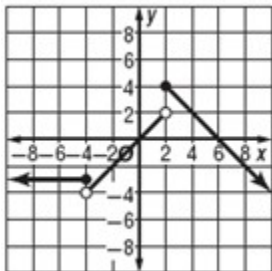


## 2-5 Special Functions

Graph each function. Identify the domain and range.

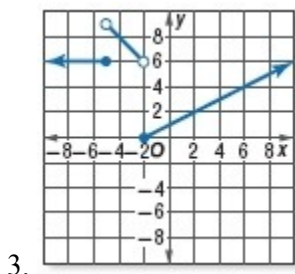
$$1. g(x) = \begin{cases} -3 & \text{if } x \leq -4 \\ x & \text{if } -4 < x < 2 \\ -x + 6 & \text{if } x \geq 2 \end{cases}$$

ANSWER:



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

Write the piecewise-defined function shown in each graph.



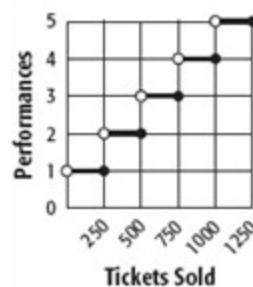
3.

ANSWER:

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

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.

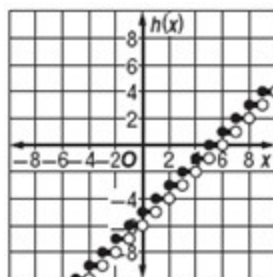
ANSWER:



Graph each function. Identify the domain and range.

$$7. h(x) = \lfloor x - 5 \rfloor$$

ANSWER:



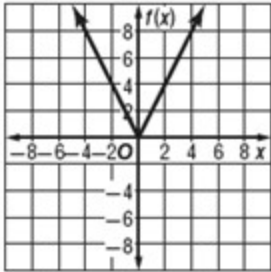
$$D = \{\text{all real numbers}\}; R = \{\text{all integers}\}$$

## 2-5 Special Functions

Graph each function. Identify the domain and range.

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

ANSWER:

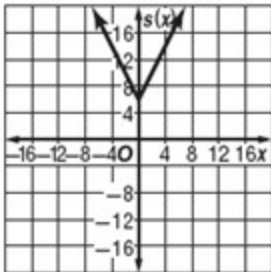


$$D = \{\text{all real numbers}\};$$

$$R = \{f(x) \mid f(x) \geq 0\}$$

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

ANSWER:



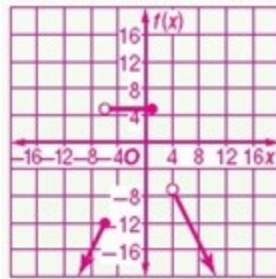
$$D = \{\text{all real numbers}\};$$

$$R = \{s(x) \mid s(x) \geq 6\}$$

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:



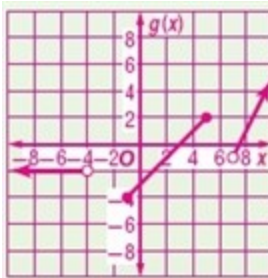
Art needs fixed pt should be at (2,5)

$$D = \{x \mid x \leq 2 \text{ or } x > 4\};$$

$$R = \{f(x) \mid f(x) < -7, \text{ or } f(x) = 5\}$$

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:



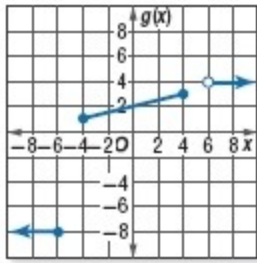
$$D = \{x \mid x < -4, -1 \leq x \leq 5, \text{ or } x > 7\};$$

$$R = \{g(x) \mid g(x) \geq -4\}$$

## 2-5 Special Functions

Write the piecewise-defined function shown in each graph.

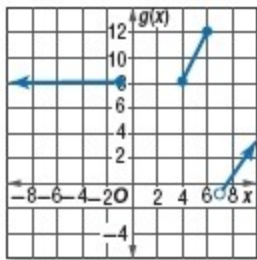
17.



ANSWER:

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

19.



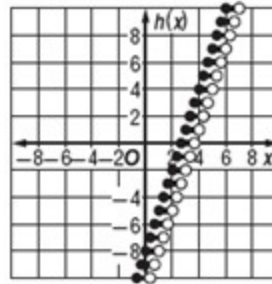
ANSWER:

$$g(x) = \begin{cases} 8 & \text{if } x \leq -1 \\ 2x & \text{if } -1 \leq x \leq 6 \\ 2x - 15 & \text{if } x \geq 6 \end{cases}$$

Graph each function. Identify the domain and range.

21.  $h(x) = \lfloor 3x \rfloor - 8$

ANSWER:



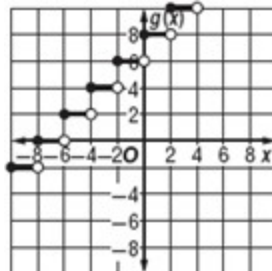
Art Change

D = {all real numbers};

R = {all integers}

23.  $g(x) = 2 \lfloor 0.5x + 4 \rfloor$

ANSWER:



D = {all real numbers};

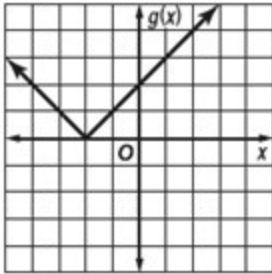
R = {all even integers}

## 2-5 Special Functions

Graph each function. Identify the domain and range.

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

ANSWER:

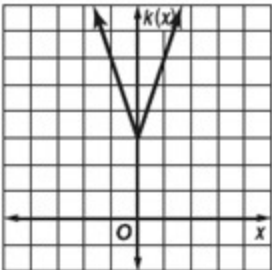


$D = \{\text{all real numbers}\};$

$R = \{g(x) \mid g(x) \geq 0\}$

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

ANSWER:

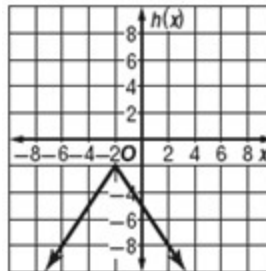


$D = \{\text{all real numbers}\};$

$R = \{k(x) \mid k(x) \geq 3\}$

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

ANSWER:



$D = \{\text{all real numbers}\};$

$R = \{h(x) \mid h(x) \leq -2\}$

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.

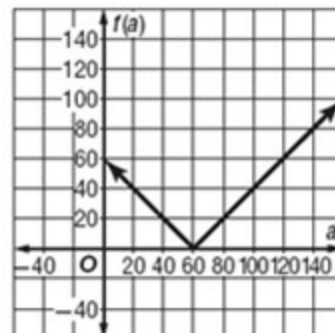
c. Use the domain to graph the function.

ANSWER:

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

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

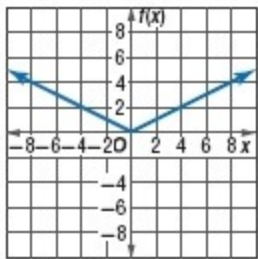
c.



## 2-5 Special Functions

Use each graph to write the absolute value function.

33.



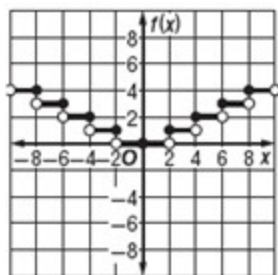
ANSWER:

$$f(x) = |0.5x|$$

Graph each function. Identify the domain and range.

35.  $f(x) = \lceil |0.5x| \rceil$

ANSWER:

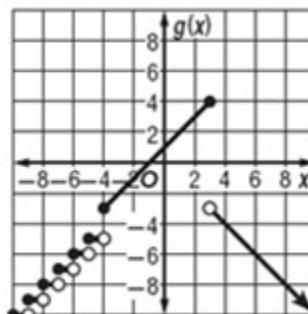


$$D = \{\text{all real numbers}\};$$

$$R = \{\text{all whole numbers}\}$$

$$37. g(x) = \begin{cases} \lfloor x \rfloor & \text{if } x < -4 \\ x+1 & \text{if } -4 \leq x \leq 3 \\ -|x| & \text{if } x > 3 \end{cases}$$

ANSWER:



$$D = \{\text{all real numbers}\};$$

$$R = \{g(x) \mid g(x) \leq 4\}$$

## 2-5 Special Functions

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

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

**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.

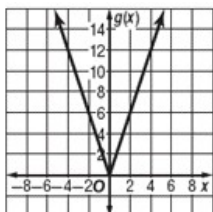
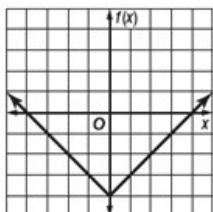
**ANSWER:**

**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.**

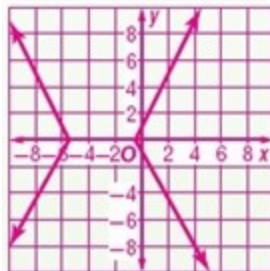
$x$	-4	-3	-2	-1	0	1	2	3	4
$f(x)$	0	-1	-2	-3	-4	-3	-2	-1	0
slope		-1	-1	-1	-1	1	1	1	1

$x$	-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  $n$ th term of the linear pattern defined by the table?

2	4	6	8	$n$
7	13	19	25	?

**ANSWER:**

$3n + 1$

## 2-5 Special Functions

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.  $h(6)$

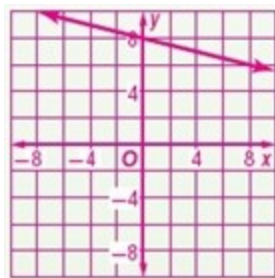
ANSWER:

$$-99$$

Graph each equation.

57.  $y = -0.25x + 8$

ANSWER:



59.  $8x + 4y = 32$

ANSWER:

