutions are **1** and **-9**.

3 Answer as a radical



$x^2 = 20$, so $x = \pm\sqrt{20} = \pm 2\sqrt{5}$.

Since $\sqrt{5} \approx 2.236$, $x \approx 4.47$ or $x \approx -4.47$.

4 True or false?



She is wrong. Both $3^2 = 9$ and $(-3)^2 = 9$ are positive, so no real number squared equals -9 .

The equation $x^2 = -9$ has **no real solution**.

5 Standard form



a) Subtract $2x + 7$: $3x^2 - 2x - 7 = 0$, so $a = 3$, $b = -2$, $c = -7$.

b) Expand: $x^2 + 2x - 3 = 5$. Subtract 5: $x^2 + 2x - 8 = 0$, so $a = 1$, $b = 2$, $c = -8$.

6 Counting solutions



a) $\Delta = 25 - 8 = 17 > 0$: two solutions.

b) $\Delta = 144 - 4 \cdot 4 \cdot 9 = 144 - 144 = 0$: one solution.

c) $\Delta = 1 - 4 \cdot 2 \cdot 3 = -23 < 0$: no real solution.

7 Zero-product warm-up



Either $x - 6 = 0$ or $x + 2 = 0$, so $x = 6$ or $x = -2$.

Expanding: $x^2 + 2x - 6x - 12 = x^2 - 4x - 12$. Check $x = 6$: $36 - 24 - 12 = 0$.

8 Complete the square



$x^2 + 8x = -7$. Half of 8 is 4, and $4^2 = 16$: $x^2 + 8x + 16 = 9$, so $(x + 4)^2 = 9$.

Then $x + 4 = \pm 3$, so $x = -1$ or $x = -7$. Check $x = -1$: $1 - 8 + 7 = 0$.

9 Completing the square with a radical



$x^2 - 10x = -18$. Add 25: $(x - 5)^2 = 7$.

So $x = 5 \pm \sqrt{7}$, which gives $x \approx 7.65$ or $x \approx 2.35$.

10 Quadratic formula with a leading coefficient



$a = 3, b = 1, c = -10$. $\Delta = 1 + 120 = 121 = 11^2$.

$x = \frac{-1 \pm 11}{6}$, so $x = \frac{10}{6} = \frac{5}{3}$ or $x = \frac{-12}{6} = -2$.

11 Irrational solutions



$\Delta = 36 - 28 = 8$, so $x = \frac{6 \pm 2\sqrt{2}}{2} = 3 \pm \sqrt{2}$.

Numerically, $x \approx 4.41$ or $x \approx 1.59$.

12 Which method?



a) Square root method: $x^2 = 9$, so $x = \pm 3$.

b) Factoring: $(x + 3)(x + 4) = 0$, so $x = -3$ or $x = -4$.

c) The quadratic formula: $\Delta = 9 + 20 = 29$, so $x = \frac{3 \pm \sqrt{29}}{2}$, that is $x \approx 4.19$ or $x \approx -1.19$.

13 A rectangular patio



Let w be the width in feet. Then $w(w + 5) = 84$, so $w^2 + 5w - 84 = 0$.

$\Delta = 25 + 336 = 361 = 19^2$, so $w = \frac{-5 \pm 19}{2}$, that is $w = 7$ or $w = -12$.

A width cannot be negative, so the patio is **7 ft wide and 12 ft long**. Check: $7 \times 12 = 84$.

14 Find the error



The zero-product property only works when the product equals **0**, not **10**.

Correct work: $x^2 + 3x - 10 = 0$, so $(x + 5)(x - 2) = 0$ and $x = -5$ or $x = 2$. Check $x = 2$: $4 + 6 = 10$.

15 Reading a table of values



- a) The solutions are the values of x where $y = 0$: $x = 1$ and $x = 3$. Check: $9 - 12 + 3 = 0$.
- b) The lowest value in the table is -1 , reached at $x = 2$, halfway between the two zeros. The lowest point is $(2, -1)$.

16 One solution exactly



We need $\Delta = k^2 - 4 \cdot 1 \cdot 16 = k^2 - 64 = 0$, so $k = 8$ or $k = -8$.

For $k = 8$: $x^2 + 8x + 16 = (x + 4)^2 = 0$, so $x = -4$.

17 Completing the square when a is not 1



Divide by 2: $x^2 - 6x = -\frac{5}{2}$. Add 9: $(x - 3)^2 = \frac{13}{2}$.

So $x = 3 \pm \sqrt{\frac{13}{2}} = 3 \pm \frac{\sqrt{26}}{2}$, about 5.55 or 0.45.

Formula check: $\Delta = 144 - 40 = 104$, $x = \frac{12 \pm \sqrt{104}}{4} = \frac{6 \pm \sqrt{26}}{2}$, the same values.

18 The falling tool



It hits the ground when $h = 0$: $144 - 16t^2 = 0$, so $t^2 = 9$ and $t = 3$ (the value -3 is rejected because time cannot be negative).

After 1 second: $h = 144 - 16 = 128$ feet. The tool lands after **3 seconds**.

19 A ball thrown upward



a) Solve $-16t^2 + 32t + 48 = 0$. Divide by -16 : $t^2 - 2t - 3 = 0$, so $(t - 3)(t + 1) = 0$. Since $t \geq 0$, the ball lands at $t = 3$ seconds.

b) The ledge is at 48 ft: $-16t^2 + 32t = 0$, so $-16t(t - 2) = 0$ and $t = 0$ or $t = 2$. The ball is back at ledge height after **2 seconds**.

20 A line cuts a parabola



Set equal: $x^2 - 3x = 2x - 6$, so $x^2 - 5x + 6 = 0$, $(x - 2)(x - 3) = 0$, and $x = 2$ or $x = 3$.

Using $y = 2x - 6$: $y = -2$ and $y = 0$. The solutions are $(2, -2)$ and $(3, 0)$. Check $(2, -2)$: $4 - 6 = -2$.

21 Tangent line or no intersection



a) $x^2 + 2x + 1 = 4x$, so $x^2 - 2x + 1 = 0$, $(x - 1)^2 = 0$, $x = 1$. One point: $(1, 4)$; the line is tangent to the parabola.

b) $x^2 + 1 = 2x - 3$, so $x^2 - 2x + 4 = 0$. $\Delta = 4 - 16 = -12 < 0$: no solution, so the graphs never meet.

22

Reading a graph

★★★

- a) The x-intercepts are $(-4, 0)$ and $(2, 0)$, so $x = -4$ or $x = 2$. Check: $16 - 8 - 8 = 0$.
- b) $x^2 + 2x = 0$, so $x(x + 2) = 0$ and $x = 0$ or $x = -2$. These are the x-coordinates where the parabola meets the horizontal line $y = -8$.

**Test yourself: quick challenge for Grade 9**[Change level](#)Level : **Grade 9**

6 random questions, instant feedback.

**Start the challenge****Keep exploring with Zyro****Math practice**

Solving Quadratic Equations: math practice, Grade 9

**Math quizzes**

Solving Quadratic Equations: math quiz, Grade 9



Math tests

Solving Quadratic Equations: math test, Grade 9



Math practice

Radicals and Exponential Functions: math practice, Grade 9



Math practice

Algebraic Expressions and Properties of Real Numbers: math practice, Grade 9



Math quizzes

Radicals and Exponential Functions: math quiz, Grade 9

Zyro vous emmène sur nos sites partenaires

Embarquez pour d'autres planètes du savoir et leurs applis.

Décollage