4-1 Quadratic Functions and Transformations ~ Writing Equations in Vertex Form Notes

A.   Formula

Vertex Form: $y = a(x - h)^2 + k$ where (h, k) is the vertex (maximum or minimum) of the parabola.

$|a| > 1$ Stretch (Narrow) $|a| < 1$ Compress (Wide)

h is the horizontal shift

k is the vertical shift

B.   Real World

The bridge pictured below has the longest span of any suspension bridge in the United States. Each tower of the Verrazano-Narrow Bridge in New York rises about 650 ft. above the center of the roadbed. The length of the main span is 4260 ft. Find the equation of the parabola that could model its main cables. (Hint: Draw an x- and y-axis on the picture. Have the $x - axis$ be the roadbed and the $y - axis$ be a vertical line of symmetry between the two towers.)

C.   When the Vertex is not at the Origin - Write the equation of each parabola in vertex form.

1.   vertex (3, –2), point (2, 3)

2.   vertex $\left(\frac{1}{2},1\right)$, point (2, –8)

3.   vertex (–4, –24), point (–5, –25)

4.   The diagram shows the path of a model rocket launched from the ground. It reaches a maximum altitude of 384 ft when it is above a location 16 ft from the launch site. What quadratic function models the height of the rocket?

Launch   16 ft   32 ft

384 ft