

Graphing Quantitative Relationships Summary

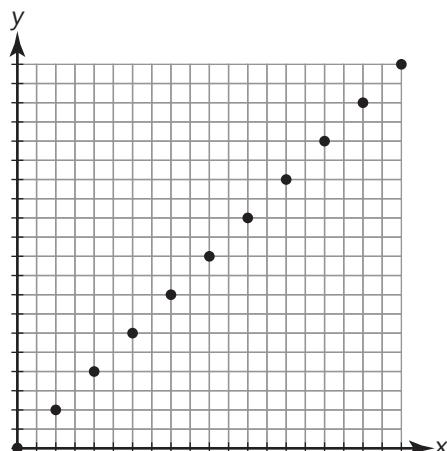
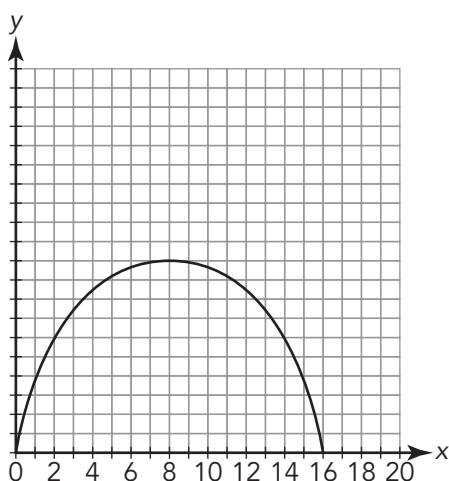
KEY TERMS

- discrete graph
- continuous graph
- dependent quantity
- independent quantity
- independent variable
- dependent variable

LESSON
1

Every Graph Tells a Story

A **discrete graph** is a graph of isolated points. Often, those points are counting numbers.

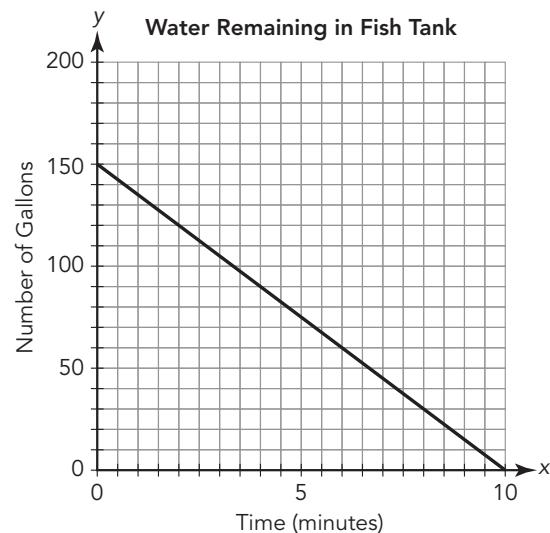


A **continuous graph** is a graph with no breaks in it. Each point on a continuous graph, even those represented by fractional numbers, represents a solution to the graphed scenario.

When one quantity depends on another in a real-world problem situation, it is said to be the **dependent quantity**. The quantity on which it depends is called the **independent quantity**. The variable that represents the independent quantity is called the **independent variable**, and the variable that represents the dependent quantity is called the **dependent variable**.

For example, suppose you are draining a 150-gallon fish tank at a rate of 15 gallons per minute. How much water remains in the tank at a specific time?

In this scenario, the independent quantity is time, measured in minutes, and the dependent quantity is the number of gallons of water in the fish tank. The equation that represents the scenario is $w = 125 - 15t$. The independent variable is t , which represents the number of minutes, and the dependent variable is w , which represents the gallons of water in the tank.



Note that the independent quantity is plotted on the horizontal axis and the dependent quantity is plotted on the vertical axis.

LESSON
2

The Power of the Horizontal Line

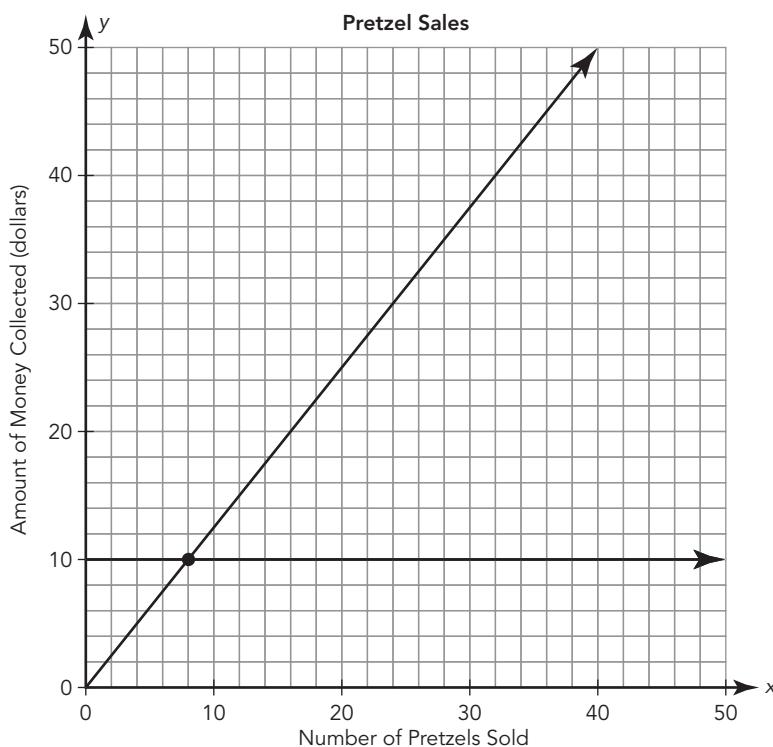
You can use a graph to determine an independent quantity given a dependent quantity.

For example, Nic sells pretzels for \$1.25 each morning at the games held at the Community Center. The amount of money collected for the number of pretzels sold can be represented by points on the graph. The equation corresponding to the graph is $y = 1.25x$. You can use the graph to determine how many pretzels Nic sold if he collected \$10.

First, locate 10 on the y -axis and draw a horizontal line. This shows that \$10 is the amount of money collected. The x -value of the point where your horizontal line intersects with the graph of $1.25x$ is the number of pretzels sold for \$10.

If you are given a graph, a solution to the equation represented by the graphed line is any point on that line. Nic sold 8 pretzels if he collected \$10.

In some problem situations, when you model a relationship with a line, not all the points on the line will make sense. It is up to you to interpret the meaning of data values from the line drawn on a graph for each situation.



LESSON
3

Planes, Trains, and Paychecks

You can write an equation from a relationship given in a table.

For example, the number of tiles required to complete a job and the number of tiles ordered are represented in the table shown.

Number of Tiles Required	60	75	100
Number of Tiles Ordered	80	95	120

The independent quantity is the number of tiles required to complete a job and the dependent quantity is the number of tiles ordered. By analyzing the table, you can see that the number of tiles ordered is always 20 more than the number of tiles required. An equation that models this relationship is $y = x + 20$.

You can write an equation from a relationship represented in a graph.

For example, the graph shows the relationship between the distance of a train from the station and the time in minutes. A table of values can be completed using the points from the graph.

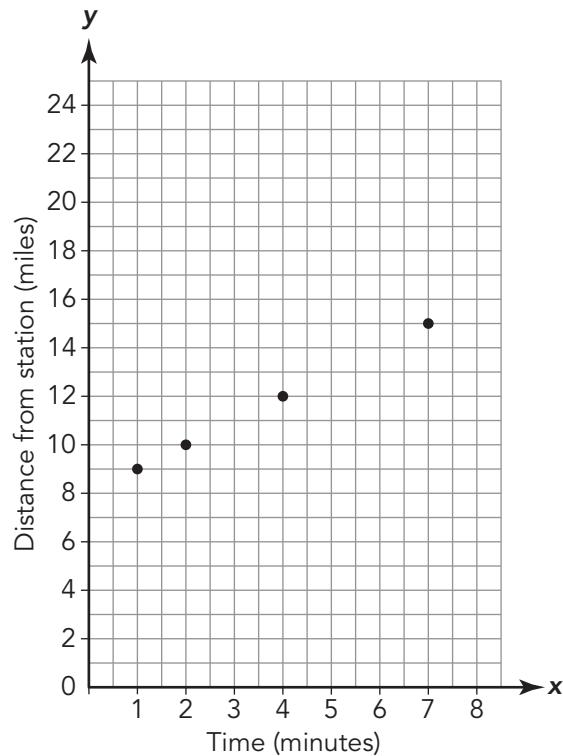
Time (minutes)	Distance (miles)
1	9
2	10
4	12
7	15

If t represents the time in minutes and d represents the distance from the station in miles, then the equation $d = t + 8$ represents the relationship between the quantities.

You can write an equation from a scenario.

For example, Deanna got a job working at the post office making \$10.25 per hour.

An equation that models the relationship between the number of hours Deanna worked and the amount of money she earned can be written. Let a represent the amount Deanna earned and h represent the number of hours she worked. The equation is $a = 10.25h$.



LESSON
4

Triathlon Training

The equation that relates distance, rate, and time is often written as $d = rt$.

For example, Deazia is training for a triathlon. Deazia's coach plotted her times and distances from her last few swimming training sessions. Based on the data, the coach drew in a line to represent an approximation of her average speed.

Deazia's swimming speed is a unit rate. There is a proportional relationship between distance and time.

Deazia wants to know how long it will take her to swim 1.5 km.

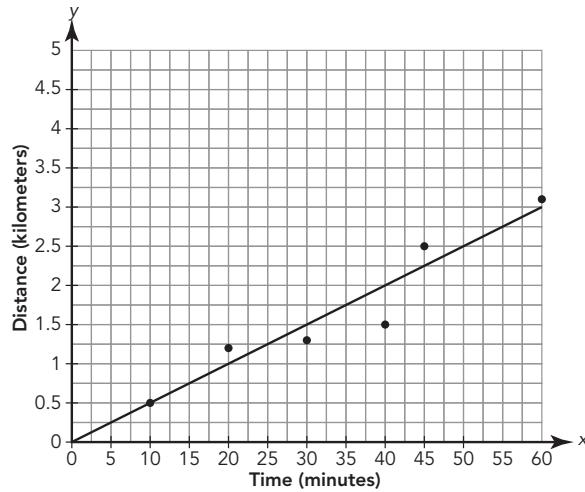
$$\frac{\text{distance}}{\text{time}} = \frac{1 \text{ km}}{20 \text{ minutes}}$$

$$\frac{1.5 \text{ km}}{\text{time}} = \frac{1 \text{ km}}{20 \text{ minutes}}$$

$$\frac{1.5 \text{ km}}{\text{time}} = \frac{1 \text{ km}}{20 \text{ minutes}}$$

$\times 1.5$

$\times 1.5$



It should take Deazia 30 minutes to complete the swimming segment of the Olympic Style triathlon.

