

Name: \_\_\_\_\_

**Section 8.1**

**Concepts and Vocabulary:**

6. If  $f(x) = ax^2 + bx + c$ , the  $x$ -coordinate of the vertex is given by  $x =$ \_\_\_\_\_.

10. If a parabola opens downward, the point with the largest  $y$ -value is called the \_\_\_\_\_.

**Finding the Vertex:**

In exercises 15 - 23 find the vertex of the parabola.

15.  $f(x) = x^2 - 4x - 2$

21.  $f(x) = -0.3x^2 + 0.6x + 1.1$

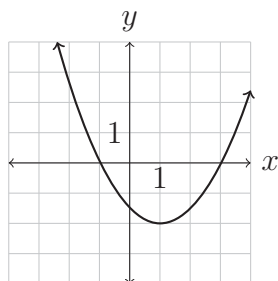
19.  $f(x) = 3 - 2x^2$

23.  $f(x) = 6x - x^2$

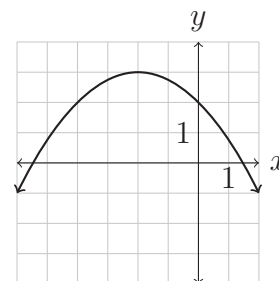
**Graphs of Quadratic Functions:**

In exercises 29 and 31 identify the vertex, axis of symmetry, and whether the parabola opens upward or downward.

29.



31.



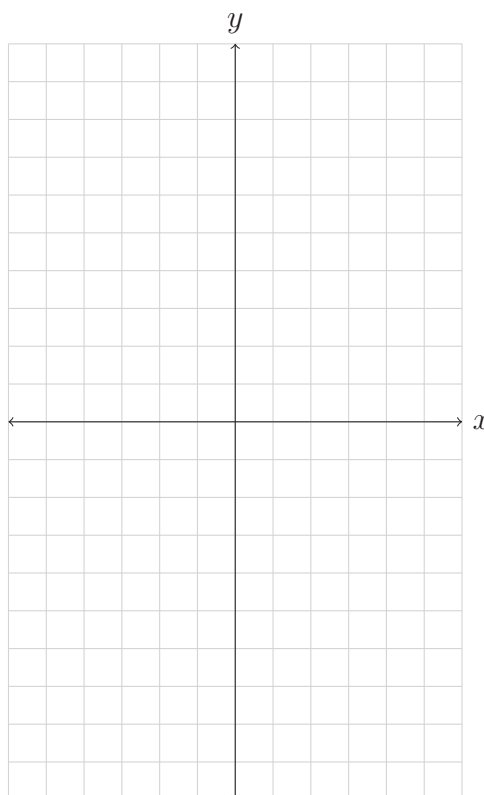
In exercises 41 - 51 follow the given steps to graph the parabola which corresponds to the given quadratic function. Remember to label all of the points shown in the table and also the equation of the axis of symmetry when you graph the function. Then evaluate the function for the specified values of  $x$ .

41.  $f(x) = -(x + 2)^2$

a. Complete the table with the points needed to sketch a graph of  $f(x)$ . Show your work in the space below.

Name of point	$x$	$f(x)$
Vertex		
$y$ -intercept		
$y$ -int mirror		
$x$ -intercept		
$x$ -intercept		

b. Graph the function.

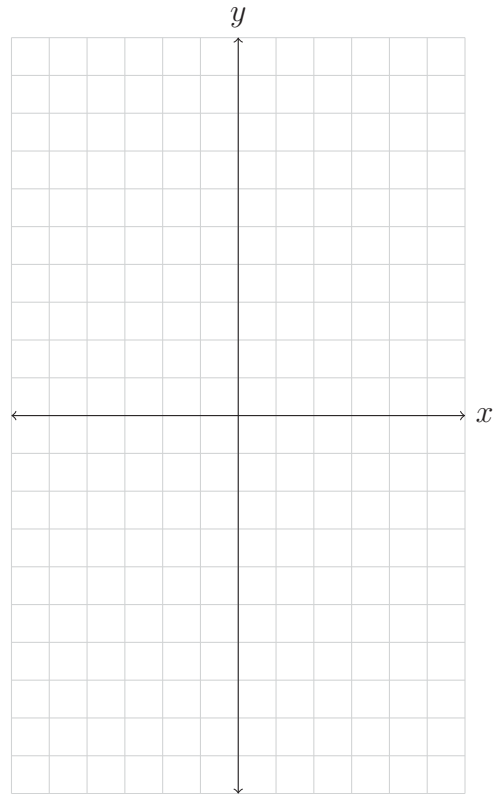


45.  $f(x) = 2x^2 - 3$

a. Complete the table with the points needed to sketch a graph of  $f(x)$ . Show your work in the space below.

Name of point	$x$	$f(x)$
Vertex		
$y$ -intercept		
$y$ -int mirror		
$x$ -intercept		
$x$ -intercept		

b. Graph the function.

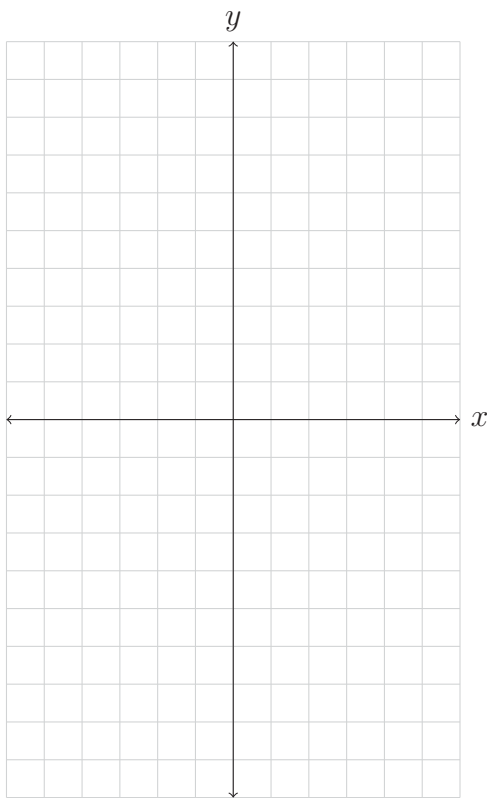


49.  $f(x) = -2x^2 + 4x - 1$

a. Complete the table with the points needed to sketch a graph of  $f(x)$ . Show your work in the space below.

Name of point	$x$	$f(x)$
Vertex		
$y$ -intercept		
$y$ -int mirror		
$x$ -intercept		
$x$ -intercept		

b. Graph the function.

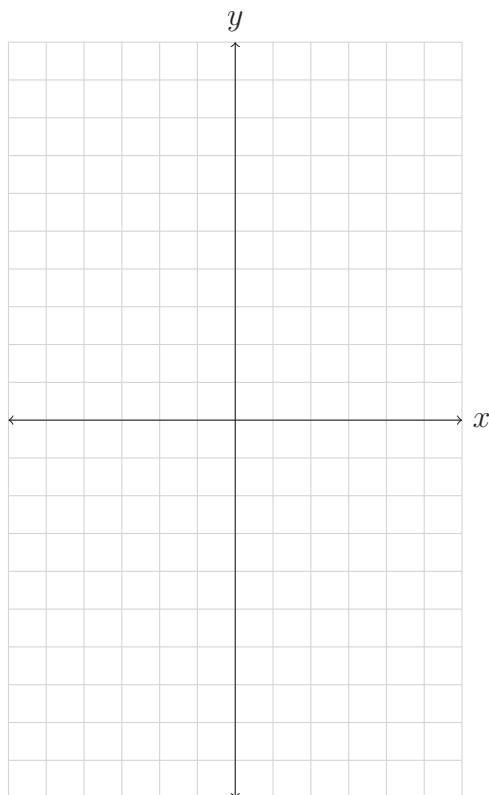


51.  $f(x) = \frac{1}{4}x^2 - x + 5$

a. Complete the table with the points needed to sketch a graph of  $f(x)$ . Show your work in the space below.

Name of point	$x$	$f(x)$
Vertex		
$y$ -intercept		
$y$ -int mirror		
$x$ -intercept		
$x$ -intercept		

b. Graph the function.

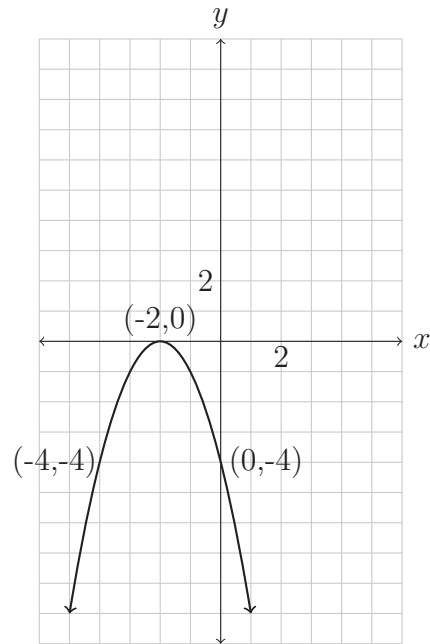




**Solutions to 41 - 51:**

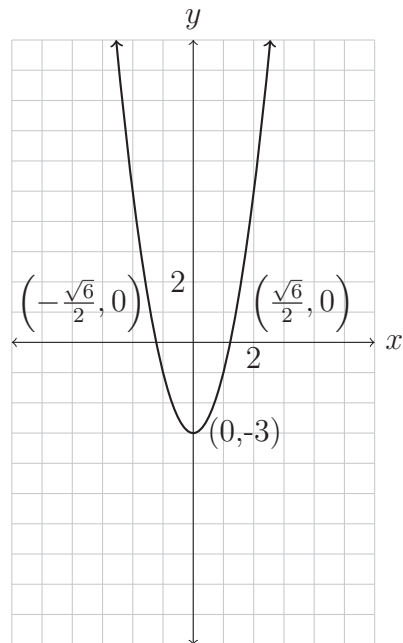
41.  $f(x) = -(x + 2)^2$

Name of point	$x$	$f(x)$
Vertex	-2	0
$y$ -intercept	0	-4
$y$ -int mirror	-4	-4
$x$ -intercept	-2	0



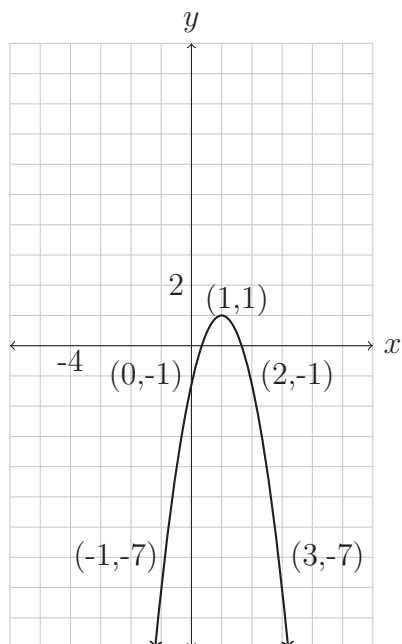
45.  $f(x) = 2x^2 - 3$

Name of point	$x$	$f(x)$
Vertex	0	-3
$y$ -intercept	0	-3
$y$ -int mirror	0	-3
$x$ -intercept	$-\frac{\sqrt{6}}{2}$	0
$x$ -intercept	$\frac{\sqrt{6}}{2}$	0



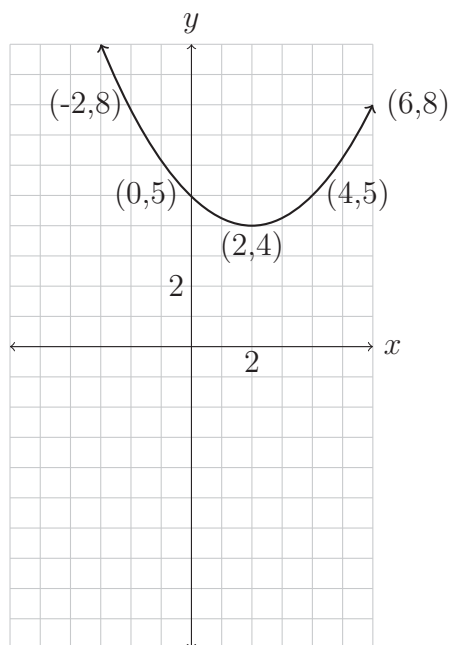
49.  $f(x) = -2x^2 + 4x - 1$

Name of point	$x$	$f(x)$
Vertex	1	1
$y$ -intercept	0	-1
$y$ -int mirror	2	-1
Extra Point	3	-7
Extra Point	-1	-7



51.  $f(x) = \frac{1}{4}x^2 - x + 5$

Name of point	$x$	$f(x)$
Vertex	2	4
$y$ -intercept	0	5
$y$ -int mirror	4	5
Extra Point	6	8
Extra Point	-2	8





## Section 8.2

### Concepts and Vocabulary:

1. Compared to the graph of  $f(x) = x^2$ , the graph of  $g(x) = \underline{\hspace{2cm}}$  is shifted upward 2 units.
2. Compared to the graph of  $f(x) = x^2$ , the graph of  $g(x) = \underline{\hspace{2cm}}$  is shifted to the right 2 units.
3. The vertex of  $f(x) = (x - 1)^2 + 2$  is  $\underline{\hspace{2cm}}$ .
5. A quadratic function  $f$  may be written in 2 different forms. What are they?
6. The vertex form of a parabola is given by  $\underline{\hspace{2cm}}$  and its vertex is  $\underline{\hspace{2cm}}$ .

### Tables and Translations:

In exercises 11 and 13, Complete the table for each translation of  $f(x) = x^2$ . State what the translation does.

11. 

	$x$	-2	-1	0	1	2
$f(x) = x^2$						
$g(x) = x^2 - 3$						

What did the translation do to  $f(x)$ ?

13. 

	$x$				
$f(x) = x^2$	4	1	0	1	4

	$x$				
$g(x) = (x - 3)^2$	4	1	0	1	4

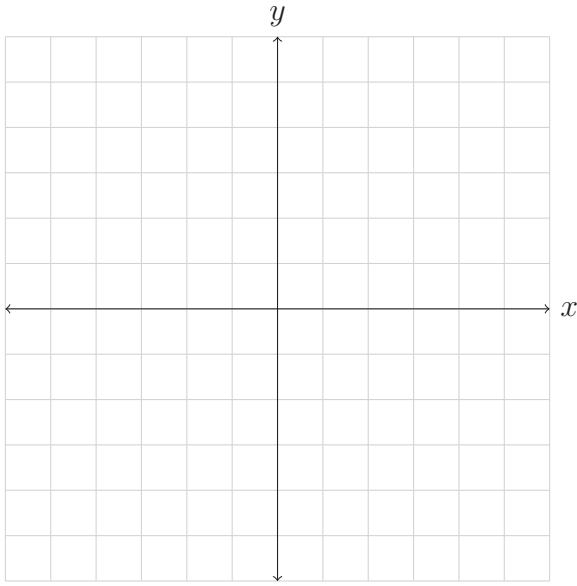
What did the translation do to  $f(x)$ ?

### Graphs of Parabolas:

In exercises 15 - 33 odd, (a) sketch the graph of the equation, (b) identify the vertex, (c) compare the graph to the graph of  $\text{sqr}(x) = x^2$  by stating any transformations used.

15.  $f(x) = x^2 - 4$

a.

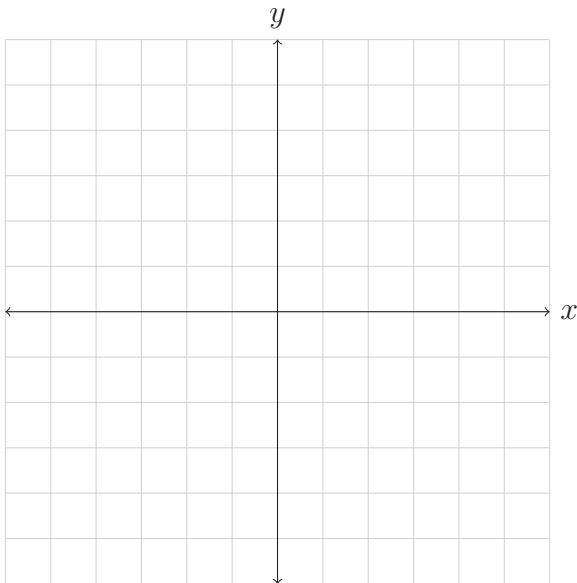


b. What is the vertex?

c. Compare  $f(x)$  to  $\text{sqr}(x) = x^2$ .

19.  $f(x) = (x - 3)^2$

a.

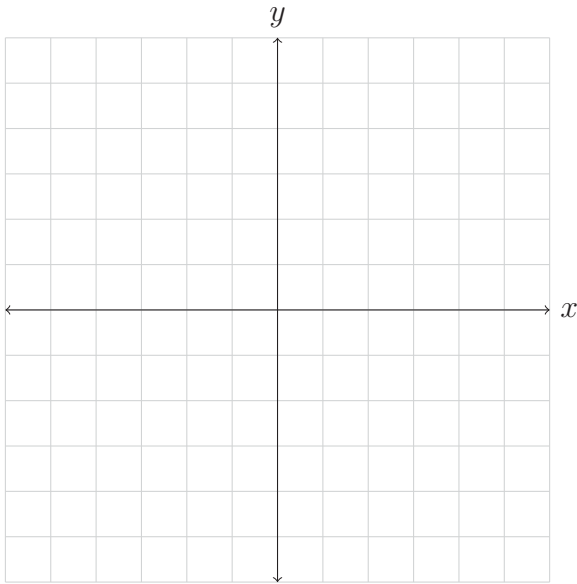


b. What is the vertex?

c. Compare  $f(x)$  to  $\text{sqr}(x) = x^2$ .

27.  $f(x) = (x + 1)^2 - 2$

a.

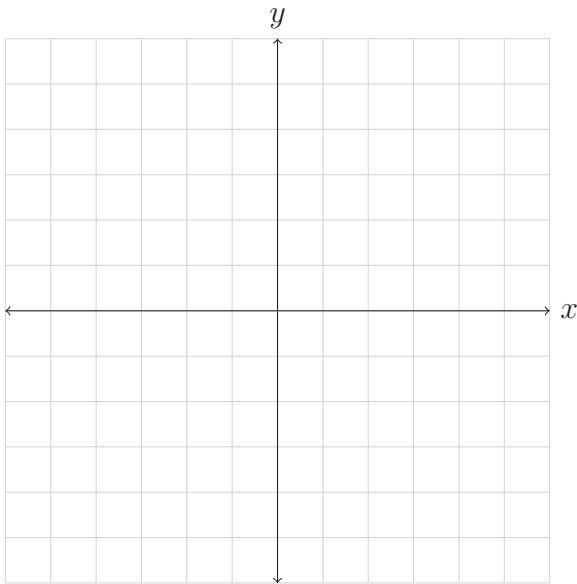


b. What is the vertex?

c. Compare  $f(x)$  to  $sqr(x) = x^2$ .

29.  $f(x) = (x - 1)^2 + 2$

a.



b. What is the vertex?

c. Compare  $f(x)$  to  $sqr(x) = x^2$ .

### Completing the Square:

In exercises 61 - 77 odd, complete the square to rewrite the function in vertex form. Then identify the vertex.

61.  $f(x) = x^2 + 2x$

67.  $f(x) = x^2 - 4x + 5$

63.  $f(x) = x^2 - 4x$

69.  $f(x) = x^2 + 3x - 2$

65.  $f(x) = x^2 + 2x - 3$

71.  $f(x) = x^2 - 7x + 1$

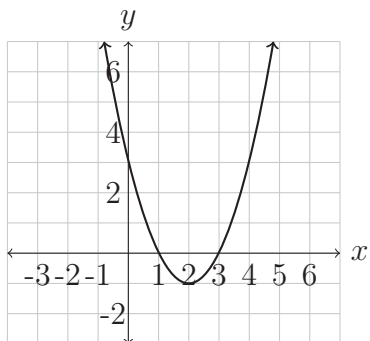
73.  $f(x) = 3x^2 + 6x - 1$

77.  $f(x) = -2x^2 - 8x + 5$

**Supplemental Problems:**

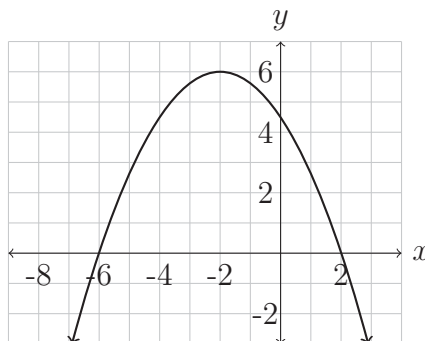
S1. Use interval notation to express domain and range of the quadratic functions graphed below.

a.



The graph of  $y = m(x)$ .

b.



The graph of  $y = n(x)$ .

S2. Graph the quadratic function  $f(x) = -0.4x^2 + 5x + 15$  on your graphing calculator. Be sure to find a viewing window that allows you to see the vertex and all intercepts.

- a. Use either the min or max key to estimate the coordinates of the vertex of  $y = f(x)$ .
- b. Use function notation to state the vertex as an input and output in the function  $f$ .
- c. Use the calculator to determine the horizontal intercepts of  $y = f(x)$ .
- d. Use the trace key and substitute  $x = 0$  to find the vertical intercept of  $y = f(x)$ .
- e. Use interval notation to express the domain and range of  $f$ .

### Solutions to Supplemental Problems:

S1a. The domain of  $m$  is  $(-\infty, \infty)$  and the range is  $[-1, \infty)$ .

S1b. The domain of  $n$  is  $(-\infty, \infty)$  and the range is  $(-\infty, 6]$ .

S2a. The vertex is  $(-6.25, 30.625)$ .

S2b.  $f(-6.25) = 30.625$

S2c. The horizontal intercepts are  $(-2.5, 0)$  and  $(15, 0)$ .

S2d. The vertical intercept is  $(0, 15)$ .

S2e. The domain of  $f$  is  $(-\infty, \infty)$  and the range is  $(-\infty, 30.625]$ .