

Quadratic Equation Quest

Write and solve equations from graphs and real situations.

HIGH SCHOOL • MA.912.AR.3.1

MA.912.AR.3.1 "Given a mathematical or real-world context, write and solve one-variable quadratic equations over the real number system."

NAME _____

DATE _____

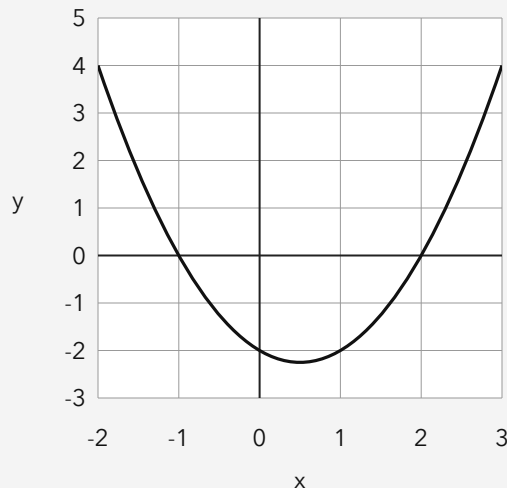
You will need: Pencil; Ruler

SET IT EQUAL TO ZERO

To solve $ax^2 + bx + c = 0$, write the equation with 0 on one side. Factor when possible, or use the quadratic formula, then check each real solution.

WORKED EXAMPLE

Use the graph. Solve $y = 0$.



— $y = x^2 - x - 2$

1. Set y to 0: $x^2 - x - 2 = 0$.
2. Factor: $(x - 2)(x + 1) = 0$.
3. Set each factor equal to 0.
4. $x = 2$ or $x = -1$.

Answer: $x = -1, 2$

PRACTICE 4 problems

1 Solve: $x^2 - 17x + 70 = 0$

ANSWER _____

2 Solve: $5x^2 - 245 = 0$

ANSWER _____

3 Solve: $x^2 + 19x + 78 = 0$

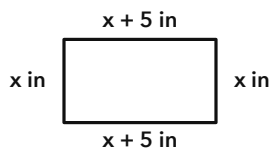
ANSWER _____

4 Solve: $x^2 + 10x - 31 = 0$

ANSWER _____

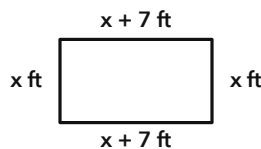
APPLY IT Show your work

- 1** The tablet screen shown has an area of 104 square inches. Let x be the shorter side. Write and solve a quadratic equation for x .



REASONING AND ANSWER

- 2** The streaming backdrop shown has an area of 144 square feet. Let x be its shorter side. Write and solve a quadratic equation for x .



REASONING AND ANSWER

CHALLENGE One step up

A laptop screen has a diagonal of 17 inches. Its width is 7 inches more than its height x . Write and solve a quadratic equation to find the screen dimensions. Explain why one solution is rejected.

WORK SPACE AND ANSWER

PRACTICE 1

$x = 7, 10$

PRACTICE 2

$x = -7, 7$

PRACTICE 3

$x = -13, -6$

PRACTICE 4

$x = -5 - 2\sqrt{14}$ or $x = -5 + 2\sqrt{14}$

APPLY IT 1

$x(x + 5) = 104$; $x = 8$. The screen measures 8 in by 13 in. Use the area equation $x(x + 5) = 104$. The roots are 8 and -13, so use $x = 8$ because a length is positive.

APPLY IT 2

$x(x + 7) = 144$; $x = 9$. The backdrop measures 9 ft by 16 ft. Use $x(x + 7) = 144$, then write $x^2 + 7x - 144 = 0$. The positive solution is $x = 9$.

CHALLENGE

$x^2 + (x + 7)^2 = 289$; $x = 8$ or $x = -15$. Reject -15 because a screen length cannot be negative. The dimensions are 8 in by 15 in.

Accept equivalent factored equations, expanded equations, and solution order. For measurement contexts, students must reject the negative root and give positive dimensions.