Section 8.2

Parabolas and Modeling

Quadratic Functions

Use your calculator to graph $y = x^2$ in a standard window.

Now, graph $y_1 = x^2$ and $y_2 = x^2 + 4$ in a standard window.

How did the change in the equation affect the graph?
Quadratic Functions

Use your calculator to graph $y = x^2$ in a standard window.

Now, graph $y_1 = x^2$ and $y_2 = x^2 - 4$ in a standard window.
How did the change in the equation affect the graph?
Quadratic Functions

Use your calculator to graph $y = x^2$ in a standard window.

Now, graph $y_1 = x^2$ and $y_2 = (x - 4)^2$ in a standard window.

How did the change in the equation affect the graph?
Quadratic Functions

Use your calculator to graph \( y = x^2 \) in a standard window.

Now, graph \( y_1 = x^2 \) and \( y_2 = 4x^2 \) in a standard window.

How did the change in the equation affect the graph?
The Vertex Form of a Quadratic Function.

If a parabola has a vertex at \((x_v, y_v)\), then its vertex form is given by:

\[
 f(x) = a(x - x_v)^2 + y_v
\]

Note, if \(a > 0\), the parabola opens up
if \(a < 0\), the parabola opens down
if \(|a| > 1\), the parabola is thinner than the basic parabola
if \(0 < |a| < 1\), the parabola is wider than the basic parabola
Sketch \( f(x) = -\frac{1}{2}(x - 4)^2 + 6 \)

Sketch \( f(x) = 4(x + 2)^2 - 9 \)
Write a function that models the following graph.