LESSON MAKER PRO

Parabolas in Action

Use quadratic models to understand real situations.

HIGH SCHOOL · FA.F.28

FA.F.28 "Identify and graph real-world contexts that can be modeled by a quadratic equation."

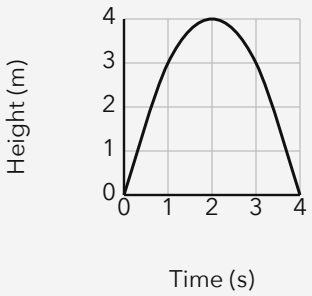
NAME _____ DATE _____

GRAPH THE STORY

A quadratic model makes a curved graph called a parabola. The vertex shows the greatest or least value. The x-intercepts show where the output is zero.

WORKED EXAMPLE

The graph shows a tossed ball's height y in meters after x seconds. Write a quadratic model for its height.



1. The vertex is (2, 4), so $y = a(x - 2)^2 + 4$.
2. Use (0, 0): $0 = 4a + 4$.
3. Solve to get $a = -1$.

Answer: $y = -(x - 2)^2 + 4$

PRACTICE 4 problems

1 A square mural has side length x feet. Write its area equation and give points to plot when x = 0, 1, and 3.

ANSWER _____

2 A ball's height is $y = -x^2 + 6x + 7$, where x is time in seconds. When is it highest, and how high is it?

ANSWER _____

3 A vendor's daily profit is $y = -(x - 5)^2 + 16$, where x is the price in dollars. Find both break-even prices.

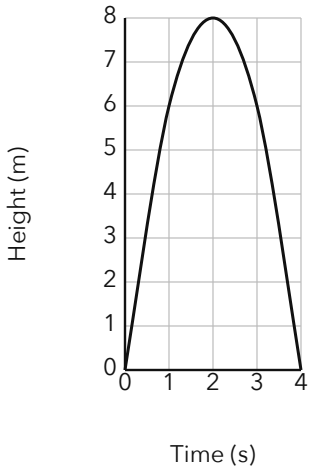
ANSWER _____

4 A garden has width x feet and length 10 - x feet. Write its area equation and find the graph's vertex.

ANSWER _____

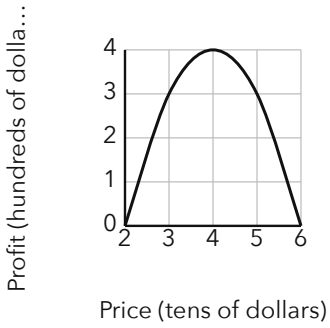
APPLY IT Show your work

1 A game character jumps along the path shown. Write a quadratic height model, then find the greatest height.



ANSWER _____

2 The graph shows a club's concert profit at different ticket prices. What ticket price gives the greatest profit, and what is that profit?



ANSWER _____

CHALLENGE One step up

A bike rental's daily profit is $y = -2(x - 6)^2 + 32$, where x is the rental price in dollars. Find the break-even prices and all prices that give at least $14 profit.

WORK SPACE AND ANSWER

ANSWER KEY

Parabolas in Action

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A square mural has side length x feet. Write its area equation and give points to plot when x = 0, 1, and 3.	**$y = x^2$; (0, 0), (1, 1), (3, 9)**
2	A ball's height is $y = -x^2 + 6x + 7$, where x is time in seconds. When is it highest, and how high is it?	**At 3 seconds; 16 units high.**
3	A vendor's daily profit is $y = -(x - 5)^2 + 16$, where x is the price in dollars. Find both break-even prices.	**$1 and $9**
4	A garden has width x feet and length 10 - x feet. Write its area equation and find the graph's vertex.	**y = x(10 - x); vertex (5, 25)**

PART 2 · APPLY IT

1. **$y = -2(x - 2)^2 + 8$; greatest height: 8 m** The vertex is (2, 8). Substituting (0, 0) into vertex form gives a = -2.
2. **$40 per ticket; $400 profit** The vertex is (4, 4). Use the axis units to convert its coordinates to dollars.

CHALLENGE

Break-even prices: $2 and $10. Profit is at least $14 when $3 ≤ x ≤ $9.

Accept equivalent expanded equations and clearly labeled coordinates. In problem 2, the height unit is not specified, so do not require meters.