

Notes #19 ~ Sect. 5.2: Properties of Parabolas

The graph of $y = ax^2 + c$ is a parabola with

an axis of symmetry $x = 0$, the y-axis and

a vertex of the y-intercept $(0,c)$.

1 Graph $y = \frac{1}{3}x^2 + 1$.

Step 1: Graph the vertex,
which is the y-intercept $(0,1)$.

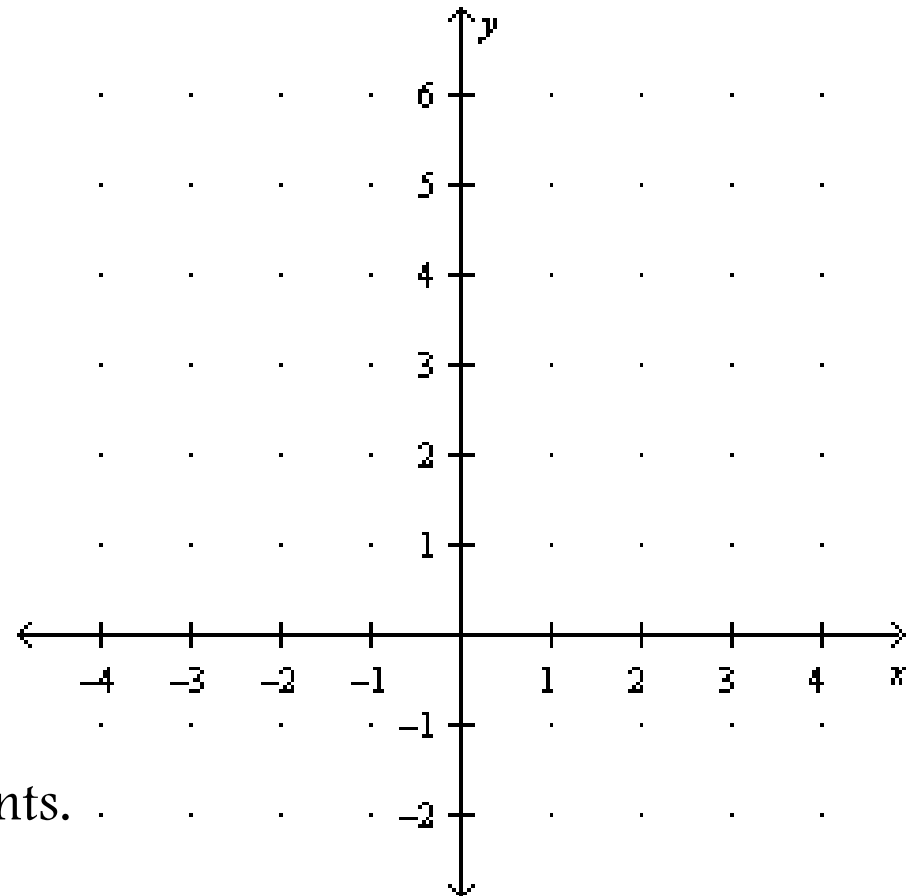
Step 2: Make a table of values
to find some points on one side
of the axis of symmetry $x=0$.

Graph the points.

x	y
1	
2	
3	

Step 3: Graph the corresponding points.

Step 4: Sketch the curve.

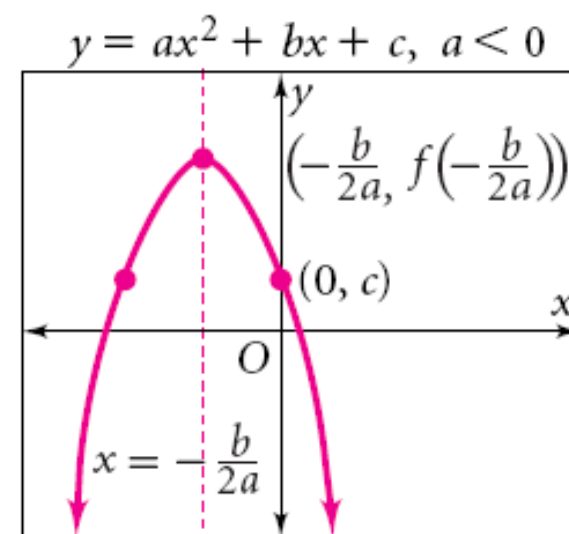
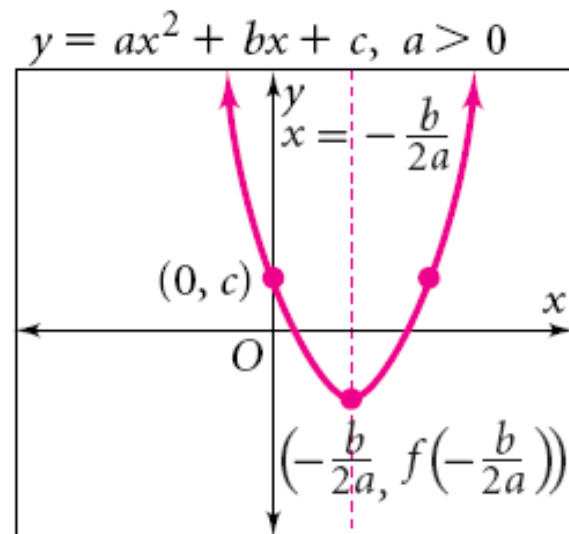


Properties

Graph of a Quadratic Function in Standard Form

The graph of $y = ax^2 + bx + c$ is a parabola when $a \neq 0$.

- When $a > 0$, the parabola opens up. When $a < 0$, the parabola opens down.
- The axis of symmetry is the line $x = -\frac{b}{2a}$.
- The x -coordinate of the vertex is $-\frac{b}{2a}$. The y -coordinate of the vertex is the value of y when $x = -\frac{b}{2a}$, or $y = f\left(-\frac{b}{2a}\right)$.
- The y -intercept is $(0, c)$.



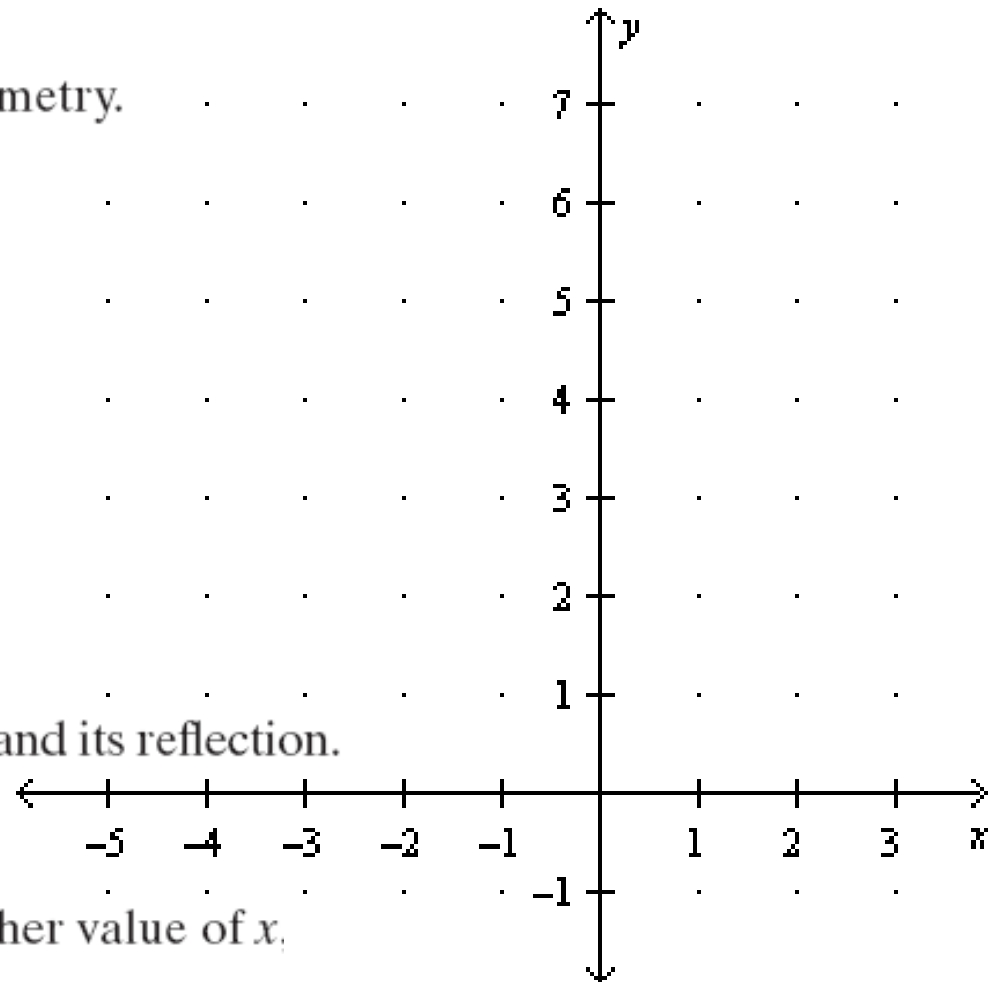
2 Graph $y = \frac{1}{2}x^2 + x + 3$.
Label the vertex and axis of symmetry.

Step 1 Find and graph the axis of symmetry.

$$x = -\frac{b}{2a} =$$

Step 2 Find and graph the vertex.

Step 3 Find and graph the y-intercept and its reflection.



Step 4 Evaluate the function for another value of x .

Step 5 Sketch the curve.

3 Graph $y = -\frac{1}{4}x^2 + 2x - 3$.
What is the maximum value of the function?

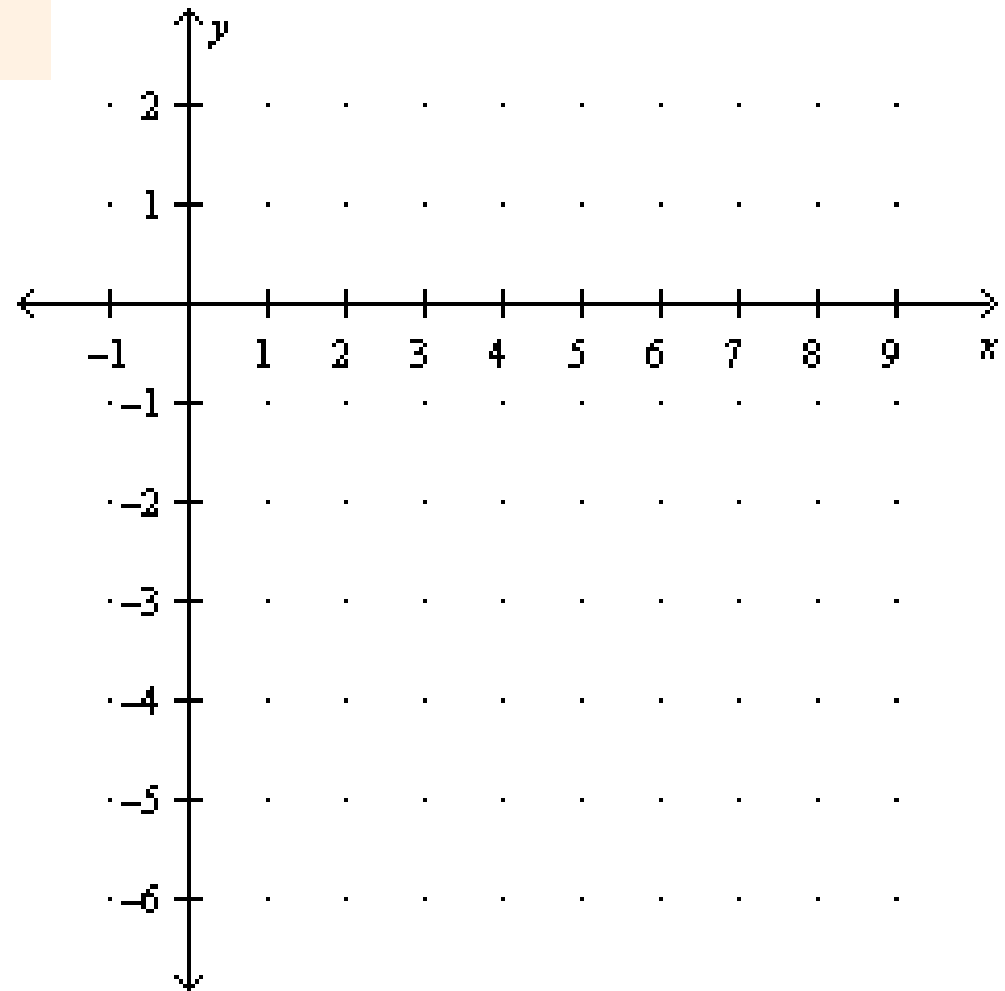
Step 1:

$$x = -\frac{b}{2a} =$$

Step 2:

Step 3:

Step 4:



28. Revenue A model for a company's revenue is $R = -15p^2 + 300p + 12,000$, where p is the price in dollars of the company's product. What price will maximize revenue? Find the maximum revenue.