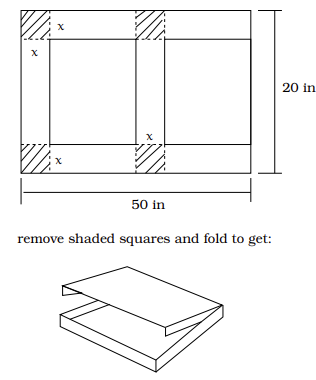
**Entry Task on****“*polynomials*”**

A 20 inch by 50 inch piece of cardboard is going to be used to make a box.

The box will be made by cutting out four squares with side length x as shown.



For both parts below find the function in terms of x.

1. Find the volume, V(x), of the resulting box
2. Find the exposed surface area, A(x)?

**Ch 7: Quadratics**

Goal: Learn about second degree polynomials, which are great for modeling the path of a thrown ball and for applied max/min problems.

(general form)

(vertex form)

***Examples 1:*** Plot points and graph

**Key Facts**

* (x-coord. of vertex)
* open upward (smile)
* open downward (frown)
* not a quadratic!

***Examples 2*:** Plot points and graph

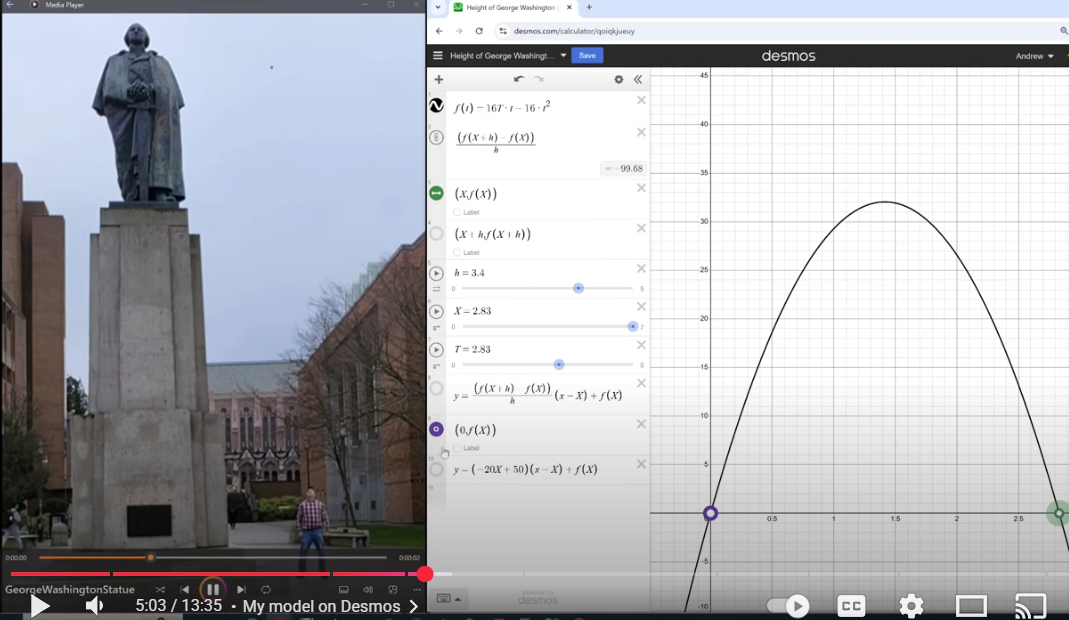
***Completing the Square and the Vertex Derivation***

*Expanding*  gives

*Example*: Find , and if given the general form

*0*

*Example*: Find , and if given the general form

[](Video%20clip%20of%20me%20throwing%20a%20tennis%20ball)Example *(height of Washington Statue)*:

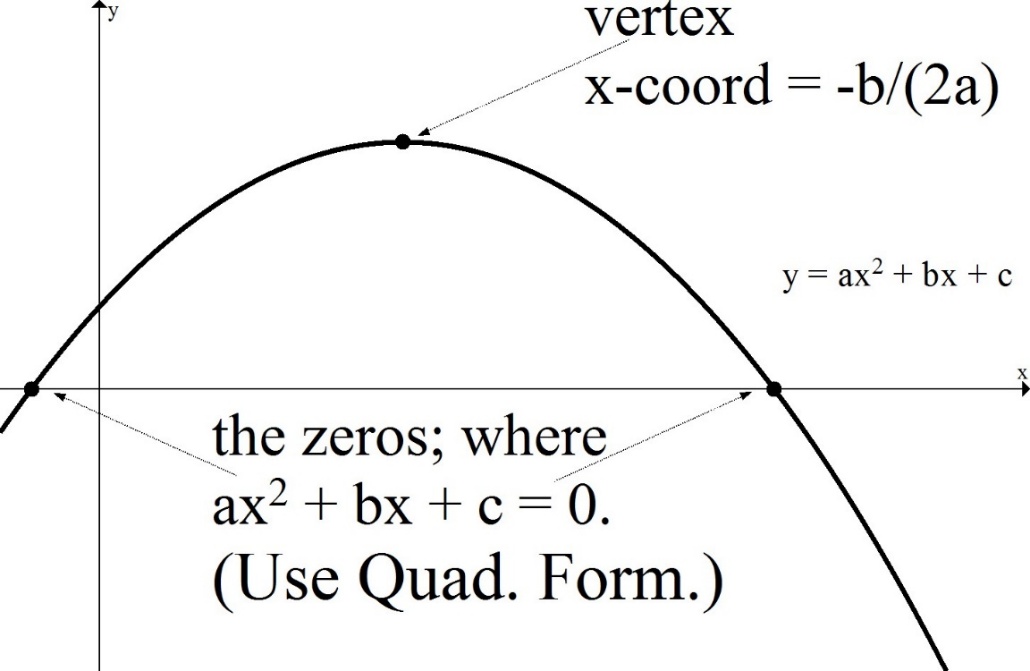
Find the t and y coordinates of the vertex of the following function

Click for [video clip of throwing a tennis ball](https://youtu.be/07TDV5SgJT4?si=Xnv6iPNQeQhcGnB2&t=237)

**Parabola Summary & Basics**

If *a* is negative, the parabola opens downward.

For example: .



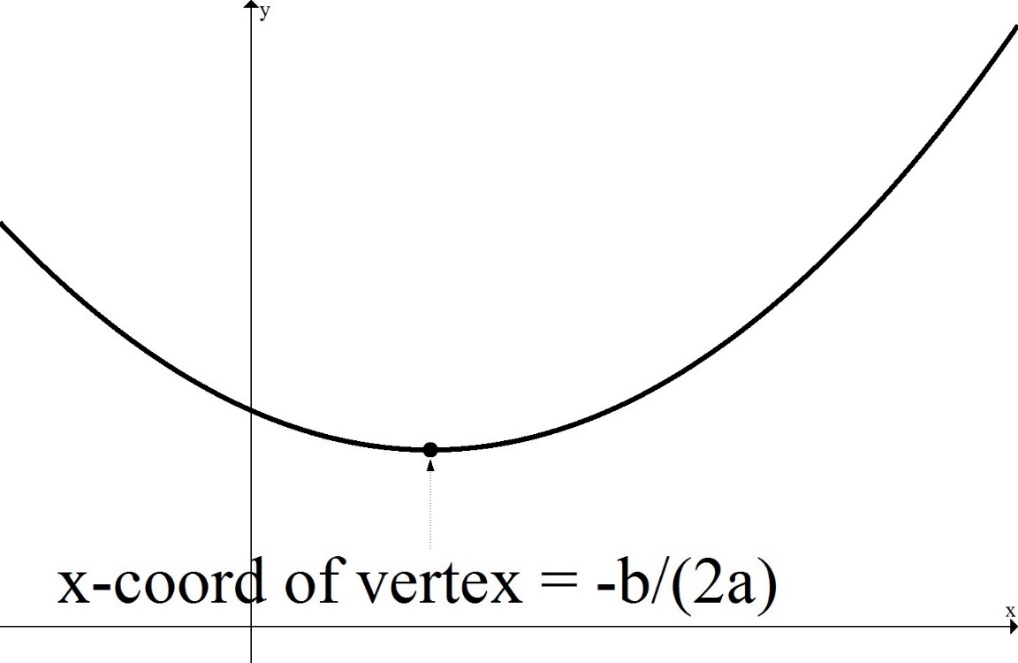
Note: A **quadratic equation** is an equation that can be written in the form

.

The solution(s) are given by the *quadratic formula*

If *a* is positive, the parabola opens upward.

For example: .



***Optimization Problems***

* Draw/Label,
* What do we want?
* What are we given?

*Example*: You have 500 feet of fencing and you want to build a cage with one wall in the middle as shown.

How should you build it to maximize area?

*Example*: You run a petting zoo.

If you charge $8, you will sell 300 tickets/day giving a revenue of $2400 for that day.

If you charge $9, you will sell 280 tickets/day giving a revenue of $2520 for that day.

Assume tickets sold is a linear function of price, x.

Find the formula for tickets sold base on x.

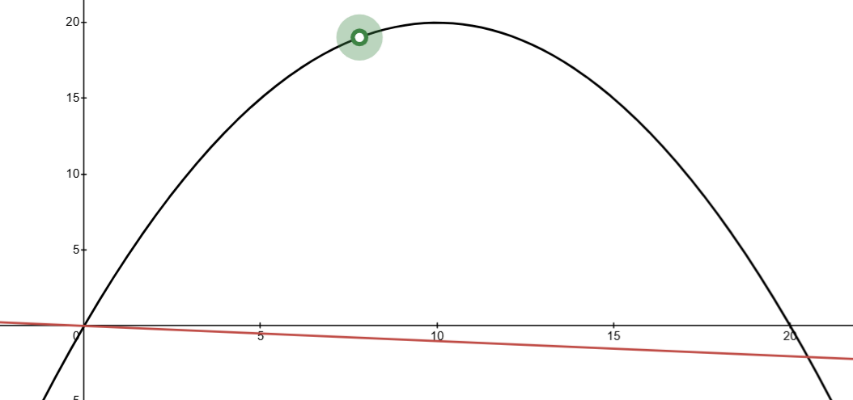
How many tickets should you sell to maximize revenue? (and *what is the max revenue?* and *what is the price?)*

*Example*: A ball is following the path given

by . In addition, the ground is sloping downward This is shown at right.

How would you find the following…

1. The highest y-value of the ball.
2. The location of the ball when it is farthest above the sloping ground.

[](https://www.desmos.com/calculator/svjixeogiu)

[Link to desmos visual](https://www.desmos.com/calculator/svjixeogiu).

1. The location where the ball hits the ground.