

Key

Definition of a function

Determine whether each relation is a function.

1.

x	y
0	-1
1	-1
2	-1
3	-1
4	-1

Yes

2.

x	g(x)
-2	-2
3	4
4	3
2.3	1
-1	0

Yes

3.

x	f(x)
5.1	-4
2	1
-3	2
2	3
4	2.3

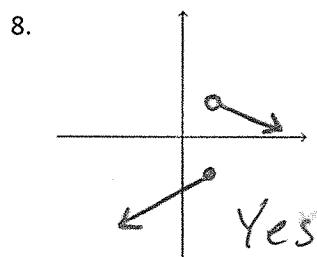
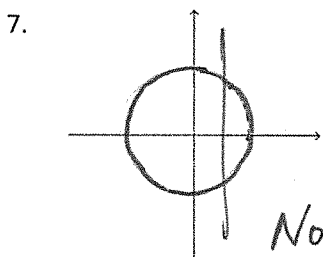
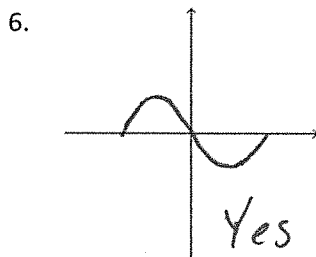
No

4. $\{(1,4), (1,-2), (1,0)\}$

No

5. $\{(2,-0.23), (2.1,-0.2), (-2,-2), (2.21,-0.2)\}$

Yes



9. Suppose f is a function. Which of the following is not possible. Explain.

f has multiple x-intercepts.

f has multiple y-intercepts.

This would not pass vertical line test (the input, $x=0$, has multiple outputs.)

Finding domain and range

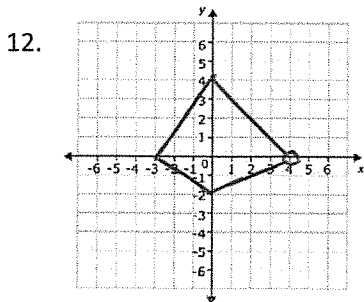
Find the domain and range of each relation.

10.

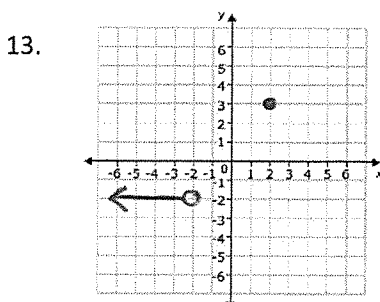
x	y
-1	-2
4	-2
6	0

$D: \{-1, 4, 6\}$
 $R: \{-2, 0\}$

11. $\{(1.7,2), (2,1.7), (3,-1)\}$ $D: \{1.7, 2, 3\}$
 $R: \{2, 1.7, -1\}$

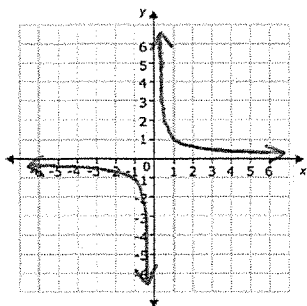


$D: [-3, 4]$
 $R: [-2, 4]$



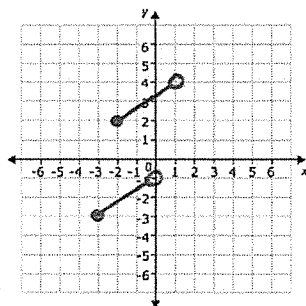
$D: (-\infty, -2) \cup \{2\}$
 $R: \{-2, 3\}$

14.



$$D: \{x \in \mathbb{R} \mid x \neq 0\}$$

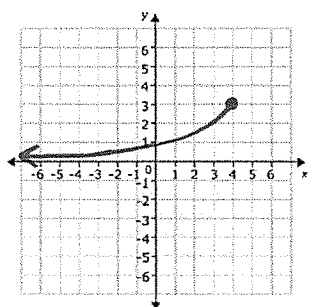
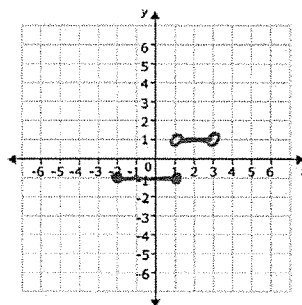
$$R: \{y \in \mathbb{R} \mid y \neq 0\}$$



$$D: [-3, 1)$$

$$R: [-3, -1) \cup [2, 4)$$

Draw functions that have the following domains and ranges.

16. Domain: $(-\infty, 4]$ Range: $(0, 3]$ 17. Domain: $[-2, 1] \cup (1, 3)$ Range: $\{-1, 2\}$ 

Forms for the equation of a line

Find the equation for each line described below in slope-intercept form.

18. The line with a slope of -2 and a y -intercept of $(0, 1)$.

$$y = -2x + 1$$

19. The line that passes through the points $(3, 3)$ and $(0, 4)$.

$$m = \frac{4-3}{0-3} = -\frac{1}{3} \quad y = -\frac{1}{3}x + 4$$

20. The line that passes through the points $(-1, -2)$ and $(4, 3)$.

$$m = \frac{3-(-2)}{4-(-1)} = 1 \quad y + 2 = 1(x + 1) \rightarrow y = x - 1$$

21. The x -axis.

$$y = 0$$

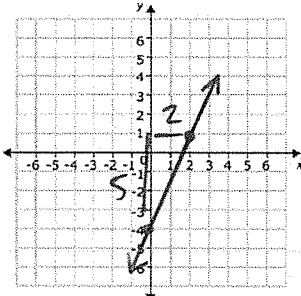
22. The line that is parallel to $y = x$ and passes through the point $(4, -1)$.

$$y + 1 = 1(x - 4) \rightarrow y = x - 5$$

23. The line that is perpendicular to $3x - 2y = 1$ and passes through the origin.

$$y = \frac{3}{2}x - \frac{1}{2} \rightarrow \text{perp. slope} = -\frac{2}{3} \quad y - 0 = -\frac{2}{3}(x - 0) \\ \rightarrow y = -\frac{2}{3}x$$

24.



$$y = \frac{5}{2}x - 4$$

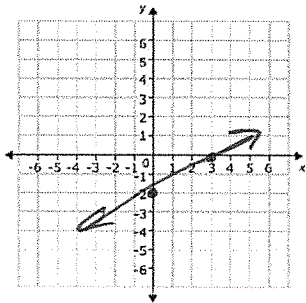
Graph each line.

26. $2x - 3y = 6$

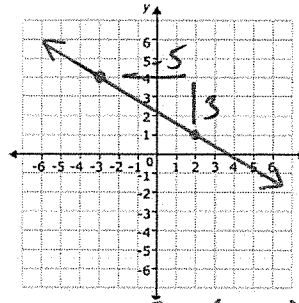
Intercepts:

$$2x = 6 \rightarrow x = 3$$

$$-3y = 6 \rightarrow y = -2$$



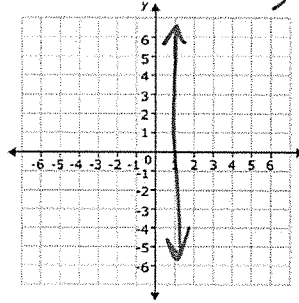
25.



$$y - 1 = -\frac{3}{5}(x - 2) \\ \rightarrow y = -\frac{3}{5}x + \frac{11}{5}$$

27. $2x = 3x - 1$

$$\rightarrow x = 1$$



Determine whether the following pairs of lines are parallel, perpendicular or neither.

28. $x = 2y \rightarrow y = \frac{1}{2}x$ $m = \frac{1}{2}$
 $y = 2x$ $m = 2$

Neither

29. $y - 3x = 4 \rightarrow y = 3x + 4$ $m = 3$
 $y + 1 = 3(x + 2)$ $m = 3$

Parallel

Systems of linear equations

Solve each system. #33 must be solved by graphing.

30. $\begin{cases} y = 2x + 4 \\ x - y = 7 \end{cases}$

$$x - (2x + 4) = 7 \\ -x - 4 = 7 \\ x = -11 \\ y = 2(-11) + 4 = -18 \\ (-11, -18)$$

31. $\begin{cases} 2x + 3y = 4 \\ 4x - 3y = 8 \end{cases}$

$$+ \quad \quad \quad 6x = 12 \\ x = 2 \\ 2(2) + 3y = 4 \\ y = 0 \\ (2, 0)$$

$$32. \begin{cases} -x + 5x = -3 \\ 3x - 10y = 4 \end{cases} \rightarrow 4x = -3 \rightarrow x = -3/4$$

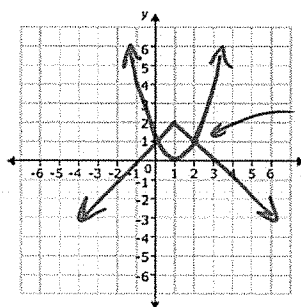
$$3(-3/4) - 10y = 4$$

$$-10y = 25/4$$

$$y = -25/40 = -5/8$$

$$\left(-\frac{3}{4}, -\frac{5}{8}\right)$$

$$33. \begin{cases} y = -|x - 1| + 2 \\ y = (x - 1)^2 \end{cases}$$



$(2, 1) + (0, 1)$

Linear inequalities (unions and intersections)

Determine whether the given point is a solution to the system of inequalities.

$$34. (2, -1); \begin{cases} y < -2x + 1 \\ x > 2 \end{cases}$$

$$-1 < -2(2) + 1$$

$$-1 < -3 \quad \checkmark$$

$$2 > 2 \quad \times$$

No

$$35. (1, 3); \begin{cases} x - y^2 < -3x \\ x + y \geq 5 - x \end{cases}$$

$$1 - 3^2 < -3(1)$$

$$-8 < -3 \quad \checkmark$$

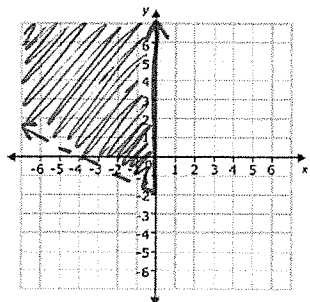
$$1 + 3 \geq 5 - 1$$

$$4 \geq 4 \quad \checkmark$$

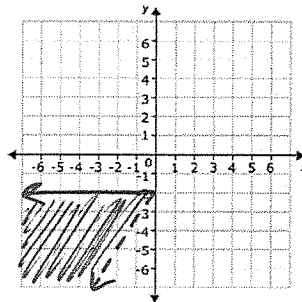
Yes

Graph each system of inequalities.

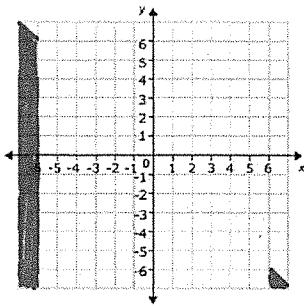
$$36. \begin{cases} y > -\frac{1}{2}x - 2 \\ x \leq 0 \end{cases}$$



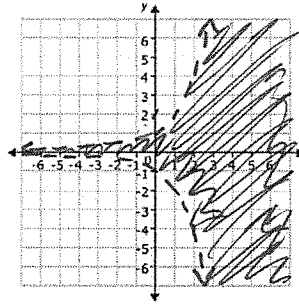
$$37. \begin{cases} y \leq -2 \\ 2x - 3y < 6 \end{cases} \rightarrow y > 2/3x - 2$$



$$38. \begin{cases} |x| \geq 6 \\ y \leq -x \end{cases}$$

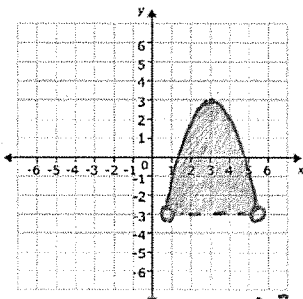


$$39. \begin{cases} y < 2^x \\ y > -2^x \end{cases}$$



Determine what system of inequalities are given on each graph.

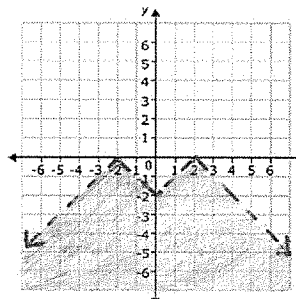
40.



$$\begin{cases} y \leq -(x-3)^2 + 3 \\ y > -3 \end{cases}$$

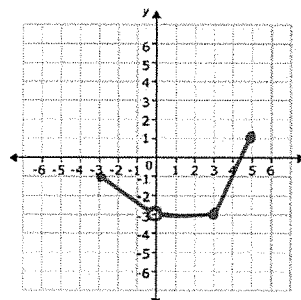
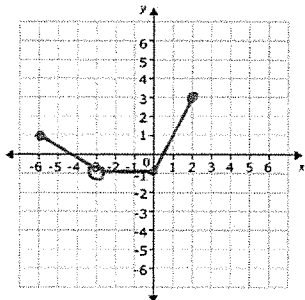
Vertical and horizontal shifts

41.



union of $y < -|x+2|$
 $y < -|x-2|$

42. The graph of $g(x)$ is given in the graph on the left. Use it to graph the function $g(x-3) - 2$ on the right.



43. Suppose the points $(4,0)$ and $(2,2)$ are on the function $f(x)$. What two points must lie on the graph of $f(x+2) - 1$?

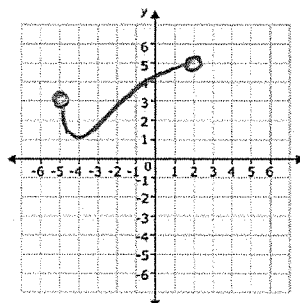
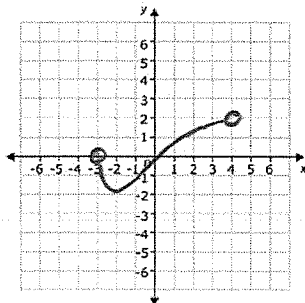
$$(4-2, 0-1) = (2, -1)$$

$$(2-2, 2-1) = (0, 1)$$

44. The function $h(x)$, has a domain of $(-\infty, 2)$ and a range of $[-1, 1]$. What are the domain and range of the function $h(x + 3) - 5$?

$$D: (-\infty, -1) \quad R: [-6, -4]$$

45. The graph of $k(x)$ is given in the graph on the left. What function has been drawn on the right?

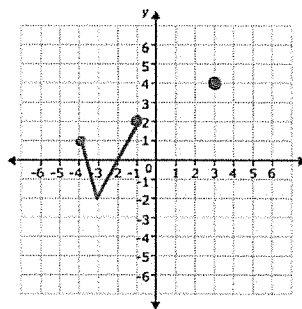


$$k(x+2)+3$$

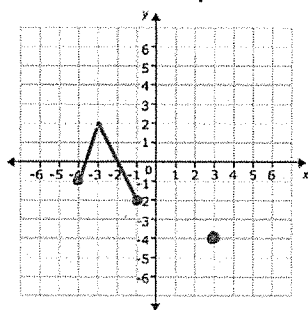
Vertical and horizontal reflections

The graph of $f(x)$ is given to the right.

Use it to determine which functions have been graphed below.

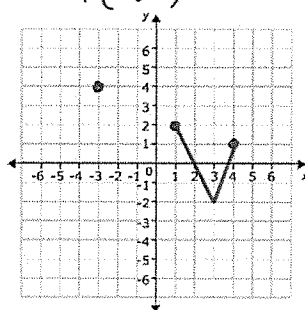


46.



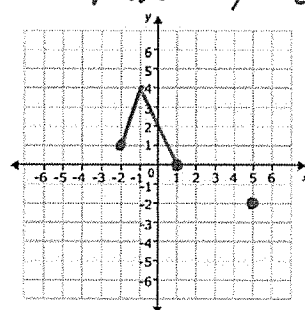
$$-f(x)$$

47.



$$f(-x)$$

48.



$$-f(x-2)+2$$

49. Suppose the point $(2, -1)$ lies on the function $f(x)$. What point must lie on the graph of $f(-x) + 2$?

$$(-2, 1)$$

50. Suppose the point $(1, 3)$ lies on the function $f(x)$. What point must lie on the graph of $-f(x - 1)$?

$$(2, -3)$$

51. The function $h(x)$, has a domain of $(0, \infty)$ and a range of $\{2\}$. What are the domain and range of the function $-h(-x) - 2$?

$$D: (-\infty, 0) \quad R: \{-4\}$$

Vertical stretches and compressions

52. $y = 2^{-x+1}$

Parent function: 2^x

Shifts: left 1

Reflections: horizontal

Stretches/Shrinks: none

54. $y = 2(x + 3)^2 + 1$

Parent function: x^2

Shifts: left 3, up 1

Reflections: none

Stretches/Shrinks: Stretch by 2

53. $y = -\frac{2}{3}|x - 2|$

Parent function: $|x|$

Shifts: right 2

Reflections: vertical

Stretches/Shrinks: Shrink by $\frac{2}{3}$

55. $y = -\sqrt{-x} + 6$

Parent function: \sqrt{x}

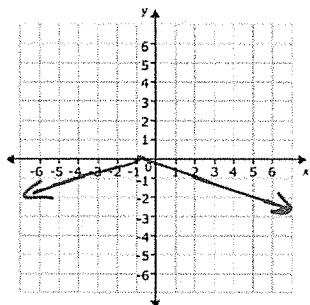
Shifts: up 6

Reflections: vertical + horizontal

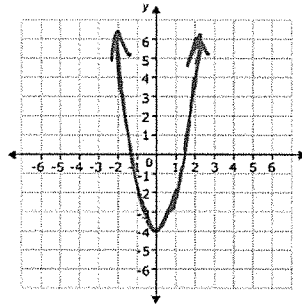
Stretches/Shrinks: none

Graph each function.

56. $f(x) = -\frac{1}{3}|x + 1|$

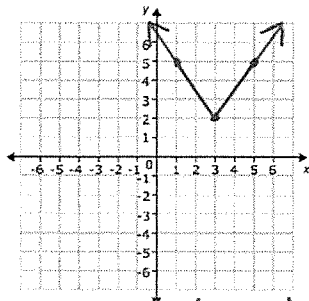


57. $f(x) = 2x^2 - 4$



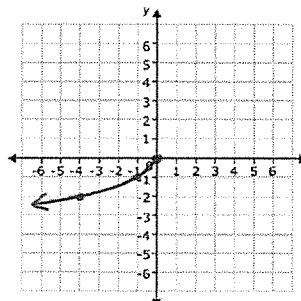
What functions are graphed below?

58.



$f(x) = \frac{3}{2}|x - 3| + 2$

59.



$f(x) = -\sqrt{-x}$

60. Give an expressions that represents the square root function stretched vertically by a factor of 3, reflected horizontally, and shifted down 2 units.

$f(x) = 3\sqrt{-x} - 2$