6. The pumpkin's height in feet t seconds after it is launched will still be given by $h = h_0 + v_0 t - 16t^2$. It is fairly easy to measure the initial height ($h_0$) from which the pumpkin is launched, but it is not easy to measure the initial upward velocity ($v_0$).

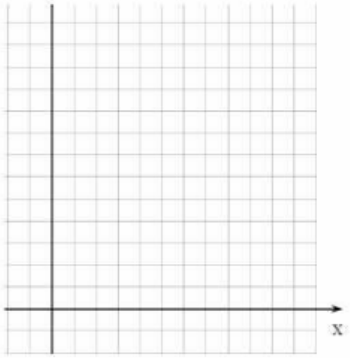
a. Suppose that a pumpkin leaves a cannon at a point 24 feet above the ground when $t = 0$. What does that fact tell about the rule giving height $h$ as a function of time in flight $t$?

b. Suppose you were able to use a stopwatch to discover that the pumpkin shot descibed in Part a returned to the ground after 6 seconds. Use that information to find the value of $v_0$.

7. Suppose that you were able to use a ranging tool that records the height of a flying pumpkin every half second from the time it left a cannon. A sample of the data for one pumpkin launch appears in the following table.

| Time (in seconds) | 0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
|---|---|---|---|---|---|---|---|---|---|
| Height (in feet) | 15 | 40 | 60 | 70 | 70 | 65 | 50 | 30 | 0 |

a. Plot the data on a graph and experiment with several values of $v_0$ and $h_0$ in search of a function that models the data pattern well.




b. Use a calculator that offers quadratic curve-fitting to find a quadratic model for the sample data pattern. Compare that automatic curve-fit to what you found with your own experimentation.

$h(t) = -15.67t^2 + 59.63t + 15.09$

$h(6) = -16t^2 + 60t + 15$ ☆

c. Use the rule you found in Part b to write and solve equations and inequalities matching these questions about pumpkin shot.

i. When was the pumpkin 60 feet above the ground?

$60 = -16t^2 + 60t + 15$

$t = 1.04, 2.71$

ii. For which time(s) was the pumpkin at least 60 feet above the ground?

$60 \leq -16t^2 + 60t + 15$

$1.04 \leq t \leq 2.71$

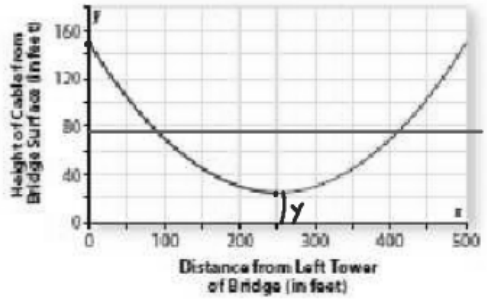
d. Use the rule you found in Part b to answer the following questions.

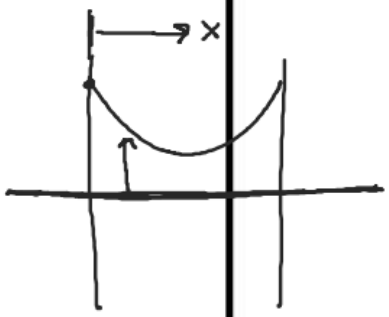
i. What is your best estimate for the maximum height of the pumpkin?

ii. How do you know if you have a good estimate? When does the pumpkin reach that height?

What you will learn about:

Suspension Bridges: Some of the longest bridges in the world are suspended from cables that hang in parabolic arcs between towers. One of the most famous suspension bridges is the Golden Gate Bridge in San Francisco, CA.




1. Use the function $y = 0.002x^2 - x + 150$ to answer the following questions.

a. What is the approximate height (from the bridge surface) of the towers from which the cable is suspended?

150 ft

b. What is the shortest distance from the cable to the bridge surface, and where does it occur?

min distance 25 ft

happens 250 ft from left tower

c. For what interval(s) is the suspension cable 75 feet above the bridge surface?