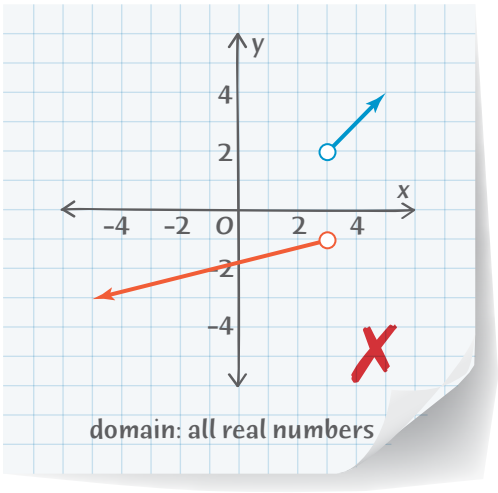
PRACTICE & PROBLEM SOLVING

Practice Tutorial
Additional Exercises Available Online

UNDERSTAND

10. **Make Sense and Persevere** What do closed circles and open circles on the graph of a step function indicate?

11. **Error Analysis** What error did Damian make when defining the domain of the graph? Explain.



12. **Communicate Precisely** For what values of x is the function $f(x) = \begin{cases} -3x + 4, & -2 < x \leq 3 \\ 2x + 1, & 4 \leq x < 9 \end{cases}$ defined?

13. **Mathematical Connections** For the piecewise-defined function $f(x) = \begin{cases} 7, & x > 3 \\ 5x - 3, & x \leq 3 \end{cases}$ find two x-values that have the same y-value and the sum of the x-values is 10.

14. **Higher Order Thinking** The function $f(x) = \lfloor x \rfloor$ is the called the greatest integer function because the output returned is the greatest integer less than or equal to x. For example, $f(3.2) = \lfloor 3.2 \rfloor = 3$ and $f(0.975) = \lfloor 0.975 \rfloor = 0$. Graph the function $f(x) = \lfloor x \rfloor$. What type of graph does this look like?

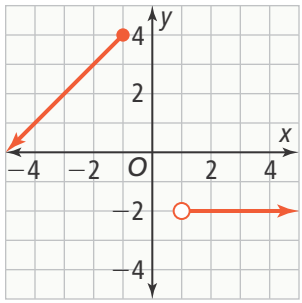
PRACTICE

15. A phone company offers a monthly cellular phone plan for $25. The plan includes 250 anytime minutes, and charges $0.20 per minute above 250 min. Write a piecewise-defined function for $C(x)$, the cost for using x minutes in a month. SEE EXAMPLE 1

16. Graph the piecewise-defined function. State the domain and range. Identify whether the function is increasing, constant, or decreasing on each interval of the domain. SEE EXAMPLE 2

$$f(x) = \begin{cases} \frac{1}{4}x + 3, & -2 < x \leq 0 \\ 2, & 0 < x \leq 4 \\ 3 - x, & 4 < x \leq 7 \end{cases}$$

17. Write the rule that defines the function in the following graph. SEE EXAMPLE 3



Write each absolute value function as a piecewise-defined function. SEE EXAMPLE 4

18. $f(x) = |3x + 1|$

19. $g(x) = |-2x - 6|$

Graph the step function. SEE EXAMPLE 5

20. $f(x) = \begin{cases} 2, & -3 \leq x < 1 \\ 5, & 1 \leq x < 4 \\ 8, & 4 \leq x < 6 \\ 9, & 6 \leq x < 10 \end{cases}$

21. The parking rates for a parking garage are shown. Graph the function for the cost of parking rates at the garage. SEE EXAMPLE 5

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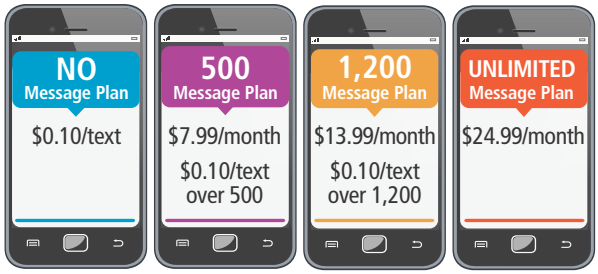
APPLY

22. Model With Mathematics If Kyle works more than 40 h per week, his hourly wage for the extra hour(s) is 1.5 times the normal hourly wage of $10 per hour. Write a piecewise-defined function that gives Kyle's weekly pay P in terms of the number h of hours he works. Determine how much Kyle will get paid if he works 45 h.

23. Look for Relationships Text message plans offered at a phone company, along with overage charges, are shown.



a. Write a function for each plan where x is the number of texts and $f(x)$ is the total monthly cost.

b. Sarah uses approximately 1,500 texts per month. What is the monthly cost under each text message plan?

c. Write an interval for the number of text messages that would make each plan the best one to purchase.

24. Reason The cost C (in dollars) of sending next-day mail depends on the weight x (in ounces) of a package. The cost of packages, up to 5 lb, is given by the function below. What are the domain and range of the function?

$$f(x) = \begin{cases} 12.25, & 0 < x \leq 8 \\ 16.75, & 8 < x \leq 32 \\ 19.50, & 32 < x \leq 48 \\ 23.50, & 48 < x \leq 64 \\ 25.25, & 64 < x \leq 80 \end{cases}$$

ASSESSMENT PRACTICE

25. Is 3 in the range of the function? Select **yes** or **no.**

	Yes	No
$f(x) = \begin{cases} x-3, & x < -2 \\ 5-x, & x > 1 \end{cases}$	○	○
$f(x) = \begin{cases} x-3, & x < -2 \\ 5-x, & x > 1 \end{cases}$	○	○
$f(x) = \begin{cases} x-3, & x < -2 \\ 5-x, & x > 1 \end{cases}$	○	○
$f(x) = \begin{cases} x-3, & x < -2 \\ 5-x, & x > 1 \end{cases}$	○	○

26. SAT/ACT What is the vertex of the absolute value function $f(x) = -|x - a| + b$ where a and b are real numbers?

Ⓐ (a, b) Ⓒ $(a, -b)$
Ⓑ $(-a, b)$ Ⓓ $(-a, -b)$

27. Performance Task Yama works a varying number of hours per month for a construction company. The following scatter plot shows how much money he earns for each number of hours he works. Write the piecewise-defined function that represents Yama's earnings as a function of his hours worked.