

# Essential Question What are different representations of a function?

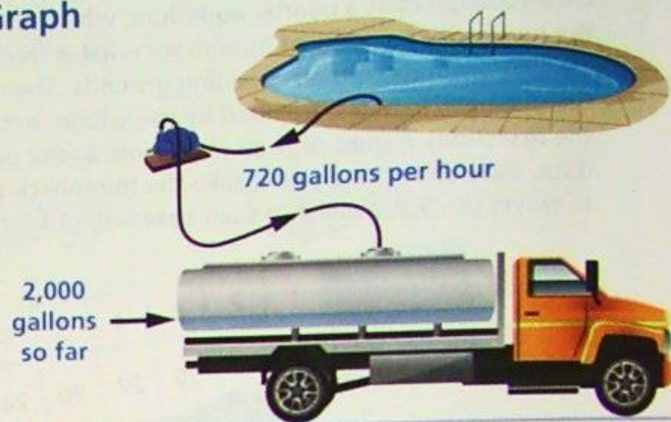
## EXAMPLE 1 Represent a Linear Function with an Equation and a Graph

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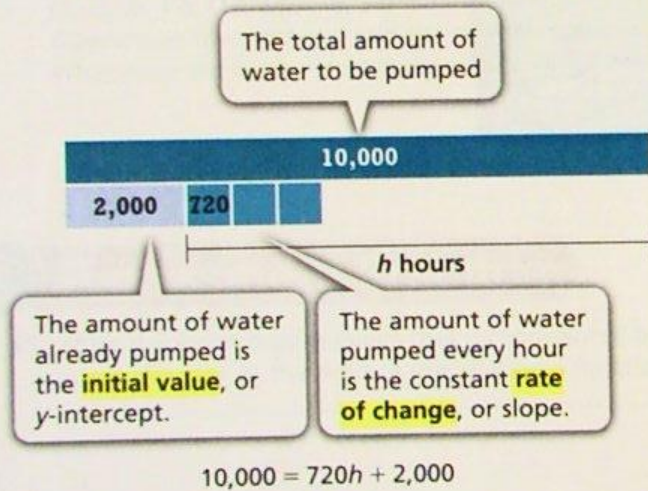


A 10,000-gallon swimming pool needs to be emptied. Exactly 2,000 gallons have already been pumped out of the pool and into the tanker. How can you determine how long it will take to pump all of the water into the tanker?

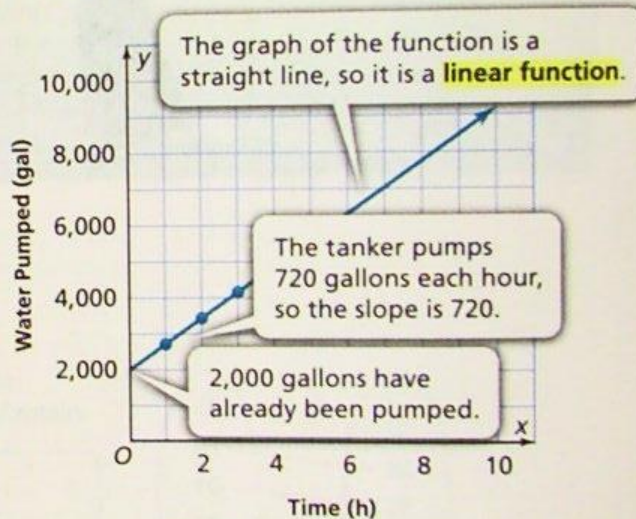
**Generalize** How can you use what you know about linear equations to solve the problem? MP.8



**ONE WAY** Use the information given to draw a diagram that represents the situation, and then write an equation.



**ANOTHER WAY** Use the information given to make a graph.



### Try It!

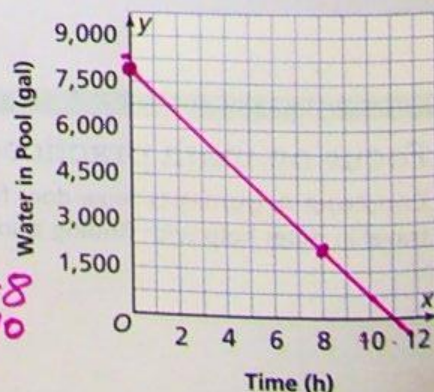
As the pump is pumping water, the amount of water in the pool decreases at a constant rate. Complete the statements below. Then graph the function.

The amount of water remaining in the pool is **8000** gallons.

The amount of water pumped each hour is **720** gallons.

The equation is  **$0 = 8000 - 720h$**  if  $h = 8$   
 $8000 - 720 \cdot 8 = 2240$

**Convince Me!** How is the rate of change of this function different from that in Example 1? Explain.



## EXAMPLE 2

### Represent a Nonlinear Function with a Graph

How can you determine whether the relationship between side length and area is a function?

STEP 1 Make a table that relates different side lengths and areas.

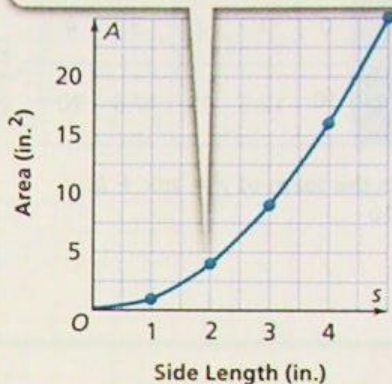
Length, $s$ (in.)	Area, $A$ (in. <sup>2</sup> )
0	0
1	1
2	4
3	9
4	16
5	25

Each input value has a unique output value, so the relationship is a function.

$$A = s^2$$

STEP 2 Graph the ordered pairs from the table.

Because each  $x$ -value corresponds to exactly one  $y$ -value, the graph represents a function.

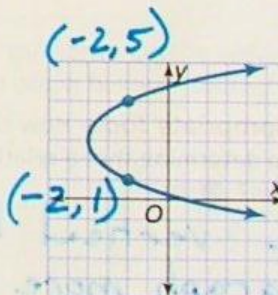
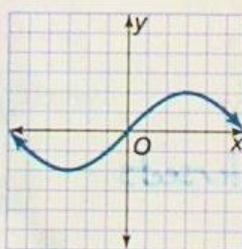
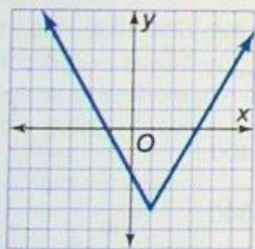


The graph of this function is not a straight line, so it is a **nonlinear function**.

## EXAMPLE 3

### Identify Functions from Graphs

Determine whether each graph represents a function.



Each of these graphs represents a function because each  $x$ -value corresponds to exactly one  $y$ -value.

This graph does not represent a function because each  $x$ -value does not correspond to exactly one  $y$ -value. For example, the  $x$ -value,  $-2$ , corresponds to two  $y$ -values,  $1$  and  $5$ .

### Try It!

Draw a graph that represents a linear function. What equation represents the function?

$$m = 2 = \frac{2}{1}$$

$$b = 0$$

$$y = 2x + 0$$

