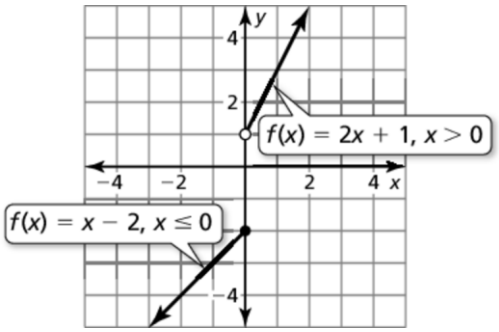
Name _____

NOTES 4.7 Piecewise Functions

Piecewise Function

A **piecewise function** is a function defined by two or more equations. Each "piece" of the function applies to a different part of its domain. An example is shown below.

$$f(x) = \begin{cases} x - 2, & \text{if } x \leq 0 \\ 2x + 1, & \text{if } x > 0 \end{cases}$$



- The expression $x - 2$ represents the value of f when x is less than or equal to 0.
- The expression $2x + 1$ represents the value of f when x is greater than 0.

In Exercise 1–9, evaluate the function.

$$f(x) = \begin{cases} 3x - 1, & \text{if } x \leq 1 \\ 1 - 2x, & \text{if } x > 1 \end{cases}$$

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

1. $f(0)$ **2.** $f(1)$ **3.** $f(5)$

4. $f(-4)$ **5.** $g(0)$ **6.** $g(-3)$

7. $g(1)$ **8.** $g(3)$ **9.** $g(-5)$

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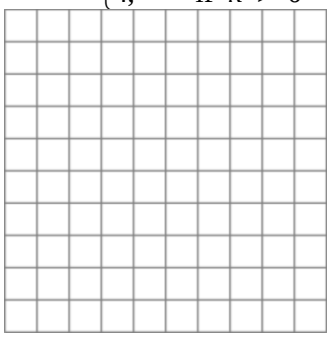
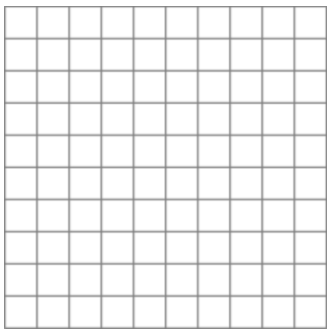
In Exercise 10–13, graph the function. Describe the domain and range.

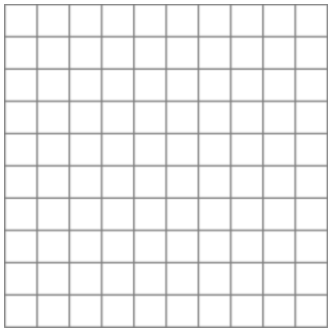
10. $y = \begin{cases} -4x, & \text{if } x \leq 0 \\ 4, & \text{if } x > 0 \end{cases}$



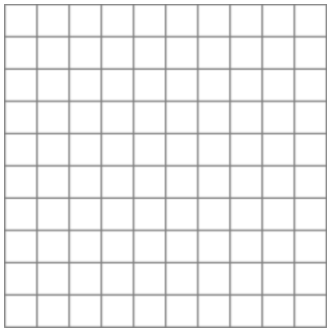
11. $y = \begin{cases} 4 - x, & \text{if } x < 2 \\ x + 3, & \text{if } x \geq 2 \end{cases}$



12. $y = \begin{cases} 2x, & \text{if } x < -2 \\ 2, & \text{if } -2 \leq x < 2 \\ -2x, & \text{if } x \geq 2 \end{cases}$

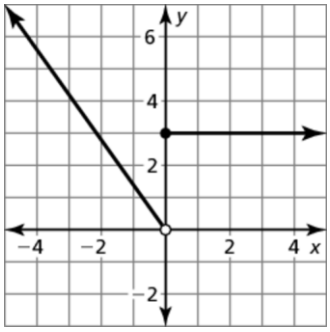


13. $y = \begin{cases} -1, & \text{if } x \leq -1 \\ 0, & \text{if } -1 < x < 2 \\ 1, & \text{if } x \geq 2 \end{cases}$

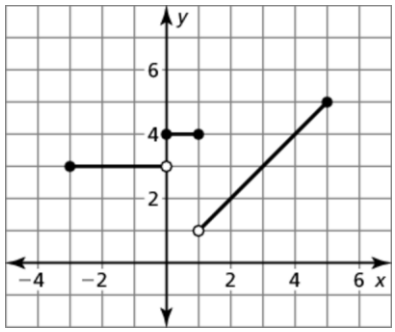


In Exercise 14 and 15, write a piecewise function for the graph.

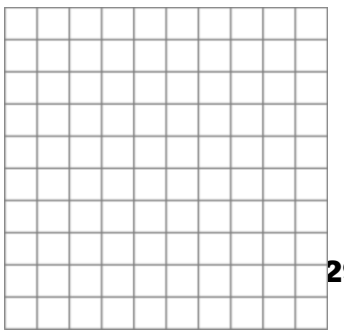
14.



15.



16. A postal service charges \$4 for shipping any package weighing up to but not including 1 pound and \$1 for each additional pound or portion of a pound up to but not including 5 pounds. Packages 5 pounds or over have different rates. Write and graph a step function that shows the relationship between the number x of pounds a package weighs and the total cost y for postage.



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