

## Section 1.4 Shifting, Reflecting, and Stretching Graphs

**Objective:** In this lesson you learned how to identify and graph shifts, reflections, and nonrigid transformations of functions.

Course Number

Instructor

Date

### Important Vocabulary

Define each term or concept.

**Vertical shift**

**Horizontal shift**

**Rigid transformations**

**Nonrigid transformations**

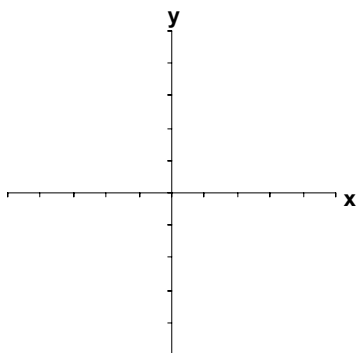
### I. Summary of Graphs of Parent Functions (Page 42)

Sketch an example of each of the six most commonly used functions in algebra.

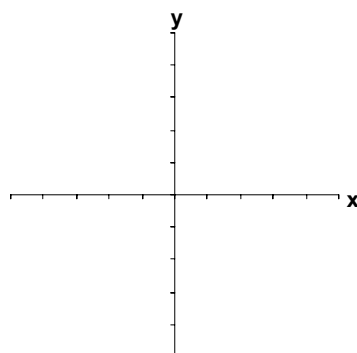
#### *What you should learn*

How to recognize graphs of parent functions

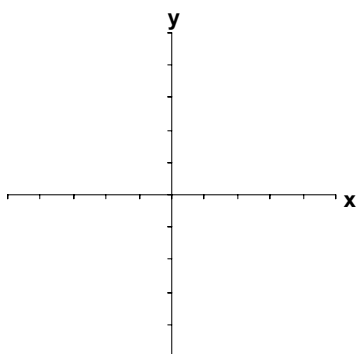
Constant Function



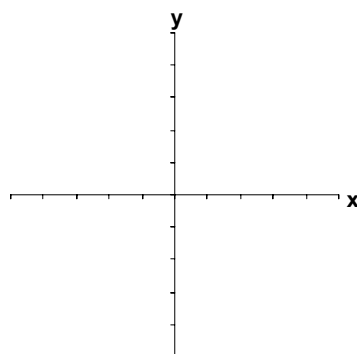
Identity Function



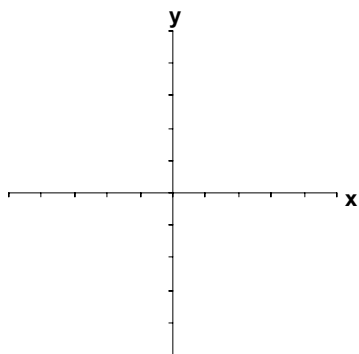
Absolute Value Function



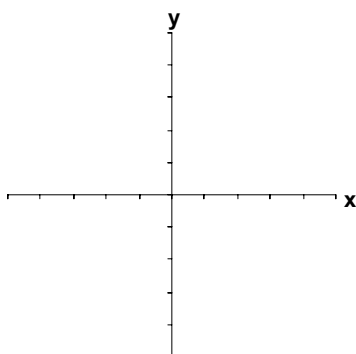
Square Root Function



Quadratic Function



Cubic Function



## II. Vertical and Horizontal Shifts (Pages 43–44)

Let  $c$  be a positive real number. Complete the following representations of shifts in the graph of  $y = f(x)$ :

- 1) Vertical shift  $c$  units upward: \_\_\_\_\_
- 2) Vertical shift  $c$  units downward: \_\_\_\_\_
- 3) Horizontal shift  $c$  units to the right: \_\_\_\_\_
- 4) Horizontal shift  $c$  units to the left: \_\_\_\_\_

**Example 1:** Let  $f(x) = |x|$ . Write the equation for the function resulting from a vertical shift of 3 units downward and a horizontal shift of 2 units to the right of the graph of  $f(x)$ .

***What you should learn***

How to use vertical and horizontal shifts and reflections to graph functions

## III. Reflecting Graphs (Pages 45–46)

A **reflection** in the  $x$ -axis is a type of transformation of the graph of  $y = f(x)$  represented by  $h(x) = \underline{\hspace{2cm}}$ . A **reflection** in the  $y$ -axis is a type of transformation of the graph of  $y = f(x)$  represented by  $h(x) = \underline{\hspace{2cm}}$ .

**Example 2:** Let  $f(x) = |x|$ . Describe the graph of  $g(x) = -|x|$  in terms of  $f$ .

**IV. Nonrigid Transformations** (Page 47)

Name three types of rigid transformations:

- 1)
- 2)
- 3)

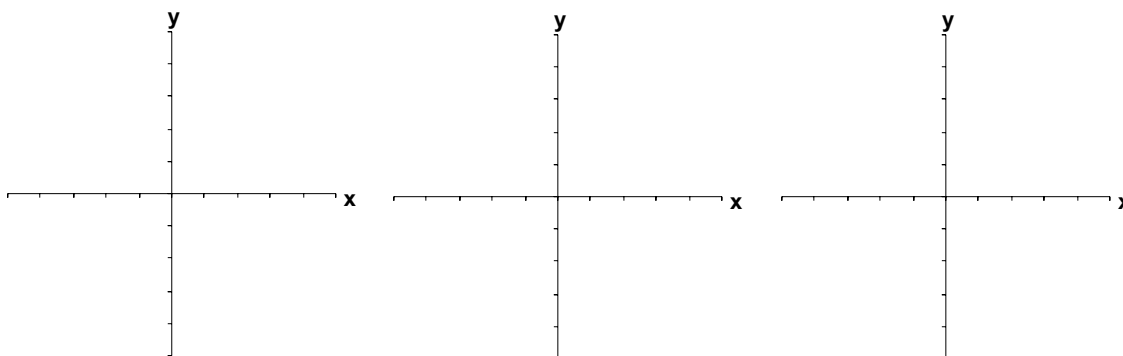
***What you should learn***  
How to use nonrigid transformations to graph functions

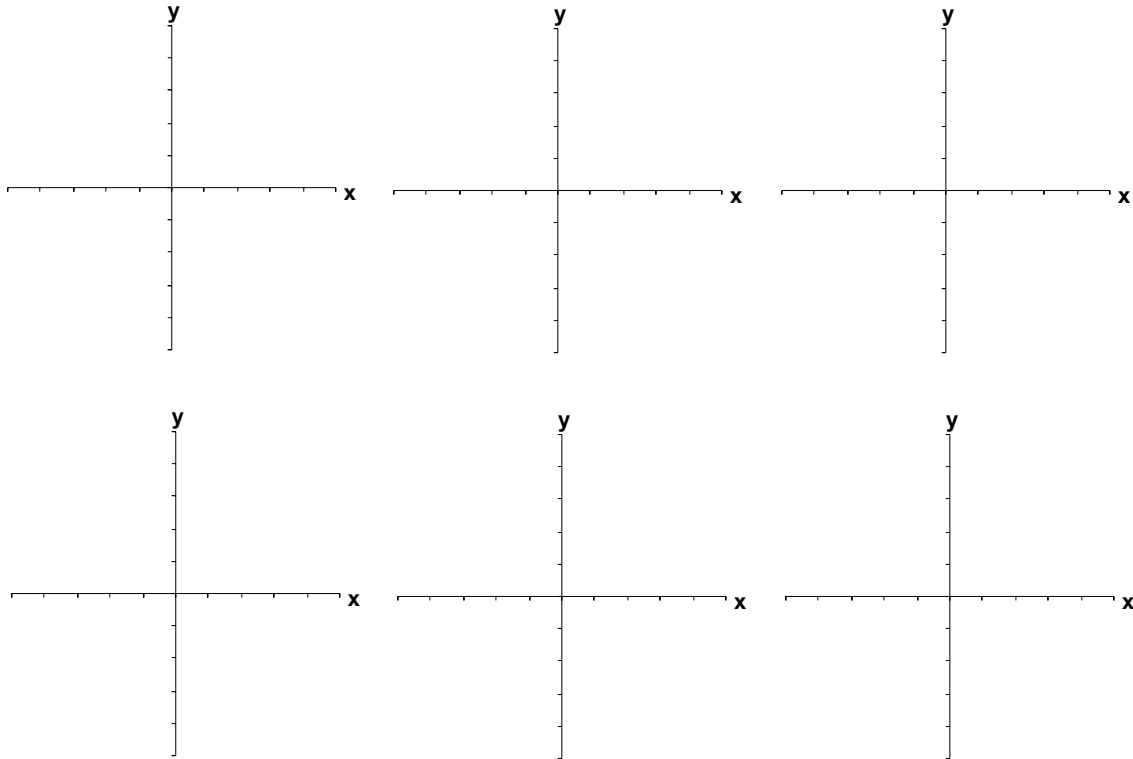
Rigid transformations change only the \_\_\_\_\_ of the graph in the coordinate plane.

Name four types of nonrigid transformations:

- 1)
- 2)
- 3)
- 4)

A nonrigid transformation  $y = cf(x)$  of the graph of  $y = f(x)$  is a \_\_\_\_\_ if  $c > 1$  or a \_\_\_\_\_ if  $0 < c < 1$ . A nonrigid transformation  $y = f(cx)$  of the graph of  $y = f(x)$  is a \_\_\_\_\_ if  $c > 1$  or a \_\_\_\_\_ if  $0 < c < 1$ .

**Additional notes**

**Additional notes****Homework Assignment**

Page(s)

Exercises