# LT 3.1 Study Guide and Intervention <br> Graphing Quadratic Functions using a Table 

## Graph Quadratic Functions

| Quadratic Function <br> In Standard Form | A function defined by an equation of the form $f(x)=a x^{2}+b x+c$, where $a \neq 0$ |
| :--- | :--- |

Example: Make a table of values that includes the vertex. Use this information to graph the function $f(x)=$ $x^{2}-3 x+5$. Label the vertex, the axis of symmetry, and the $y$-intercept. Use this information to graph the function.

| $\boldsymbol{x}$ | $\boldsymbol{x}^{2}-\mathbf{3 x + 5}$ | $\boldsymbol{f}(x)$ | $(x, f(x))$ |
| :---: | :--- | :---: | :---: |
| 0 | $0^{2}-3(0)+5$ | 5 | $(0,5)$ |
| 1 | $1^{2}-3(1)+5$ | 3 | $(1,3)$ |
| 3 | $\left(\frac{3}{2}\right)^{2}-3\left(\frac{3}{2}\right)+5$ | $\frac{11}{4}$ | $\left(\frac{3}{2}, \frac{11}{4}\right)$ |
| 2 | $2^{2}-3(2)+5$ | 3 | $(2,3)$ |
| 2 | $3^{2}-3(3)+5$ | 5 | $(3,5)$ |



## Exercises

Complete parts a-c for each quadratic function.
a. Make a table of values that includes the vertex.
b. Use this information to graph the function.
c. Label $y$-intercept, the $x$-intercepts, the axis of symmetry, and the vertex.

1. $f(x)=x^{2}+6 x+8$
2. $f(x)=-x^{2}-2 x+2$
3. $f(x)=2 x^{2}-4 x+3$
Use x from -4 to -2
Use x from -2 to 0
Use x from 0 to 2
4. $f(x)=x^{2}+4 x-7$
5. $f(x)=3 x^{2}-6 x+7$

Use x from 1 to 3
Use x from 0 to 2

## LT 3.2 Study Guide and Intervention <br> Graphing Quadratic Functions using the equation of the Axis of Symmetry

## Graph Quadratic Functions

| Quadratic Function <br> In Standard Form | A function defined by an equation of the form $f(x)=a x^{2}+b x+c$, where $a \neq 0$ |
| :--- | :--- |
| Graph of a <br> Quadratic Function | A parabola with these characteristics: $y$-intercept: $c$; axis of symmetry: $x=\frac{-b}{2 a} ;$ <br> $x$-coordinate of vertex: $\frac{-b}{2 a}$ |

Example: Find the $y$-intercept, the equation of the axis of symmetry, and the $x \& y$-coordinate of the vertex for the graph of $f(x)=x^{2}-3 x+5$. Use this information to graph the function.
$a=1, b=-3$, and $c=5$, so the $y$-intercept is 5 . The equation of the axis of symmetry is $x=\frac{-(-3)}{2(1)}$ or $\frac{3}{2}$. The $x$-coordinate of the vertex is $\frac{3}{2}$.
Next make a table of values for $x$ near $\frac{3}{2}$.

| $\boldsymbol{x}$ | $\boldsymbol{x}^{2}-\mathbf{3 x + 5}$ | $\boldsymbol{f}(x)$ | $(x, f(x))$ |
| :---: | :--- | :---: | :---: |
| 0 | $0^{2}-3(0)+5$ | 5 | $(0,5)$ |
| 1 | $1^{2}-3(1)+5$ | 3 | $(1,3)$ |
| 3 | $\left(\frac{3}{2}\right)^{2}-3\left(\frac{3}{2}\right)+5$ | $\frac{11}{4}$ | $\left(\frac{3}{2}, \frac{11}{4}\right)$ |
| 2 | $2^{2}-3(2)+5$ | 3 | $(2,3)$ |
| 2 | $3^{2}-3(3)+5$ | 5 | $(3,5)$ |



## Exercises

Complete parts a-c for each quadratic function.
a. Find the $y$-intercept, the equation of the axis of symmetry, and the $x$ \& $y$-coordinate of the vertex.
b. Use this information to graph the function.
c. Label the vertex, the axis of symmetry, and the y-intercept, including where it occurs (the value)
d. Label the $x$-intercepts.

1. $f(x)=100-2 x-x^{2}$
2. $f(x)=-x^{2}-4 x+10$
3. $f(x)=x^{2}-10 x+5$
4. $f(x)=20+6 x-x^{2}$
5. $f(x)=-6 x^{2}+12 x+21$
