



## Lesson 31: Problems in Mathematical Terms

### Student Outcomes

- Students analyze an equation in two variables to choose an independent variable and dependent variable. Students determine whether or not the equation is solved for the second variable in terms of the first variable or vice versa. They then use this information to determine which variable is the independent variable and which is the dependent variable.
- Students create a table by placing the independent variable in the first row or column and the dependent variable in the second row or column. They compute entries in the table by choosing arbitrary values for the independent variable (no constraints) and then determine what the dependent variable must be.

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### Classwork

#### Example 1

Marcus reads for 30 minutes each night. He wants to determine the total number of minutes he will read over the course of a month. He wrote the equation  $t = 30d$  to represent the total amount of time that he has spent reading, where  $t$  represents the total number of minutes read and  $d$  represents the number of days that he read during the month. Determine which variable is independent and which is dependent. Then create a table to show how many minutes he has read in the first seven days.

$t = 30d$

# of days ( $d$ )	Total min. read ( $t$ )
1	30
2	60
3	90
4	120
5	150
6	180
7	210

Independent variable Constant # of days ( $d$ )

Dependent variable Total min. read ( $t$ )

1 - Always goes  
2nd - Depends on the independent variable.

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**Example 2**

Kira designs websites. She can create three different websites each week. Kira wants to create an equation that will give her the total number of websites she can design given the number of weeks she works. Determine the independent and dependent variables. Create a table to show the number of websites she can design over the first 5 weeks. Finally, write an equation to represent the number of websites she can design when given any number of weeks.

Independent variable # of weeks worked (w)

Dependent variable # of websites designed (d)

Equation  $3w = d$

$3w = d$

# of weeks worked (w)	# of websites (d)
1	3
2	6
3	9
4	12
5	15

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**Example 3**

Priya streams movies through a company that charges her a \$5 monthly fee plus \$1.50 per movie. Determine the independent and dependent variables, write an equation to model the situation and create a table to show the total cost per month given that she might stream between 4 and 10 movies in a month.

Independent variable \_\_\_\_\_

Dependent variable \_\_\_\_\_

Equation \_\_\_\_\_


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Exercises

1. Sarah is purchasing pencils to share. Each package has 12 pencils. The equation  $n = 12p$ , where  $n$  is the number of pencils and  $p$  is the number of packages can be used to determine the total number of pencils Sarah purchased. Determine which variable is dependent and which is independent. Then make a table showing the number of pencils purchased for 3-7 packages.

$n = 12p$

(p)	(n)
3	36
4	48
5	60
6	72
7	84

Ind = # of package (p)  
 Dep = # of pencils (n)

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2. Charlotte reads 4 books each week. Let  $b$  be the number of books she reads each week and let  $w$  be the number of weeks that she reads. Determine which variable is dependent and which is independent. Then write an equation to model the situation, and make a graph that shows the number of books read in under 6 weeks.


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3. A miniature golf course has a special group rate. You can pay \$20 plus \$3 per person when you have a group of 5 or more friends. Let  $f$  be the number of friends and  $c$  be the total cost. Determine which variable is independent and which is dependent, and write an equation that models the situation. Then make a table to show the cost for 5 to 12 friends.


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4. Carlos is shopping for school supplies. He bought a pencil box for \$3 and he also needs to buy notebooks. Each notebook is \$2. Let  $t$  = the total cost of the supplies and  $n$  be the number of notebooks. Determine which variable is independent and which is dependent, and write an equation that models the situation. Then make a table to show the cost for 1 to 5 notebooks.


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Problem Set

- Jaziyah sells 3 houses each month. To determine the number of houses she can sell in any given number of months she uses the equation  $t = 3m$ , where  $t$  is the total number of houses sold and  $m$  is the number of months. Name the independent and dependent variables. Then create a table to show how many houses she sells in less than 6 months.


- Joshua spends 25 minutes of each day reading. Let  $d$  be the number of days that he reads and let  $m$  represent the total minutes of reading. Determine which variable is independent and which is dependent. Then write an equation that will model the situation. Make a table showing the number of minutes spent reading over 7 days.


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- Each package of hot dog buns contains 8 buns. Let  $p$  be the number of packages and  $b$  be the total number of buns. Determine which variable is independent and which is dependent. Then write an equation that will model the situation and make a table showing the number of hot dog buns in 3 to 8 packages.


- Emma was given 5 sea shells. Each week she collected 3 more. Let  $w$  be the number of weeks and  $s$  be the number of sea shells she has total. Which variable is independent and which is dependent? Write an equation to model the relationship, and make a table to show how many shells she has from week 4 to week 10.


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5. Emilia is shopping for fresh produce at a farmer’s market. She bought a watermelon for \$5 and she also wants to buy peppers. Each pepper is \$0.75. Let  $t$  = the total cost of the produce and  $n$  be the number of peppers bought. Determine which variable is independent and which is dependent, and write an equation that models the situation. Then make a table to show the cost for 1 to 5 peppers.


6. A taxi cab service charges a flat fee of \$7 plus an additional \$1.25 per mile. Show the relationship between the total cost and the number of miles. Which variable is independent and which is dependent? Write an equation to model the relationship, and make a table to show the cost of 4 to 10 miles.


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**Exit Ticket**

For each problem, determine the independent and dependent variables, write an equation to represent the situation, and then make a table with at least 5 values that models the situation.

1. Kyla spends 60 minutes of each day exercising. Let  $d$  be the number of days, and let  $m$  represent the total minutes of exercise in a given time frame. Show the relationship between the number of days and the total minutes of exercise.


Independent Variable \_\_\_\_\_

Dependent Variable \_\_\_\_\_

Equation \_\_\_\_\_

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2. A taxi cab service charges a flat fee of \$8 plus an additional \$1.50 per mile. Show the relationship between the total cost and the number of miles driven.


Independent Variable \_\_\_\_\_

Dependent Variable \_\_\_\_\_

Equation \_\_\_\_\_

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