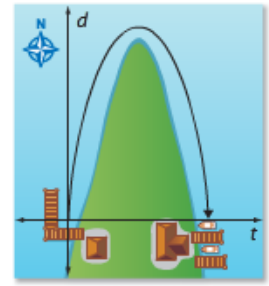
Example 6

58. BOATING Miranda has her boat docked on the west side of Casper Point. She is boating over to Casper Marina, which is located strictly east of where her boat is docked. The equation $d = -16t^2 + 66t$ models the distance she travels north of her starting point, where d is the number of feet and t is the time traveled in minutes.



a. Graph this equation.

b. What is the maximum number of feet north that she traveled?

c. How long did it take her to reach Casper Marina?

GRAPHING CALCULATOR **Graph each equation. Use the TRACE feature to find the vertex on the graph. Round to the nearest thousandth if necessary.**

59. $y = 4x^2 + 10x + 6$

60. $y = 8x^2 - 8x + 8$

61. $y = -5x^2 - 3x - 8$

62. $y = -7x^2 + 12x - 10$

63. GOLF The average amateur golfer can hit a ball with an initial upward velocity of 31.3 meters per second. The height can be modeled by the equation $h = -4.9t^2 + 31.3t$, where h is the height of the ball, in meters, after t seconds.

a. Graph this equation. What do the portions of the graph where $h > 0$ represent in the context of the situation? What does the end behavior of the graph represent?

b. At what height is the ball hit?

c. What is the maximum height of the ball?

d. How long did it take for the ball to hit the ground?

e. State a reasonable range and domain for this situation.

64. FUNDRAISING The marching band is selling poinsettias to buy new uniforms. Last year the band charged \$5 each, and they sold 150. They want to increase the price this year, and they expect to lose 10 sales for each \$1 increase. The sales revenue R, in dollars, generated by selling the poinsettias is predicted by the function $R = (5 + p)(150 - 10p)$, where p is the number of \$1 price increases.

a. Write the function in standard form.

b. Find the maximum value of the function.

c. At what price should the poinsettias be sold to generate the most sales revenue? Explain your reasoning.

65. FOOTBALL A football is kicked up from ground level at an initial upward velocity of 90 feet per second. The equation $h = -16t^2 + 90t$ gives the height h of the football after t seconds.

a. What is the height of the ball after one second?

b. When is the ball 126 feet high?

c. When is the height of the ball 0 feet? What do these points represent in the context of the situation?

66. CCSS STRUCTURE Let $f(x) = x^2 - 9$.

a. What is the domain of $f(x)$?

b. What is the range of $f(x)$?

c. For what values of x is $f(x)$ negative?

d. When x is a real number, what are the domain and range of $f(x) = \sqrt{x^2 - 9}$?