EXAMPLE 2 Graph and classify real-world functions

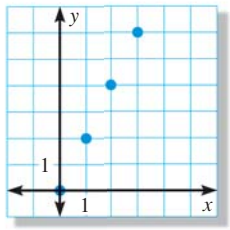
Write and graph the function described. Determine the domain and range. Then tell whether the function is *discrete* or *continuous*.

a. A student group is selling chocolate bars for \$2 each. The function $f(x)$ gives the amount of money collected after selling x chocolate bars.

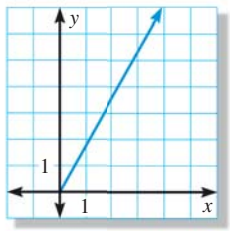
b. A low-flow shower head releases 1.8 gallons of water per minute. The function $V(x)$ gives the volume of water released after x minutes.

Solution

a. The function is $f(x) = 2x$. The first four points of the graph of $f(x)$ are shown. Only whole chocolate bars can be sold, so the domain is the set of whole numbers 0, 1, 2, 3, ... From the graph, you can see that the range is 0, 2, 4, 6, ... The graph consists of separate points, so the function is discrete.



b. The function is $V(x) = 1.8x$. You can run the shower any nonnegative amount of time, so the domain is $x \geq 0$. From the graph, you can see that the range is $y \geq 0$. The graph is unbroken, so the function is continuous.



PRACTICE

EXAMPLE 1 on p. 80 for Exs. 1–4

Graph the function for the given domain. Classify the function as *discrete* or *continuous*. Then identify the range of the function.

1. $y = 2x + 3$; domain: $-2, -1, 0, 1, 2$

2. $f(x) = 0.5x - 4$; domain: $-4, -2, 0, 2, 4$

3. $y = -3x + 9$; domain: $x < 5$

4. $f(x) = \frac{1}{3}x + 6$; domain: $x \geq -6$

EXAMPLE 2 on p. 81 for Exs. 5–8

Write and graph the function described. Determine the domain and range. Then tell whether the function is *discrete* or *continuous*.

5. Amanda walks at an average speed of 3.5 miles per hour. The function $d(x)$ gives the distance (in miles) Amanda walks in x hours.

6. A token to ride a subway costs \$1.25. The function $s(x)$ gives the cost of riding the subway x times.

7. A family has 3 gallons of milk delivered every Thursday. The function $m(x)$ gives the total amount of milk that is delivered to the family after x weeks.

8. Steel cable that is $\frac{3}{8}$ inch in diameter weighs 0.24 pound per foot. The function $w(x)$ gives the weight of x feet of steel cable.

9. On a number line, the *signed distance* from a number a to a number b is given by $b - a$. The function $d(x)$ gives the signed distance from 3 to any number x.