Section 3.6 Solutions

$$#1 - 56$$
: let $f(x) = x^2$

$$g(x) = \sqrt{x}$$

$$h(x) = |x|$$

$$h(x) = |x|$$
 $k(x) = \sqrt[3]{x}$ $m(x) = x^3$

$$m(x) = x^3$$

- a) find the requested function
- b) describe the transformation from the original function.

1a)
$$h(x + 2) = |x + 2|$$

1b) shifts left 2

put + 2 inside absolute value since it is inside the parenthesis

3a)
$$h(x + 5) = |x + 5|$$

3b) shifts left 5

put + 5 inside absolute value since it is inside the parenthesis

5a)
$$f(x + 3) = (x + 3)^2$$

5b) shifts left 3

put +3 inside a parenthesis since it is inside the parenthesis

7a)
$$f(x+6) = (x+6)^2$$

7b) shifts left 6

put +6 inside a parenthesis since it is inside the parenthesis

9a)
$$h(x-2) = |x-2|$$

9b) shifts right 2

put -2 inside absolute value since it is inside the parenthesis

11a)
$$h(x-5) = |x-5|$$

11b) shifts right 5

put -5 inside absolute value since it is inside the parenthesis

13a)
$$g(x-3) = \sqrt{x-3}$$

13b) shifts right 3

put -5 under the square root since it is inside the parenthesis

15a)
$$g(x-4) = \sqrt{x-4}$$

15b) shifts right 4

put -4 under the square root since it is inside the parenthesis

17a)
$$f(x) + 2 = x^2 + 2$$

17b) shifts up 2

the +2 goes after the x² since it is not in a parenthesis

19a) g(x) + 5 =
$$\sqrt{x}$$
 + 5

19b) shifts up 5

the +5 goes after the square root since it is not in a parenthesis

21a)
$$h(x) - 3 = |x| - 3$$

21b) shifts down 3

the -3 goes after the absolute value since it is not in a parenthesis

23a)
$$k(x) - 6 = \sqrt[3]{x} - 6$$

23b) shifts down 6

the -6 goes after the cubed root since it is not in a parenthesis

25a)
$$h(x + 2) + 1 = |x + 2| + 1$$

25b) shifts left 2, up 1

the +2 goes inside the absolute value since it is inside the parenthesis, the +1 goes after since it is not in the parenthesis

27a)
$$h(x+5) - 1 = |x+5| - 1$$

27b) shifts left 5, down 1

the +5 goes inside the absolute value since it is inside the parenthesis, the -1 goes after since it is not in the parenthesis

29a) g(x - 2) + 1 =
$$\sqrt{x-2}$$
 + 1

29b) shifts right 2 up 1

put -2 under the square root since it is inside the parenthesis, the +1 goes after the square root since it is not in a parenthesis

31a)
$$g(x-5) - 1 = \sqrt{x-5} - 1$$

31b) shifts right 5 down 1

the -5 goes under the square root since it is inside the parenthesis, the -1 goes after since it is not in the parenthesis

33a) -k(x) =
$$-\sqrt[3]{x}$$

33b) reflects over x-axis

the negative goes in front since it is not in the parenthesis

35a)
$$-h(x) = -|x|$$

35b) reflects over x-axis

the negative goes in front since it is not in the parenthesis

37a) k(-x) =
$$\sqrt[3]{-x}$$

37b) reflects over y-axis

the negative goes under the cubed root since it is inside the parenthesis

39a)
$$h(-x) = |-x| or just |x|$$

39b) reflects over y-axis

the negative goes inside the absolute value since it is inside the parenthesis

41a)
$$-f(x + 2) + 1 = -(x + 2)^2 + 1$$

41b) reflects over x-axis, shifts left 2 and up 1

the negative goes in front of the parenthesis since it is not inside the parenthesis, the +2 belongs inside the parenthesis since it is in the parenthesis, the +1 goes after since it is not in the parenthesis

43a)
$$-f(x+5) - 1 = -(x+5)^2 - 1$$

43b) reflects over x-axis, shifts left 5 and down 1

the negative goes in front of the parenthesis since it is not inside the parenthesis, the +5 belongs inside the parenthesis since it is in the parenthesis, the -1 goes after since it is not in the parenthesis

45a)
$$-m(x-2) + 1 = -(x-2)^3 + 1$$

45b) reflects over x-axis, shifts right 2, up 1

the negative goes in front of the parenthesis since it is not inside the parenthesis, the -2 belongs inside the parenthesis since it is in the parenthesis, the +1 goes after since it is not in the parenthesis

47a)
$$-m(x-5) - 1 = -(x-5)^3 - 1$$

47b) reflects over x-axis, shifts right 5, down 1

the negative goes in front of the parenthesis since it is not inside the parenthesis, the -5 belongs inside the parenthesis since it is in the parenthesis, the -1 goes after since it is not in the parenthesis

49a)
$$2f(x) = 2x^2$$

49b) stretches

the 2 goes in front since it is not in a parenthesis

numbers greater than 1 multiplied by a function stretch the graph

53a)
$$\frac{1}{2}h(x) = \frac{1}{2}|x|$$

53b) compresses

the ½ goes in front of the absolute value since it is not in the parenthesis

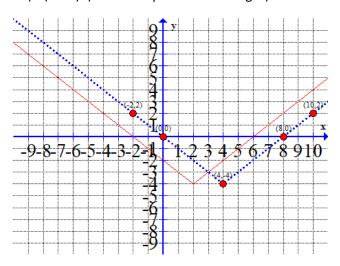
55a)
$$-\frac{1}{2}h(x) = -\frac{1}{2}|x|$$

55b) reflects over x axis, and compresses

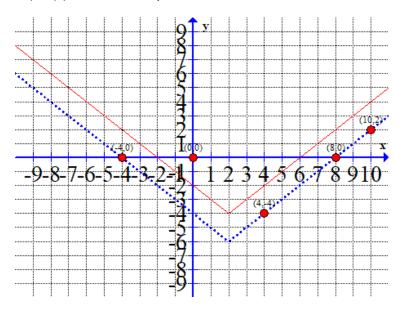
the -1/2 goes in front since it is not in the parenthesis

fractions between 0 and 1 compress, negative numbers reflect over x-axis

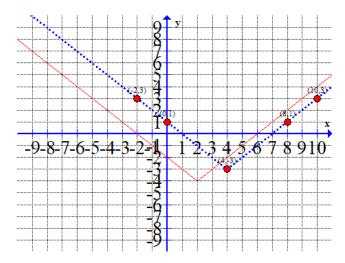
57) f(x-2) (shift each point 2 to the right)



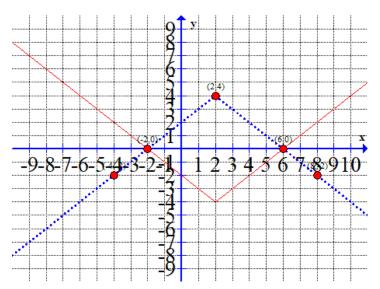
59) f(x) - 2 shift each point down 2



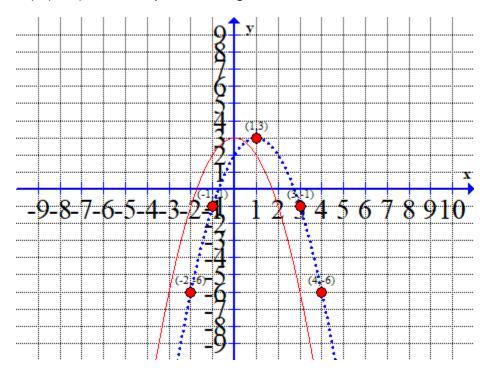
61) f(x-2) + 1 shift each point right 2 and up 1



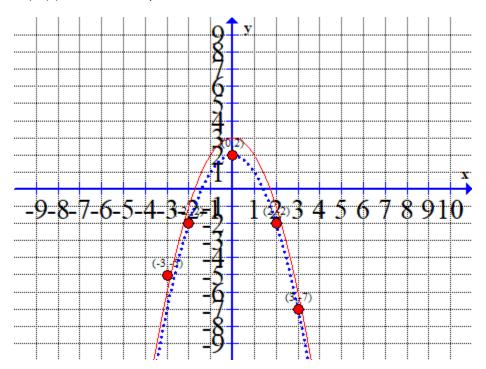
63) -f(x) reflect over x-axis by changing y-coordinate of each point



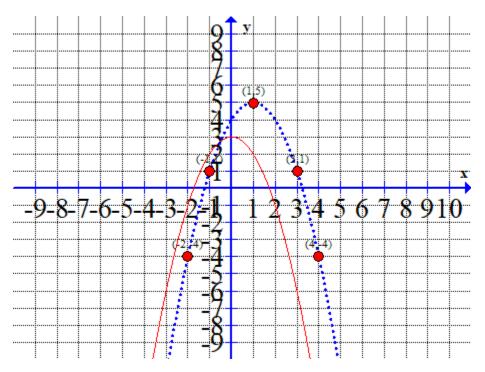
65) f(x-1) shift each point to the right 1



67) f(x) - 1 shift each point down 1



69) f(x-1) + 2 shift each point 1 to the right and up 2



71) f(-x) reflect over y-axis by changing the sign of each x

This will give you the original graph back. The original graph is symmetric to the y-axis, so reflecting the graph over the y-axis produces the original graph again.

