

Solving Quadratic Equations Four Ways

Grade 9 – Algebra 1 math · Worksheet · Standards: A-REI.B.4a, A-REI.B.4b, A-APR.B.3, A-CED.A.1

Name: _____ Date: _____ Class: _____

These 20 problems train standards A-REI.B.4, A-APR.B.3 and A-CED.A.1. The first problems use square roots and the zero-product property. The middle problems complete the square and apply the quadratic formula, and they use the discriminant.

The last problems model plots of land and moving balls with quadratic equations.

Standards: A-REI.B.4a, A-REI.B.4b, A-APR.B.3, A-CED.A.1 · **Level:** Grade 9 Algebra 1

Problem 1 Square Roots, Plain Case (easy)

Solve $x^2 = 81$.

Problem 2 Square Roots After Dividing (easy)

Solve $3x^2 = 75$.

Problem 3 Square Roots with a Shifted Square (easy)

Solve $(x - 4)^2 = 49$.

Problem 4 Zero-Product Property (easy)

Solve $(x + 6)(x - 2) = 0$.

Problem 5 Factor and Solve (easy)

Solve $x^2 + 7x + 10 = 0$ by factoring.

Problem 6 No Constant Term (easy)

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

Problem 7 Factor a Trinomial Equation (medium)

Solve $x^2 - 7x - 30 = 0$.

Problem 8 Factor with a Leading 2 (medium)

Solve $2x^2 + x - 10 = 0$.

Problem 9 Irrational Square Roots (medium)

Solve $(x + 2)^2 = 18$ and give each answer as an exact value and as a decimal rounded to the nearest hundredth.

Problem 10 Complete the Square, Positive Middle (medium)

Solve $x^2 + 8x - 5 = 0$ by completing the square. Round to the nearest hundredth.

Problem 11 Complete the Square, Negative Middle (medium)

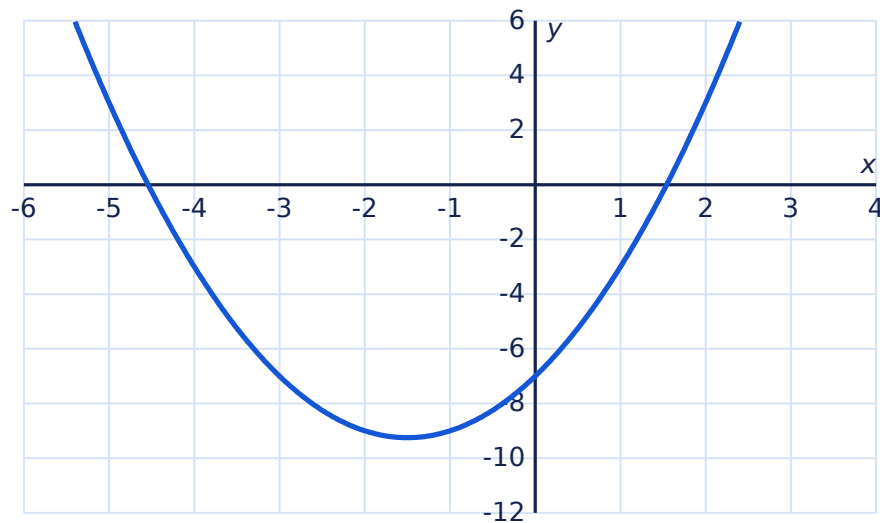
Solve $x^2 - 6x + 2 = 0$ by completing the square. Round to the nearest hundredth.

Problem 12 Complete the Square, Leading 4 (medium)

Solve $4x^2 + 8x - 1 = 0$ by completing the square. Give an exact answer and a decimal rounded to the nearest hundredth.

Problem 13 Quadratic Formula, First Try (medium)

Use the quadratic formula to solve $x^2 + 3x - 7 = 0$. Compare with the graph.

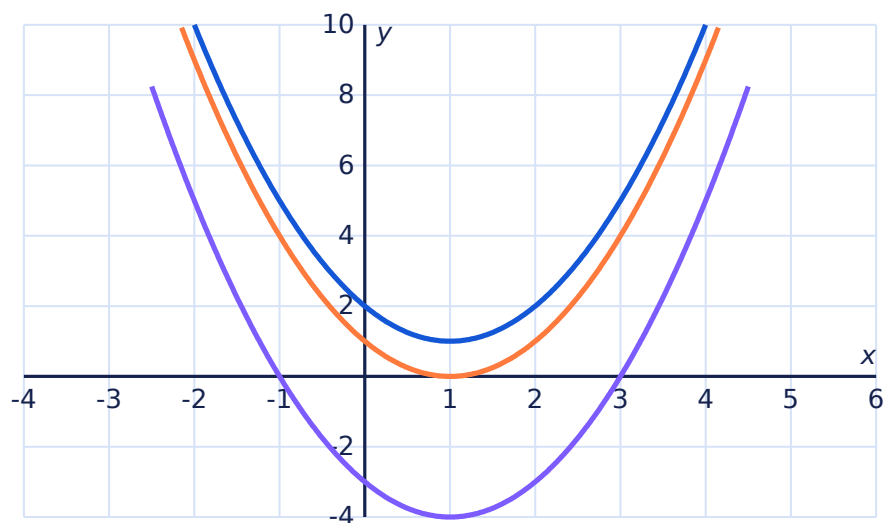


Graph of $y = x^2 + 3x - 7$.

Problem 14 Count the Solutions (medium)

The graph shows the three ways a parabola can meet the x-axis: not at all, once or twice. For each equation, compute the discriminant and state how many real solutions it has.

- a. $x^2 - 6x + 9 = 0$
- b. $2x^2 + 3x + 5 = 0$
- c. $x^2 - x - 1 = 0$



Three parabolas and the x-axis.

Problem 15 Formula with $a = 3$ (hard)

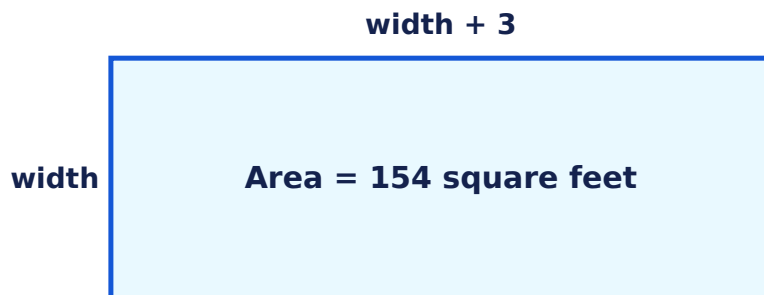
Solve $3x^2 - 5x - 4 = 0$. Round to the nearest hundredth.

Problem 16 Pick the Fast Method (hard)

Solve $4(x - 1)^2 = 100$ using the quickest method. Name the method.

Problem 17 Rectangular Plot (hard)

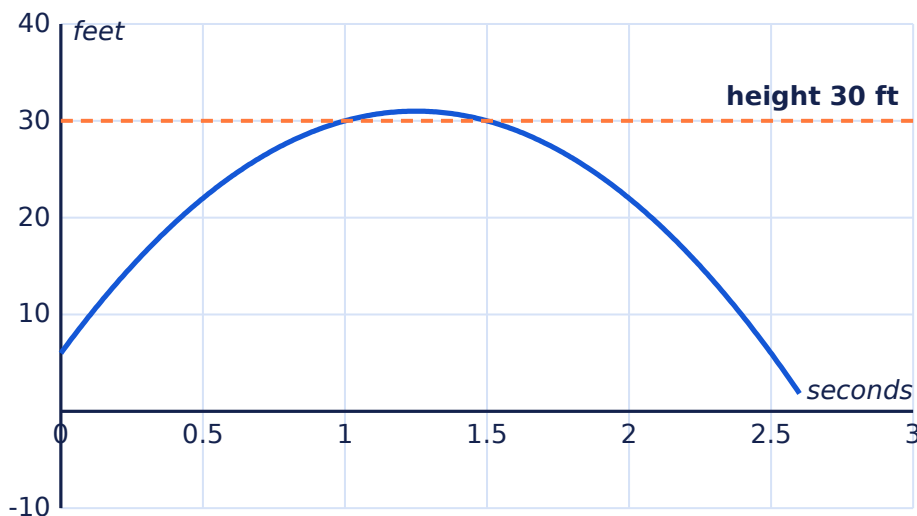
A rectangular plot is 3 feet longer than it is wide, and its area is 154 square feet. Find its dimensions.



A rectangular plot.

Problem 18 Height Equal to 30 Feet (hard)

A ball has height $h(t) = -16t^2 + 40t + 6$ feet after t seconds. At what times is the ball exactly 30 feet high?



The ball passes 30 feet twice.

Problem 19 Landing Time with the Formula (hard)

A launched ball has height $h(t) = -16t^2 + 30t + 8$ feet. Use the quadratic formula to find when it lands. Round to the nearest hundredth of a second.

Problem 20 Exactly One Solution (hard)

For what value of k does $x^2 + 6x + k = 0$ have exactly one real solution? For which values of k does it have none?