## 5.9: Problem Solving Given Equations

## Example 1:

A ball is thrown upward from the balcony of an apartment building and falls to the ground. The height of the ball, h metres above the ground after t seconds is given by the function  $h(t) = -5t^2 + 15t + 45$ .

a) Determine the <u>maximum</u> height of the ball. What *form* of the equation would be helpful here and why? Vertex \ Factored \ Standard

 $h(t) = -5t^2 + 15t + 45$ 

b) How long does it take the ball to reach its maximum height?

c) How high is the <u>balcony</u>? What form of the equation would be helpful here and why? Vertex \ Factored \ Standard

MCF 3MI	Date:
Example 2:	

The stainless steel Gateway Arch in St. Louis, Missouri, has the shape of a **catenary**, which is a curve that approximates a parabola. If the curve is graphed on a grid with the **origin on the ground directly below the top of the arch**, the curve can be modeled by the function  $h = -0.02 d^2 + 192$  where *h* is the <u>height</u> of the arch in metres, and *d* is the <u>horizontal distance from the vertex</u> of the arch in metres.

a) Sketch the *shape* of the arch.

b) Find the **maximum** height of the arch.

c) Find the approximate **<u>width</u>** of the arch *at the base*.

d) Find the approximate <u>height</u> of the arch at a horizontal distance of 15 m from one end.