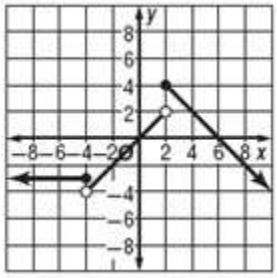
2-5 Special Functions

Graph each function. Identify the domain and range.

1. $g(x) = \begin{cases} -3 \text{ if } x \le -4 \\ x \text{ if } -4 < x < 2 \\ -x + 6 \text{ if } x \ge 2 \end{cases}$

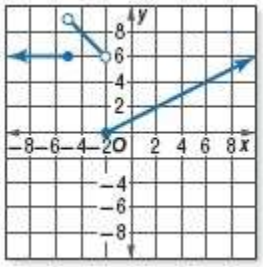
ANSWER:



D = {all real numbers}; $R = \{y \mid y \le 4\}$

Write the piecewise-defined function shown in each graph.

3.

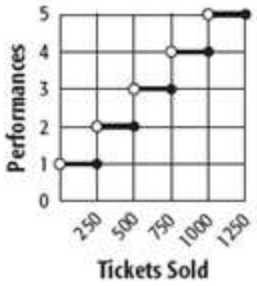


ANSWER:

$g(x) = \begin{cases} x + 4 \text{ if } x < -2 \\ -3 \text{ if } -2 \le x \le 3 \\ -2x + 12 \text{ if } x > 3 \end{cases}$

5. **CCSS REASONING** Springfield High School's theater can hold 250 students. The drama club is performing a play in the theater. Draw a graph of a step function that shows the relationship between the number of tickets sold x and the minimum number of performances y that the drama club must do.

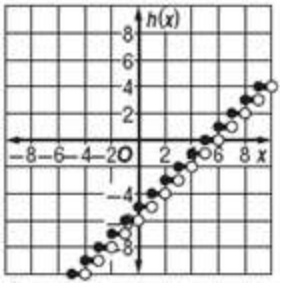
ANSWER:



Graph each function. Identify the domain and range.

7. $h(x) = [\![x - 5]\!]$

ANSWER:



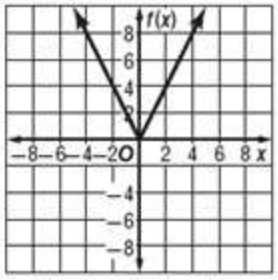
D = {all real numbers};
R = {all integers}

2-5 Special Functions

Graph each function. Identify the domain and range.

9. $f(x) = 2|x|$

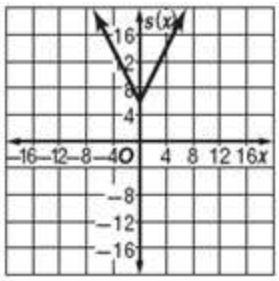
ANSWER:



D = {all real numbers};
$R = \{f(x) \mid f(x) \geq 0\}$

11. $s(x) = |-2x| + 6$

ANSWER:

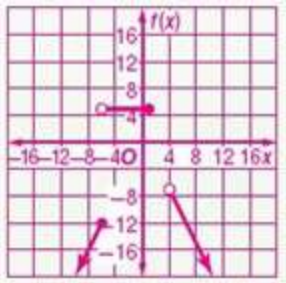


D = {all real numbers};
$R = \{s(x) \mid s(x) \geq 6\}$

Graph each function. Identify the domain and range.

13. $f(x) = \begin{cases} 2x \text{ if } x \leq -6 \\ 5 \text{ if } -6 < x \leq 2 \\ -2x + 1 \text{ if } x > 4 \end{cases}$

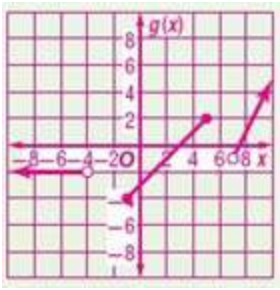
ANSWER:



Art needs fixed pt should be at (2,5)
$D = \{x \mid x \leq 2 \text{ or } x > 4\}$;
$R = \{f(x) \mid f(x) < -7, \text{ or } f(x) = 5\}$

15. $g(x) = \begin{cases} -2 \text{ if } x < -4 \\ x - 3 \text{ if } -1 \leq x \leq 5 \\ 2x - 15 \text{ if } x > 7 \end{cases}$

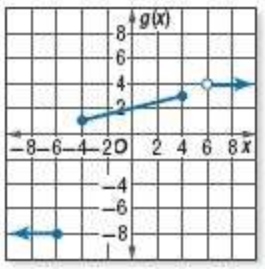
ANSWER:



$D = \{x \mid x < -4, -1 \leq x \leq 5, \text{ or } x > 7\}$;
$R = \{g(x) \mid g(x) \geq -4\}$

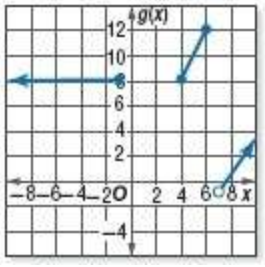
2-5 Special Functions

Write the piecewise-defined function shown in each graph.

17. 

ANSWER:

$$g(x)=\begin{cases}-8 \text{ if } x\le -6\\ 0.25x+2 \text{ if } -4\le x\le 4\\ 4 \text{ if } x>6\end{cases}$$

19. 

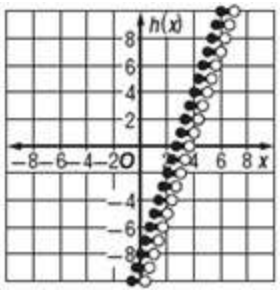
ANSWER:

$$g(x)=\begin{cases}8 & \text{if } x\le -1\\ 2x & \text{if } 4\le x\le 6\\ 2x-15 & \text{if } x>7\end{cases}$$

Graph each function. Identify the domain and range.

21. $h(x)=\llbracket 3x\rrbracket-8$

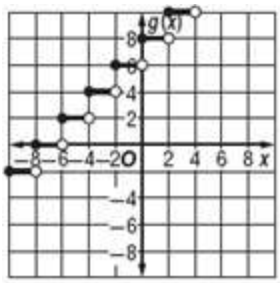
ANSWER:



Art Change
D = {all real numbers};
R = {all integers}

23. $g(x)=2\llbracket 0.5x+4\rrbracket$

ANSWER:

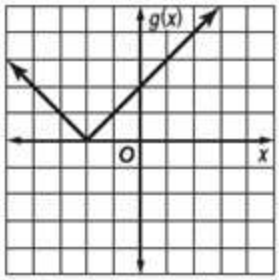


D = {all real numbers};
R = {all even integers}

Graph each function. Identify the domain and range.

25. $g(x) = |x + 2|$

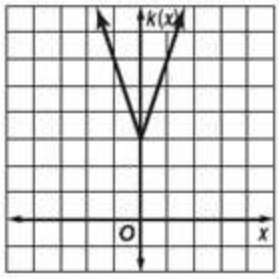
ANSWER:



D = {all real numbers};
$R = \{g(x) \mid g(x) \geq 0\}$

27. $k(x) = |-3x| + 3$

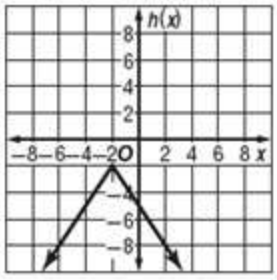
ANSWER:



D = {all real numbers};
$R = \{k(x) \mid k(x) \geq 3\}$

29. $h(x) = -3|0.5x + 1| - 2$

ANSWER:



D = {all real numbers};
$R = \{h(x) \mid h(x) \leq -2\}$

31. **CCSS SENSE-MAKING** A car's speedometer reads 60 miles an hour.

a. Write an absolute value function for the difference between the car's actual speed *a* and the reading on the speedometer.

b. What is an appropriate domain for the function? Explain your reasoning.

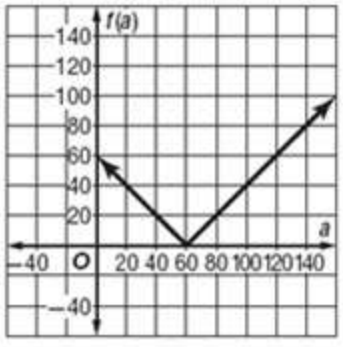
c. Use the domain to graph the function.

ANSWER:

a. $f(a) = |a - 60|$

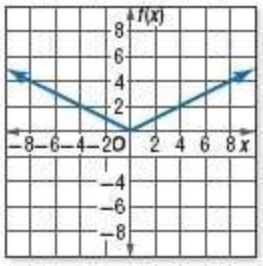
b. $\{a \mid a \geq 0\}$

c.



2-5 Special Functions

Use each graph to write the absolute value function.

33. 

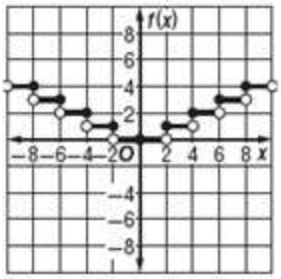
ANSWER:

$f(x) = |0.5x|$

Graph each function. Identify the domain and range.

35. $f(x) = [\![\, |0.5x| \,]\!]$

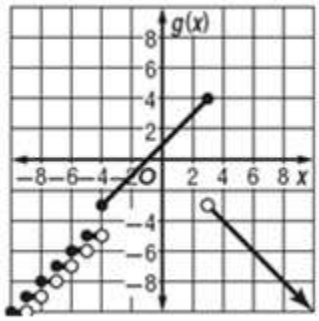
ANSWER:



D = {all real numbers};
R = {all whole numbers}

37. $g(x) = \begin{cases} [\![x]\!] \text{ if } x < -4 \\ x+1 \text{ if } -4 \le x \le 3 \\ -|x| \text{ if } x > 3 \end{cases}$

ANSWER:



D = {all real numbers};
$R = \{g(x) \mid g(x) \le 4\}$

39. **MULTIPLE REPRESENTATIONS** Consider the following absolute value functions.

$f(x) = |x| - 4$ $g(x) = |3x|$

a. TABULAR Use a graphing calculator to create a table of $f(x)$ and $g(x)$ values for $x = -4$ to $x = 4$.

b. GRAPHICAL Graph the functions on separate graphs.

c. NUMERICAL Determine the slope between each two consecutive points in the table.

d. VERBAL Describe how the slopes of the two sections of an absolute value graph are related.

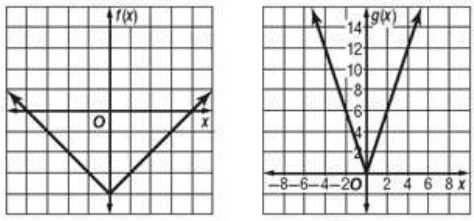
ANSWER:

a.

x	–4	–3	–2	–1	0	1	2	3	4
$f(x)$	0	–1	–2	–3	–4	–3	–2	–1	0

x	–4	–3	–2	–1	0	1	2	3	4
$g(x)$	12	9	6	3	0	3	6	9	12

b.



c.

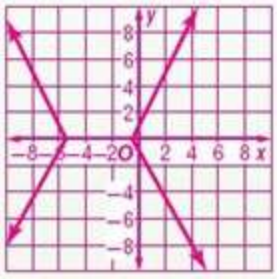
x	–4	–3	–2	–1	0	1	2	3	4
$f(x)$	0	–1	–2	–3	–4	–3	–2	–1	0
slope		–1	–1	–1	–1	1	1	1	1

x	–4	–3	–2	–1	0	1	2	3	4
$g(x)$	12	9	6	3	0	3	6	9	12
slope		–3	–3	–3	–3	3	3	3	3

d. The two sections of an absolute value graph have opposite slopes. The slope is constant for each section of the graph.

41. **CHALLENGE** Graph $|y| = 2|x + 3| - 5$.

ANSWER:



43. **OPEN ENDED** Write an absolute value function in which $f(5) = -3$.

ANSWER:

Sample answer: $f(x) = -|x - 2|$

45. **SHORT RESPONSE** What expression gives the nth term of the linear pattern defined by the table?

2	4	6	8	n
7	13	19	25	?

ANSWER:

$3n + 1$

47. **NUMBER THEORY** Twelve consecutive integers are arranged in order from least to greatest. If the sum of the first six integers is 381, what is the sum of the last six integers?

F 345

G 381

H 387

J 417

ANSWER:
J

49. **SPORTS** There are 15,991 more student athletes in New York than Illinois. Write and solve an equation to find the number of student athletes in Illinois.

ANSWER:
350,349 - x = 15, 991; 334,358

Write an equation in slope-intercept form for the line described.

51. passes through (4, 0), parallel to $3x + 2y = 6$

ANSWER:

$$y = -\frac{3}{2}x + 6$$

Find each value if $f(x) = -4x + 6$, $g(x) = -x^2$, and $h(x) = -2x^2 - 6x + 9$.

53. $f(2c)$

ANSWER:
$-8c + 6$

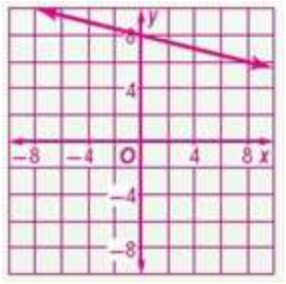
55. $h(6)$

ANSWER:
–99

Graph each equation.

57. $y = -0.25x + 8$

ANSWER:



59. $8x + 4y = 32$

ANSWER: