

## Lesson 22: Applying Equations

Some equations have two variables where the value of one depends on the value of the other. In this type of equation, the variable that depends on the other is called the **dependent variable**. The **independent variable** does not depend on the other variable.

### Example

Maureen reads 2 pages every minute. To represent this rate, she writes the equation  $p = 2m$ , where  $p$  is the number of pages she reads and  $m$  is the number of minutes. Which are the independent and dependent variables?

The equation is  $p = 2m$ . The number of pages Maureen reads depends on how many minutes she spends reading. The number of minutes she reads is up to Maureen. It is not dependent on another variable.

Therefore,  $p$ , the number of pages read, is the dependent variable, and  $m$ , the number of minutes Maureen spends reading, is the independent variable.

### Example

Taro earns a salary of \$8.75 per hour. To determine how much money he makes each week, he uses the equation  $s = 8.75h$ , where  $s$  is his total weekly salary and  $h$  is the number of hours he works in a week. Which are the independent and dependent variables?

The equation is  $s = 8.75h$ . The total amount of money Jackson makes is dependent on the number of hours he works. The number of hours that Jackson works can be changed and affects how much money he makes.

Therefore,  $s$ , Taro's weekly salary, is the dependent variable, and  $h$ , the number of hours Taro works in a week, is the independent variable.

A table can show the relationship between a dependent and an independent variable.

### ▶ Example

For every minute that Maxine runs, she travels a distance of 700 feet. Write an equation with two variables to show the total distance run. Identify the dependent and independent variables. Then create a table of values.

For each minute, the total distance is equal to 700 feet. The total distance is equal to the number of minutes multiplied by 700. Use  $m$  for the number of minutes that Maxine runs. Use  $d$  for the total distance she travels. The following equation shows this relationship.  $d = 700m$

The total distance is dependent on the number of minutes Maxine runs. Therefore,  $d$  is the dependent variable. The number of minutes that Maxine runs can be changed by Maxine. The independent variable is  $m$ .

The following table shows the relationship between the variables.

Number of Minutes run, $m$	Total Distance in Feet, $d$
1	700
2	1400
3	2100
4	2800

### ▶ Example

For every hour that Hakeem talks to Europe on his cell phone, he is charged \$6. Write an equation with two variables to show Hakeem's total charge. Identify the dependent and independent variables. Then create a table of values.

For each hour, the charge is equal to \$6. The total charge, therefore, should be equal to the number of hours multiplied by \$6. Use  $h$  for the number of hours that Hakeem talks to Europe. Use  $c$  for the total charge. The following equation shows this relationship.  $c = 6h$

The total charge is dependent on the number of hours that Hakeem talks to Europe on his phone. Therefore,  $c$  is the dependent variable. The number of hours that Hakeem talks on the phone is up to him and is not dependent on the total charge. The independent variable is, therefore,  $h$ .

You can construct a table that shows the relationship between the two variables. Pick different values for the independent variable, and find the corresponding value of the dependent variable using the equation.

Number of Hours on phone, $h$	Total Charge in dollars, $c$
1	6
2	12
3	18
4	24
5	30