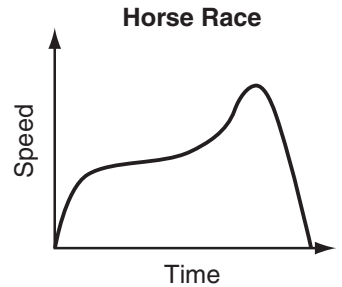


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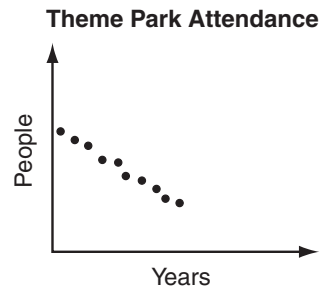
Dear Family,

As you probably know from the news, media, or your own career, graphs are used to represent many different situations. In Chapter 4, your child will make and interpret graphs that show how two variables are related. He or she will identify special relationships called *functions*, and use functions to model real-world data.

The graph at right shows how the speed of a horse changes with time during a race. Using words such as increasing, constant, or dropping, you could write a verbal description of how the speed changes. Likewise, you could use a verbal description to sketch a graph.



The horse race graph above is an example of a **continuous graph** because it is created by a connected line or curve. In contrast, **discrete graphs** show distinct points. The theme park graph at right is an example of a discrete graph, because years and people are counted with whole numbers.



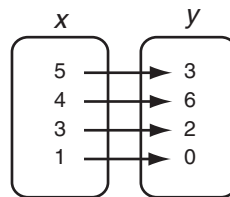
Each point on a graph can be written as an ordered pair. So, a relationship can also be given as a set of ordered pairs. In mathematics, any set of ordered pairs is a **relation**. Here are four ways to represent the same relation:

List: $\{(5, 3), (4, 6), (3, 2), (1, 0)\}$

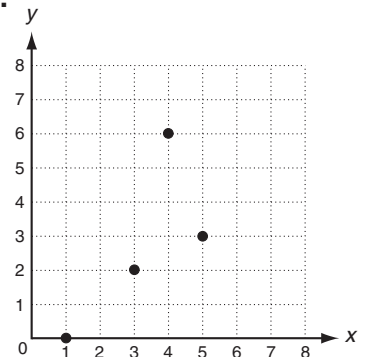
Table:

x	y
5	3
4	6
3	2
1	0

Mapping Diagram:



Graph:



The **domain** of a relation is the set of x -coordinates. The **range** is the set of y -coordinates. When each value in the domain is paired with exactly one value in the range, you have a special type of relation called a **function**.

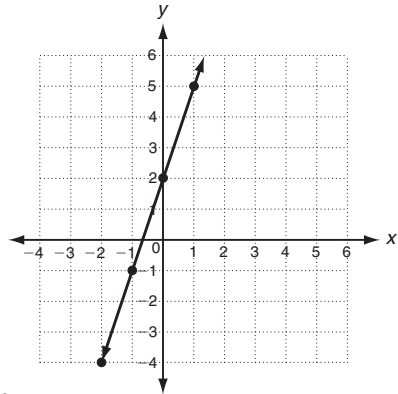
The relation shown above is a function.

Any equation with two variables represents a relation. If for each input (x -value) there is only one output (y -value), then the equation is a function.

Equation: $y = 3x + 2$

This equation is a function because each input gives only one output.

input	output
x	y
-2	-4
-1	-1
0	2
1	5



When an equation is a function, **function notation** can be used. In function notation, y is replaced with $f(x)$, read “function of x ” or “ f of x .” Variables other than f can be used too: $g(x)$, $h(x)$, etc.

Equation: $y = 3x + 2$

Function: $f(x) = 3x + 2$

To evaluate a function, you input a value for x .

For $f(x) = 3x + 2$, find $f(x)$ when $x = 3$.

$f(x) = 3x + 2$

$f(3) = 3(3) + 2$

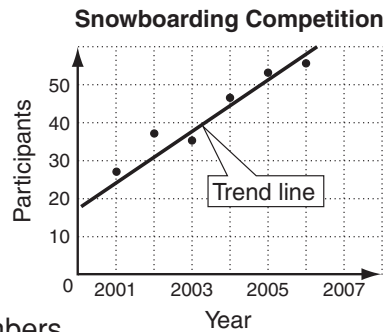
$= 11$

Input 3 for x .

The output is 11.

You graph a function by evaluating it for several x -values, plotting points, and connecting the points with a smooth line or curve.

When you make a **scatter plot** of real-world data, the points often don't form a smooth line or curve. However, you might notice a strong relationship that you can approximate with a function. With this scatter plot of snowboarding participants, for example, you could sketch a **trend line** that closely fits the data, then use the line to make predictions for the future.



Sometimes you can notice a pattern in a list, or **sequence**, of numbers. If the pattern changes by a **common difference**, the sequence is called an **arithmetic sequence**.

In the sequence 5, 2, -1, -4, -7, ..., the common difference is -3 because $5 + (-3) = 2$, $2 + (-3) = -1$, and so on.

Using the formula, $a_n = a_1 + (n - 1)d$, students can find the value of any term in an arithmetic sequence as long as they know the first term a_1 and the common difference d .

For additional resources, visit go.hrw.com and enter the keyword MA7 Parent.