Foundations for Functions

Introduction to Functions

1. D: {Irene, Anna, Lea, Kate}
R: {12, 16, 22}

2. D: {-3, 2, 3, 4}
R: {-2, 1, 3, 4}

3. function; Each value in the domain is mapped to only one value in the range.

4. not a function; The value 3 is mapped onto two values, 1 and 0.

5. not a function; Possible answer: (1, 1) and (1, -1).

6. function

7. function

8.
$$f(0) = 7(0) - 4 = -4$$
$$f\left(\frac{3}{2}\right) = 7\left(\frac{3}{2}\right) - 4 = \frac{13}{2}$$
$$f(-1) = 7(-1) - 4 = -11$$

9.
$$f(0) = -(0)^2 + 0 = 0$$
$$f\left(\frac{3}{2}\right) = -\left(\frac{3}{2}\right)^2 + \frac{3}{2} = -\frac{3}{4}$$
$$f(-1) = -(-1)^2 + (-1) = -2$$

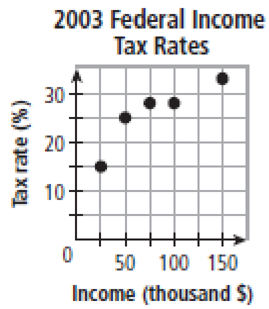
10.
$$f(0) = -2(0)^2 + 1 = 1$$
$$f\left(\frac{3}{2}\right) = -2\left(\frac{3}{2}\right)^2 + 1 = -\frac{7}{2}$$
$$f(-1) = -2(-1)^2 + 1 = -1$$

11.
$$f(0) = 2$$
$$f\left(\frac{3}{2}\right) = 5$$
$$f(-1) = 0$$

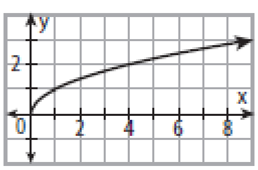
12.
$$f(0) = 4$$
$$f\left(\frac{3}{2}\right) = 4$$
$$f(-1) = -1$$

13.
$$f(0) = 0$$
$$f\left(\frac{3}{2}\right) = 3$$
$$f(-1) = \frac{1}{2}$$

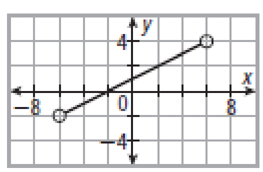
14.



15.



16.



17. Let m represent the number of miles over the speed limit.
$$f(m) = 160 + 4m$$
$$f(8) = 160 + 4(8) = 192$$
A fine of $192 for driving 8 mi/h over the speed limit.

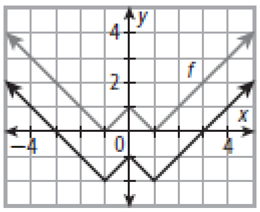
18. (5, 1)

19. (3, 5)

20. (−2, −3)

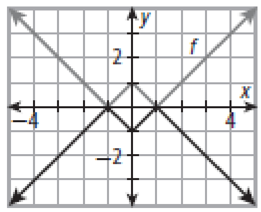
21.

x	y	$y - 2$
-3	2	$2 - 2 = 0$
-1	0	$0 - 2 = -2$
0	1	$1 - 2 = -1$
1	0	$0 - 2 = -2$
3	2	$2 - 2 = 0$



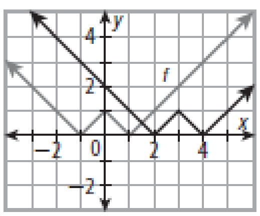
22.

x	y	$-y$
-3	2	$-1(2) = -2$
-1	0	$-1(0) = 0$
0	1	$-1(1) = -1$
1	0	$-1(0) = 0$
3	2	$-1(2) = -2$



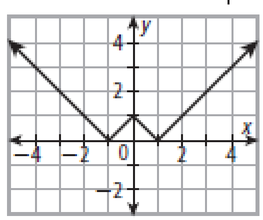
23.

$x + 3$	x	y
$-3 + 3 = 0$	-3	2
$-1 + 3 = 2$	-1	0
$0 + 3 = 3$	0	1
$1 + 3 = 4$	1	0
$3 + 3 = 6$	3	2



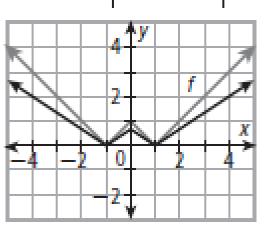
24.

$-x$	x	y
$-1(-3) = 3$	-3	2
$-1(-1) = 1$	-1	0
$-1(0) = 0$	0	1
$-1(1) = -1$	1	0
$-1(3) = -3$	3	2



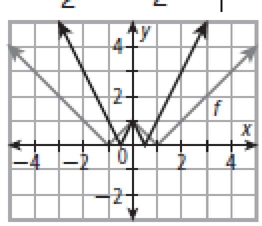
25.

x	y	$\frac{2}{3}y$
-3	2	$\frac{2}{3}(2) = \frac{4}{3}$
-1	0	$\frac{2}{3}(0) = 0$
0	1	$\frac{2}{3}(1) = \frac{2}{3}$
1	0	$\frac{2}{3}(0) = 0$
3	2	$\frac{2}{3}(2) = \frac{4}{3}$



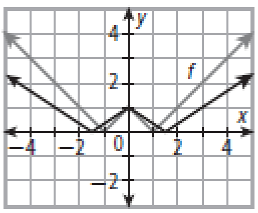
26.

$\frac{1}{2}x$	x	y
$\frac{1}{2}(-3) = -\frac{3}{2}$	-3	2
$\frac{1}{2}(-1) = -\frac{1}{2}$	-1	0
$\frac{1}{2}(0) = 0$	0	1
$\frac{1}{2}(1) = \frac{1}{2}$	1	0
$\frac{1}{2}(3) = \frac{3}{2}$	3	2



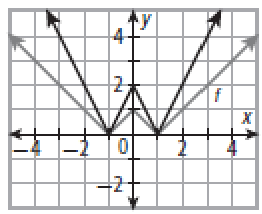
27.

$\frac{3}{2}x$	x	y
$\frac{3}{2}(-3) = -\frac{9}{2}$	-3	2
$\frac{3}{2}(-1) = -\frac{3}{2}$	-1	0
$\frac{3}{2}(0) = 0$	0	1
$\frac{3}{2}(1) = \frac{3}{2}$	1	0
$\frac{3}{2}(3) = \frac{9}{2}$	3	2

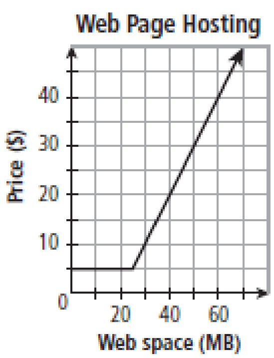


28.

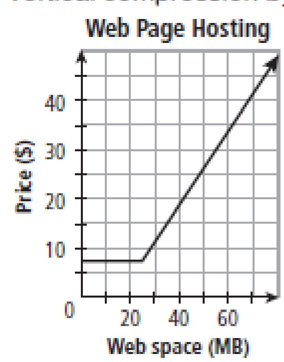
x	y	$2y$
-3	2	$2(2) = 4$
-1	0	$2(0) = 0$
0	1	$2(1) = 2$
1	0	$2(0) = 0$
3	2	$2(2) = 4$



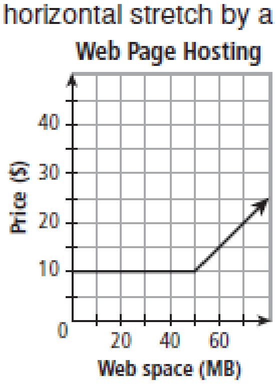
29. vertical shift down 5 units



30. vertical compression by a factor of $\frac{3}{4}$



31. horizontal stretch by a factor of 2

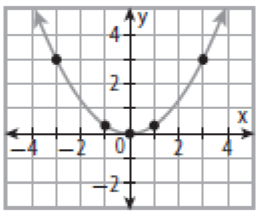


32. $g(x) = x^2 - 1$ is quadratic.
$g(x) = x^2 - 1$ represents a translation of the quadratic parent function 1 unit down.

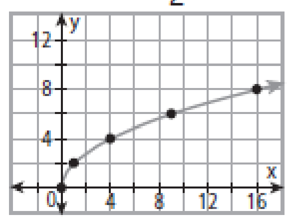
33. $g(x) = \sqrt{x - 2}$ is a square root.
$g(x) = \sqrt{x - 2}$ represents a translation of the square root parent function 2 units right.

34. $g(x) = x^3 + 3$ is cubic.
$g(x) = x^3 + 3$ represents a translation of the cubic parent function 3 units up.

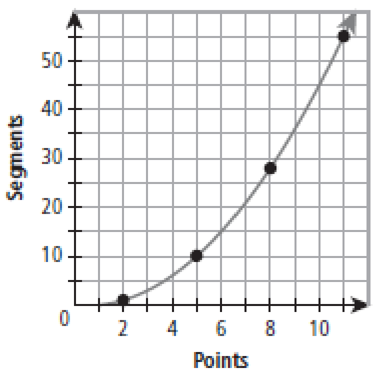
35. The data points resemble a quadratic function. The data set is a vertical compression or horizontal stretch of the quadratic parent function by a factor of $\frac{1}{3}$ or 3, respectively.



36. The data points resemble a square root function. The data set is a vertical stretch or horizontal compression of the quadratic parent function by a factor of 2 or $\frac{1}{2}$, respectively.



37. a.



b. quadratic parent function

c. 10 points

d. 21 segments