LESSON MAKER PRO

Quadratic Crossings

Find roots and interpret what they mean.

HIGH SCHOOL · A2.A.1.1

A2.A.1.1 "Use mathematical models to represent quadratic relationships and solve using factoring, completing the square, the quadratic formula, and various methods (including graphing calculator or other appropriate technology)..."

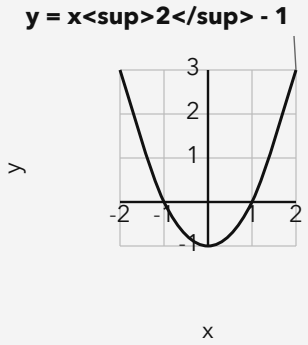
NAME _____ DATE _____

FIND THE ROOTS

A quadratic graph crosses the x-axis where y = 0. Set the model equal to 0, then factor, complete the square, or use the quadratic formula. If you must take the square root of a negative number, the roots are non-real.

WORKED EXAMPLE

Find the x-intercepts of the graphed quadratic.



1. Set y = 0: $x^2 - 1 = 0$.
2. Factor: $(x - 1)(x + 1) = 0$.
3. Solve: x = -1 or x = 1.

Answer: The x-intercepts are (-1, 0) and (1, 0).

PRACTICE 4 problems

1 Factor to solve $x^2 - 17x + 72 = 0$.

ANSWER _____

2 Factor to solve $x^2 + 15x + 56 = 0$.

ANSWER _____

3 Find the non-real roots of $x^2 + 36 = 0$.

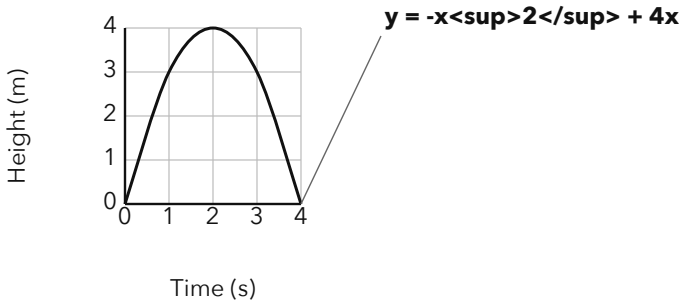
ANSWER _____

4 Use the quadratic formula to solve $x^2 + 18x + 76 = 0$.

ANSWER _____

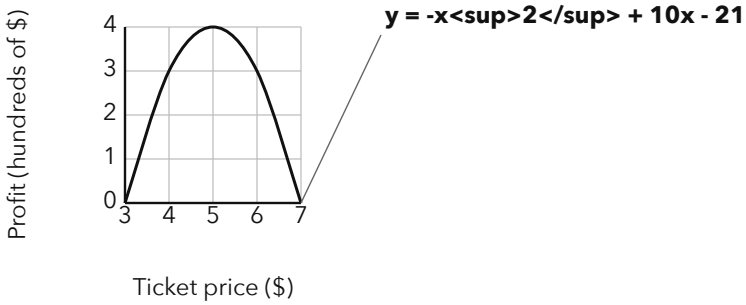
APPLY IT Show your work

1 In a game, x is time in seconds and y is a character's jump height in meters. Use the graph to find when the character is 3 meters high.



ANSWER _____

2 At a concert, x is the ticket price in dollars and y is profit in hundreds of dollars. Use the graph to find both break-even prices.



ANSWER _____

CHALLENGE One step up

A music app models profit in dollars as $P(x) = -x^2 + 12x - 40$, where x is the subscription price in dollars. Complete the square to find all roots. Can the app break even at a real price? Explain.

WORK SPACE AND ANSWER

ANSWER KEY

Quadratic Crossings

HIGH SCHOOL · A2.A.1.1

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Factor to solve $x^2 - 17x + 72 = 0$.	**x = 8 or x = 9**
2	Factor to solve $x^2 + 15x + 56 = 0$.	**x = -7 or x = -8**
3	Find the non-real roots of $x^2 + 36 = 0$.	**x = 6i or x = -6i**
4	Use the quadratic formula to solve $x^2 + 18x + 76 = 0$.	**x = -9 + √5 or x = -9 - √5**

PART 2 · APPLY IT

1. **At 1 second and 3 seconds.** The graph reaches y = 3 at x = 1 and x = 3.
2. **$3 and $7 per ticket.** Break-even means y = 0. The graph meets that level at x = 3 and x = 7.

CHALLENGE

$P(x) = -(x - 6)^2 - 4$, so the roots are x = 6 + 2i and x = 6 - 2i. Neither root is a real price, so the app cannot break even under this model.

Accept roots in either order and equivalent exact forms. For the challenge, an explanation that non-real roots cannot be subscription prices is sufficient.