Writing Quadratic Equations

Core Concept

Writing Quadratic Equations

Given a point and the vertex (h, k)   Use vertex form:

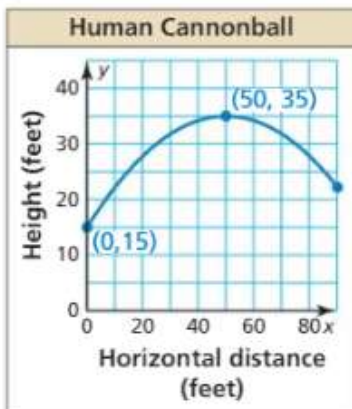$$y = a(x - h)^2 + k$$

Given a point and x-intercepts p and q   Use intercept form:
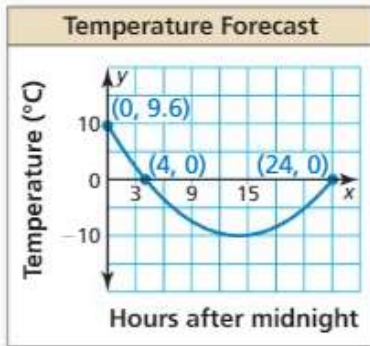
$$y = a(x - p)(x - q)$$

▶ Tutorial

EXAMPLE 1   Writing an Equation Using a Vertex and a Point

The graph shows the parabolic path of a performer who is shot out of a cannon, where y is the height (in feet) and x is the horizontal distance traveled (in feet). Write an equation of the parabola. The performer lands in a net 90 feet from the cannon. What is the height of the net?

Human Cannonball

(50, 35)

(0, 15)

Height (feet)

Horizontal distance (feet)

Temperature Forecast

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EXAMPLE 2   Writing an Equation Using a Point and *x*-Intercepts

A meteorologist creates a parabola to predict the temperature tomorrow, where x is the number of hours after midnight and y is the temperature (in degrees Celsius).

a. Write a function f that models the temperature over time. What is the coldest temperature?

b. What is the average rate of change in temperature over the interval in which the temperature is decreasing? increasing? Compare the average rates of change.

REMEMBER

The average rate of change of a function f from x_1 to x_2 is the slope of the line connecting $(x_1, f(x_1))$ and $(x_2, f(x_2))$:

$$\frac{f(x_2) - f(x_1)}{x_2 - x_1}.$$

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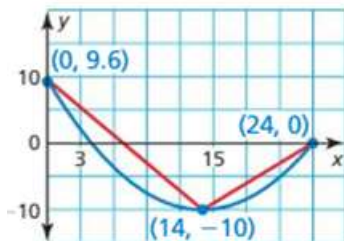
Example 3:

Write an equation of the parabola that passes through the point $(-1, 2)$ and has vertex $(4, -9)$.

Example 4:

Write an equation of the parabola that passes through the point $(2, 5)$ and has x-intercepts -2 and 4.

Section 2-4 Homework #3-21 odd

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