Lesson 4: More Examples of Functions

Classwork

Example 1

If 4 copies of the same book cost $\$256.00$, what is the unit rate for the book?

Example 2

Water flows from a faucet at a constant rate. That is, the volume of water that flows out of the faucet is the same over any given time interval. If 7 gallons of water flow from the faucet every 2 minutes, determine the rule that describes the volume function of the faucet.

Example 3

You have just been served freshly made soup that is so hot that it cannot be eaten. You measure the temperature of the soup, and it is $210°\text{F}$. Since $212°\text{F}$ is boiling, there is no way it can safely be eaten yet. One minute after receiving the soup, the temperature has dropped to $203°\text{F}$. If you assume that the rate at which the soup cools is linear, write a rule that would describe the rate of cooling of the soup.

Example 4

Consider the following function: There is a function G so that the function assigns to each input, the number of a particular player, an output, the player's height. For example, the function G assigns to the input 1 an output of $5'11''$.

1	$5'11''$
2	$5'4''$
3	$5'9''$
4	$5'6''$
5	$6'3''$
6	$6'8''$
7	$5'9''$
8	$5'10''$
9	$6'2''$

Exercises 1–3

1. A linear function has the table of values below related to the number of buses needed for a field trip.

Number of students (x)	35	70	105	140
Number of buses (y)	1	2	3	4

a. Write the linear function that represents the number of buses needed, y, for x number of students.

b. Describe the limitations of x and y.

c. Is the function discrete or continuous?

d. The entire eighth-grade student body of 321 students is going on a field trip. What number of buses does our function assign to 321 students? Explain.

e. Some seventh-grade students are going on their own field trip to a different destination, but just 180 are attending. What number does the function assign to 180? How many buses will be needed for the trip?

f. What number does the function assign to 50? Explain what this means and what your answer means.

2. A linear function has the table of values below related to the cost of movie tickets.

Number of tickets (x)	3	6	9	12
Total cost (y)	$\$27.75$	$\$55.50$	$\$83.25$	$\$111.00$

a. Write the linear function that represents the total cost, y, for x tickets purchased.

b. Is the function discrete or continuous? Explain.

c. What number does the function assign to 4? What do the question and your answer mean?

3. A function produces the following table of values.

Input	**Output**
Banana	Yellow
Cherry	Red
Orange	Orange
Tangerine	Orange
Strawberry	Red

a. Can this function be described by a rule using numbers? Explain.

b. Describe the assignment of the function.

c. State an input and the assignment the function would give to its output.

Lesson Summary

Not all functions are linear. In fact, not all functions can be described using numbers.

Linear functions can have discrete rates and continuous rates.

A function that can have only integer inputs is called a *discrete function.* For example, when planning for a field trip, it only makes sense to plan for a whole number of students and a whole number of buses, not fractional values of either.

Continuous functions are those whose inputs are any numbers of an interval, including fractional values—for example, determining the distance a person walks for a given time interval. The input, which is time in this case, can be in minutes, fractions of minutes, or decimals of minutes.

Problem Set

1. A linear function has the table of values below related to the total cost for gallons of gas purchased.

Number of gallons (x)	5.4	6	15	17
Total cost (y)	$\$19.71$	$\$21.90$	$\$54.75$	$\$62.05$

   a. Write the linear function that represents the total cost, y, for x gallons of gas.
   b. Describe the limitations of x and y.
   c. Is the function discrete or continuous?
   d. What number does the function assign to 20? Explain what your answer means.

2. A function has the table of values below. Examine the information in the table to answer the questions below.

Input	**Output**
one	3
two	3
three	5
four	4
five	4
six	3
seven	5

   a. Describe the function.
   b. What number would the function assign to the word *eleven*?

3. A linear function has the table of values below related to the total number of miles driven in a given time interval in hours.

Number of hours driven (x)	3	4	5	6
Total miles driven (y)	141	188	235	282

   a. Write the linear function that represents the total miles driven, y, for x number of hours.
   b. Describe the limitations of x and y.
   c. Is the function discrete or continuous?
   d. What number does the function assign to 8? Explain what your answer means.
   e. Use the function to determine how much time it would take to drive 500 miles.

4. A function has the table of values below that gives temperatures at specific times over a period of 8 hours.

12:00 p.m.	$92°$F
1:00 p.m.	$90.5°$F
2:00 p.m.	$89°$F
4:00 p.m.	$86°$F
8:00 p.m.	$80°$F

   a. Is the function a linear function? Explain.
   b. Describe the limitations of x and y.
   c. Is the function discrete or continuous?
   d. Let y represent the temperature and x represent the number of hours from 12:00 p.m. Write a rule that describes the function of time on temperature.
   e. Check that the rule you wrote to describe the function works for each of the input and output values given in the table.
   f. Use the function to determine the temperature at 5:30 p.m.
   g. Is it reasonable to assume that this function could be used to predict the temperature for 10:00 a.m. the following day or a temperature at any time on a day next week? Give specific examples in your explanation.