1-3 Additional Practice

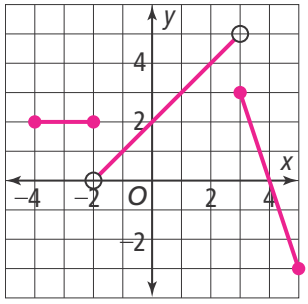
Piecewise-Defined Functions

1. A phone company offers a monthly data plan for $10 a month. The plan includes 2 megabytes of data, and charges $0.10 per megabytes above the 2 megabytes of data. Write a piecewise-defined function for $M(x)$, the cost for x megabytes of data used in a month.

$$M(x) = \begin{cases} 10, & 0 < x \le 2 \\ 10 + 0.10(x - 2), & x > 2 \end{cases}$$

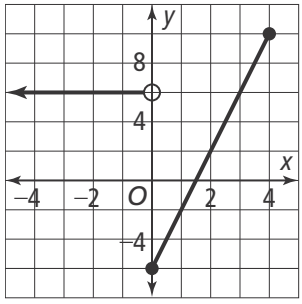
2. Graph the piecewise-defined function. State the domain and range. Identify whether the function is increasing, constant, or decreasing on each interval of the domain.

$$f(x) = \begin{cases} 2, & -4 \le x \le -2 \\ x + 2, & -2 < x < 3 \\ -3x + 12, & 3 \le x \le 5 \end{cases}$$



domain: $-4 \le x \le 5$; range: $-3 \le y < 5$; constant when $-4 \le x \le -2$; increasing when $-2 < x < 3$; decreasing when $3 \le x \le 5$

3. Write the rule that defines the piecewise-defined function in the graph.



$$f(x) = \begin{cases} 6, & x < 0 \\ 4x - 6, & 0 \le x \le 4 \end{cases}$$

4. Write the function f as a piecewise-defined function.

$f(x) = |2x - 8|$ $\quad f(x) = \begin{cases} -2x + 8, & x < 4 \\ 2x - 8, & x \ge 4 \end{cases}$

5. A shipping service uses the weight of a package to determine its postage. The charge is $3 for the first pound and $2 for each additional pound up to 5 pounds. What are the domain and range of the function?

$$f(x) = \begin{cases} 3, & 0 < x \le 1 \\ 5, & 1 < x \le 2 \\ 7, & 2 < x \le 3 \\ 9, & 3 < x \le 4 \\ 11, & 4 < x \le 5 \end{cases}$$

Domain: $0 < x < 5$

Range: {3, 5, 7, 9, 11}

6. You plan to rent a car from XYZ Car Rental Company for a flat rate of $35 a day. If you plan to use the car for 3 days or fewer, you must also pay a $10 insurance fee per day. If you plan to use the car for more than 3 days, there is a $5 insurance fee per day. Write a piecewise-defined function that models this function.

$$f(x) = \begin{cases} 45x, & 1 \le x \le 3 \\ 40x, & x > 3 \end{cases}$$