LESSON MAKER PRO

Where It Hits Zero

Solve quadratics and connect roots to graphs.

HIGH SCHOOL · FA.F.29

FA.F.29 "Solve quadratic equations in standard form by factoring, graphing, using tables, and the Quadratic Formula. Know when the Quadratic Formula might yield complex solutions and the location of the solutions in relation to the x-axis..."

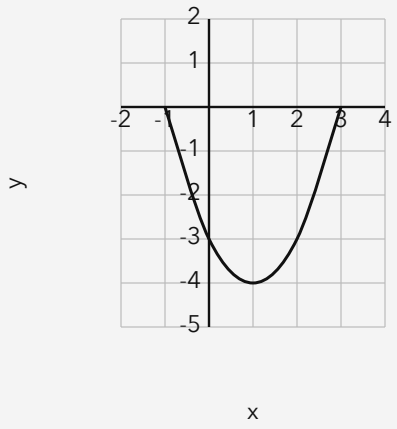
NAME _____ DATE _____

THE BIG IDEA

To solve a quadratic equation, find the x-values that make it equal 0. On a graph, these are the x-intercepts, also called real zeros. If the graph never meets the x-axis, the equation may have complex solutions.

WORKED EXAMPLE

Use the graph of $y = x^2 - 2x - 3$ to solve $x^2 - 2x - 3 = 0$.



1. Find where the curve meets the x-axis.
2. Read the x-values: -1 and 3.

Answer: x = -1 or x = 3

PRACTICE 4 problems

1 Solve by factoring: $x^2 - 5x + 6 = 0$.

ANSWER _____

2 Solve by factoring: $2x^2 + 3x - 2 = 0$.

ANSWER _____

3 Solve $x^2 + 4x + 5 = 0$. Does its graph meet the x-axis?

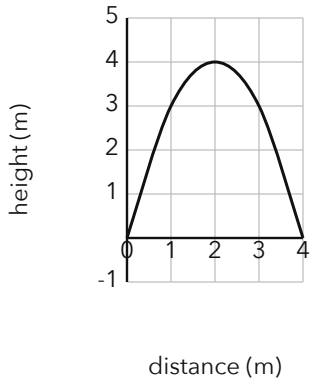
ANSWER _____

4 Use the Quadratic Formula to solve $2x^2 + 2x - 1 = 0$.

ANSWER _____

APPLY IT Show your work

1 The graph shows a game character's height during a jump. How far from the start does the character land?



ANSWER _____

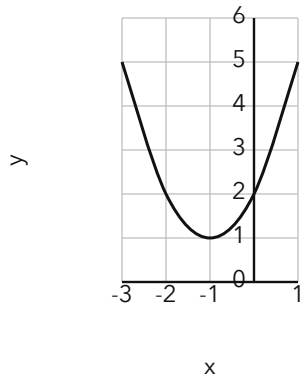
2 A club's profit in dollars is $y = -x^2 + 7x - 10$ after selling x batches of pins. How many batches can the club sell to break even?

WORK SPACE

ANSWER _____

CHALLENGE One step up

The graph shows $y = x^2 + 2x + 2$. Explain why the equation $x^2 + 2x + 2 = 0$ has no real solutions, then find its complex solutions.



WORK SPACE AND ANSWER

Where It Hits Zero

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve by factoring: $x^2 - 5x + 6 = 0$.	**x = 2 or x = 3**
2	Solve by factoring: $2x^2 + 3x - 2 = 0$.	**x = -2 or x = 1/2**
3	Solve $x^2 + 4x + 5 = 0$. Does its graph meet the x-axis?	**x = -2 + i or x = -2 - i; no**
4	Use the Quadratic Formula to solve $2x^2 + 2x - 1 = 0$.	**x = (-1 + √3)/2 or x = (-1 - √3)/2**

PART 2 · APPLY IT

1. **4 m** The character lands at the second x-intercept, where distance is 4 m.
2. **2 or 5 batches** Set profit to 0: $-x^2 + 7x - 10 = -(x - 2)(x - 5) = 0$.

CHALLENGE

The graph stays above the x-axis, so it has no real solutions. The complex solutions are x = -1 + i and x = -1 - i.

Accept roots in either order. In the challenge, a student may cite the negative discriminant, -4, instead of the graph to justify why there are no real solutions.