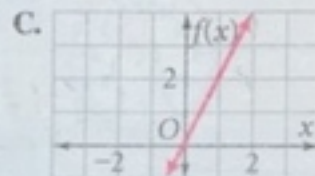
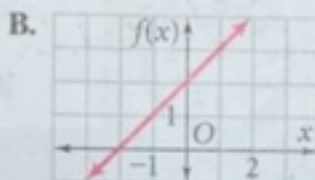
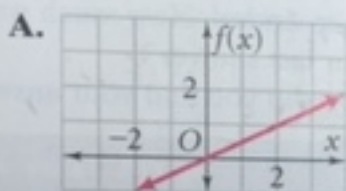


Match each graph with its rule.

1.  $f(x) = 2x$

2.  $f(x) = \frac{1}{2}x$

3.  $f(x) = x + 2$



Model each rule with a table of values and a graph.

4.  $f(x) = -3x$

5.  $f(x) = -3x + 1$

6.  $f(x) = -3x - 2$

7.  $y = 2x - 7$

8.  $f(x) = 8 - x$

9.  $y = 5 + 4x$

10.  $f(x) = \frac{1}{4}x$

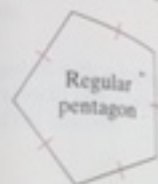
11.  $y = 4x$

12.  $y = x + 4$

**Example 2**  
(page 248)

13. **Earnings** Juan charges \$3.50 per hour for baby-sitting.  
 a. Write a rule to describe how the amount of money  $M$  earned is a function of the number of hours  $h$  spent baby-sitting.  
 b. Make a table of values.  
 c. Graph the values and join the points with a line.  
 d. **Estimation** Use the graph to estimate how long it will take Juan to earn \$20.

14. **Geometry** The figure at the right is a regular pentagon. The function  $P(\ell) = 5\ell$  describes the perimeter of a regular pentagon with side length  $\ell$ .  
 a. Make a table of values for  $\ell = 1, 2, 3,$  and  $4$ .  
 b. Graph the function.



**Example 3**  
(page 249)

Graph each function.

15.  $y = |x|$

16.  $y = |x| + 2$

17.  $y = x^2$

18.  $f(x) = x^2 - 1$

19.  $f(x) = |x| + 3$

20.  $y = x^2 + 3$

21.  $y = |x| - 4$

22.  $f(x) = -x^2 - 1$

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

**B Apply Your Skills**

24. a. Make a table for the perimeters of the rectangles formed by each set of blue tiles.



- b. The perimeter  $P(t)$  is a function of the number of tiles  $t$ . Write a rule for the data in your table and graph the function.

25. **Writing** Describe the steps you would use to graph the function rule  $f(x) = 3x - 2$ .

Graph each function.

26.  $f(x) = \frac{3}{4}x + 7$

27.  $y = x^2 - 4x + 4$

28.  $y = |2x|$

29.  $y = x + \frac{1}{2}$

30.  $f(x) = 7 - 5x$

31.  $f(x) = \left|\frac{1}{2}x\right|$

32.  $f(x) = \left|\frac{1}{2}x\right| + 1$

33.  $y = 1 - x^2$

34.  $f(x) = -5x^2$

35.  $y = 2x - 3$

36.  $y = \left|\frac{1}{3}x\right|$

37.  $f(x) = -|x + 2|$

38. **Conserving Water** The equation  $w = 6m$  models the gallons of water  $w$  used by a standard shower head for a shower that takes  $m$  minutes. The function  $w = 3m$  models the water-saving shower head.

**How Long Does Your Shower Last?**

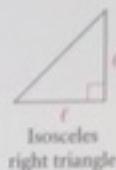
- average shower: 12.2 min
- recommended shower: 6 min
- standard head uses 6 gallons
- water-saving head cuts water flow in half

Source: Opinion Research Corp.

- a. Suppose you take a 6-minute shower using a water-saving shower head. How much water do you save compared to an average shower with a standard shower head?  
 b. Graph both functions on the same coordinate plane.  
 c. **Open-Ended** How much water did you use during your last shower?  
 d. How did you find your answer?

39. a. **Language Arts** Copy and complete the analogy: "Input value is to output value as independent variable is to     ."  
 b. Write an analogy using *input*, *output*, *domain*, and *range*.

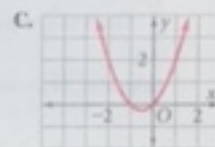
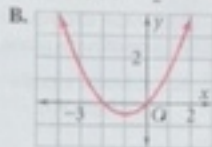
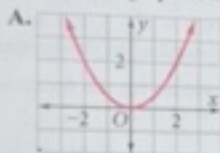
40. a. **Geometry** The function  $A(\ell) = \frac{1}{2}\ell^2$  describes the area of an isosceles right triangle with leg  $\ell$ . Make a table of values for  $\ell = 1, 2, 3,$  and  $4$ .  
 b. Graph the function.



41. **Calling Costs** For one calling plan, the cost  $C(a)$  of a call from Sacramento, California, to Salt Lake City, Utah, is a function of the number of additional minutes  $a$  after the first minute. The rule  $C(a) = 0.27 + 0.11(a - 1)$  models the cost.  
 a. How much will a 5-minute call cost?  
 b. How many minutes can you talk for \$1.50?

42. a. Graph  $y = |x|$  and  $y = -|x|$  on the same coordinate plane.  
 b. The graph of  $y = -|x|$  is the reflection of the graph of  $y = |x|$ . Over which axis is the graph of  $y = |x|$  reflected?  
 c. Write an equation of the reflection of the graph of  $y = |x| + 1$  over the same axis.

43. Which is the graph of the function  $f(x) = \frac{1}{2}x^2 + x$ ?



allenge

44. a. Graph each function on the same coordinate plane.  
 i.  $f(x) = |x| + 2$     ii.  $f(x) = |x| + 4$     iii.  $f(x) = |x| - 3$   
 b. **Critical Thinking** In the function  $y = |x| + b$ , how does changing the value of  $b$  change the graph of the function?
45. a. Graph each function on the same coordinate plane.  
 i.  $f(x) = |2x|$     ii.  $f(x) = |0.5x|$     iii.  $f(x) = |3x|$   
 b. **Critical Thinking** In the function  $y = |ax|$ , how does changing the value of  $a$  change the graph of the function?

46. The function  $s(x)$ , sometimes called the signum function, is defined as

$$s(x) = \begin{cases} 1 & \text{if } x > 0 \\ 0 & \text{if } x = 0 \\ -1 & \text{if } x < 0 \end{cases}$$

For example,  $s(17) = 1$ ,  $s(0) = 0$ , and  $s(-32) = -1$ .

- a. Evaluate  $s(3.77)$ ,  $s(0.003)$ ,  $s(-1.5)$ , and  $s(-2300)$ .  
 b. The domain of the function is all real numbers. What is the range?  
 c. Make a table of values and graph the function.  
 d. **Make a Conjecture** Do you think  $s(a + b) = s(a) + s(b)$ ? First, test some values of  $a$  and  $b$ . If your answer is yes, justify your answer. If your answer is no, give a counterexample.