

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

22 problems graded by difficulty (★ easy, ★★ medium, ★★★ hard). Try first, without looking at the solutions!

1 Square root method, first steps

★ ★ ★

Solve each equation.

a. $x^2 = 49$

b. $5x^2 = 45$

2 A square plus a shift

★ ★ ★

Solve $(x + 4)^2 = 25$.

3 Answer as a radical

★ ★ ★

Solve $x^2 - 20 = 0$. Give the exact answers, then round to the nearest hundredth.

4 True or false?

★ ★ ★

Maya says: "The equation $x^2 = -9$ has the two solutions **3** and **-3**." Is she right? Explain.

5 Standard form



Write each equation in standard form $ax^2 + bx + c = 0$ and give a, b, c .

a. $3x^2 = 2x + 7$

b. $(x + 3)(x - 1) = 5$

6 Counting solutions



Compute the discriminant and say how many real solutions each equation has.

a. $x^2 + 5x + 2 = 0$

b. $4x^2 - 12x + 9 = 0$

c. $2x^2 + x + 3 = 0$

7 Zero-product warm-up



Solve $(x - 6)(x + 2) = 0$, then expand it and check that you get $x^2 - 4x - 12 = 0$.

8 Complete the square



Solve $x^2 + 8x + 7 = 0$ by completing the square.

9 Completing the square with a radical



Solve $x^2 - 10x + 18 = 0$ by completing the square. Round to the nearest hundredth.

10 Quadratic formula with a leading coefficient



Solve $3x^2 + x - 10 = 0$ with the quadratic formula.

11 Irrational solutions



Solve $x^2 - 6x + 7 = 0$. Give exact answers and approximations to the nearest hundredth.

12 Which method?



For each equation, name the method you would pick and solve it.

a. $2x^2 - 18 = 0$

b. $x^2 + 7x + 12 = 0$

c. $x^2 - 3x - 5 = 0$

13 A rectangular patio



A rectangular patio is 5 feet longer than it is wide. Its area is 84 square feet. Find its dimensions.

14 Find the error



A student solves $x^2 + 3x = 10$ like this: " $x(x + 3) = 10$, so $x = 10$ or $x + 3 = 10$, hence $x = 10$ or $x = 7$." Explain the mistake and give the correct solutions.

15 Reading a table of values

Here are values of $y = x^2 - 4x + 3$.

x	0	1	2	3	4
y	3	0	-1	0	3

- Give the solutions of $x^2 - 4x + 3 = 0$.
- What is the lowest point of the parabola?

16 One solution exactly

For which values of k does $x^2 + kx + 16 = 0$ have exactly one real solution? Find that solution when k is positive.

17 Completing the square when a is not 1

Solve $2x^2 - 12x + 5 = 0$ by completing the square, then check with the quadratic formula.

18 The falling tool

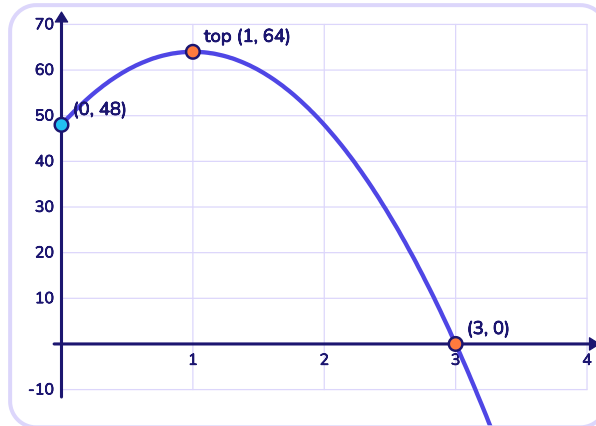
A tool slips off scaffolding 144 feet above the ground. Its height after t seconds is $h = 144 - 16t^2$. When does it hit the ground, and how high is it after 1 second?

19 A ball thrown upward

★★★

A ball is thrown upward from a ledge. Its height in feet after t seconds is

$$h = -16t^2 + 32t + 48.$$



- When does it hit the ground?
- When is it back at the height of the ledge?

20 A line cuts a parabola

★★★

Solve the system $y = x^2 - 3x$ and $y = 2x - 6$.

21 Tangent line or no intersection

★★★

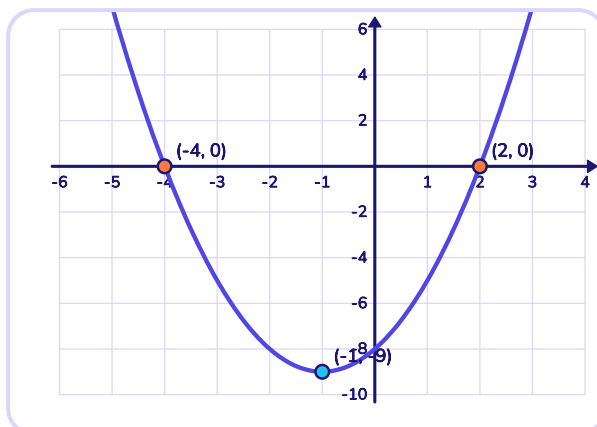
Decide how many points the parabola and the line share, and find them.

- $y = x^2 + 2x + 1$ and $y = 4x$
- $y = x^2 + 1$ and $y = 2x - 3$

22 Reading a graph



The graph shows $y = x^2 + 2x - 8$.



- Solve $x^2 + 2x - 8 = 0$.
- Solve $x^2 + 2x - 8 = -8$ algebraically and explain what it means on the graph.



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