

MODULE 2 SECTION 4**STUDY GUIDE****Urban Rescue Function Models**

GOAL **LEARN HOW TO:**

- model a function with a table or an equation
- evaluate expressions with variables
- model a function with a graph

AS YOU:

- explore distance, rate, and time
- choose between emergency vehicles

Exploration 1: Modeling a Function**Evaluating Expressions**

To **evaluate** an expression that has a variable, substitute a value for the variable and perform the operations. When two expressions are equal, you can write an **equation** to express the relationship.

Example

A hiker on a 50 mi journey has traveled for t hours at r miles per hour. Find the distance left to hike after 12 h at an average rate of 2 mi/h.

Sample Response

Distance, rate, and time are related by the formula *distance traveled* = *rate* \times *time*. So, the distance traveled in t hours at r miles per hour is the product rt .

Therefore, an expression for the distance left to hike is $50 - rt$. Evaluate this expression for $r = 2$ and $t = 12$.

$$\begin{aligned} 50 - rt &= 50 - 2 \cdot 12 && \leftarrow \text{Substitute 2 for } r \text{ and 12 for } t. \\ &= 50 - 24 \\ &= 26 \end{aligned}$$

The hiker has 26 mi left to travel.

Modeling Functions

A **function** is a relationship between input and output. For each input, there is exactly one output. You can model a function in many ways. Making a table and writing an equation are two ways to model a function.

Example

A number y is 3 more than twice another number x . Model this function in two ways.

Table:

Input x	0	1	2	3	4
Output y	3	5	7	9	11

Equation: $y = 2x + 3$

MODULE 2 SECTION 4**STUDY GUIDE****Exploration 2: Graphing a Function**

A function can also be modeled using a graph.

Example

A festival sold tickets for a concert at \$2.00 each. A local company has agreed to donate an additional \$1.00 for each ticket sold. Model the relationship between the number of tickets sold and the amount of money collected using a table, an equation, and a graph. Then find out how much money is collected if 450 tickets are sold.

Sample Response

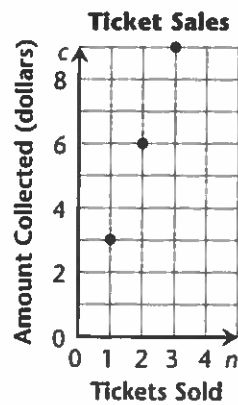
Make a table to show the relationship between the number of tickets sold (n) and the amount of money collected (c) for these values: 1, 2, 3, and n .

Tickets sold	Amount collected (\$)
1	3
2	6
3	9
n	c

Write an equation to model the relationship between the number of tickets sold and the amount collected.

$$c = 3n$$

Make a graph of the equation using the values in the table.



Use the equation to determine how much money is collected if 450 tickets are sold.

$$\begin{aligned}
 c &= 3n \\
 &= 3(450) \quad \leftarrow \text{Replace } n \text{ with } 450. \\
 &= 1350
 \end{aligned}$$

For 450 tickets, \$1350 is collected.