Lesson 20: Writing and Evaluating Expressions—Multiplication and Division

Classwork

Example 1

The farmers' market is selling bags of apples. In every bag, there are 3 apples.

a. Complete the table.

Number of Bags	Total Number of Apples
1	3
2	
3	
4	
B	

b. What if the market had 25 bags of apples to sell? How many apples is that in all?

c. If a truck arrived that had some number, a, more apples on it, then how many bags would the clerks use to bag up the apples?

d. If a truck arrived that had 600 apples on it, how many bags would the clerks use to bag up the apples?

e. How is part (d) different from part (b)?

Exercises 1–3

1. In New York State, there is a five-cent deposit on all carbonated beverage cans and bottles. When you return the empty can or bottle, you get the five cents back.

   a. Complete the table.

Number of Containers Returned	Refund in Dollars
1	
2	
3	
4	
10	
50	
100	
C	

   b. If we let C represent the number of cans, what is the expression that shows how much money is returned?

   c. Use the expression to find out how much money Brett would receive if he returned 222 cans.

   d. If Gavin needs to earn $\$4.50$ for returning cans, how many cans does he need to collect and return?

   e. How is part (d) different from part (c)?

2. The fare for a subway or a local bus ride is $\$2.50$.

   a. Complete the table.

Number of Rides	Cost of Rides in Dollars
1	
2	
3	
4	
5	
10	
30	
R	

   b. If we let R represent the number of rides, what is the expression that shows the cost of the rides?

   c. Use the expression to find out how much money 60 rides would cost.

   d. If a commuter spends $\$175.00$ on subway or bus rides, how many trips did the commuter take?

   e. How is part (d) different from part (c)?

Challenge Problem

3. A pendulum swings though a certain number of cycles in a given time. Owen made a pendulum that swings 12 times every 15 seconds.

   a. Construct a table showing the number of cycles through which a pendulum swings. Include data for up to one minute. Use the last row for C cycles, and write an expression for the time it takes for the pendulum to make C cycles.

   b. Owen and his pendulum team set their pendulum in motion and counted 16 cycles. What was the elapsed time?

   c. Write an expression for the number of cycles a pendulum swings in S seconds.

   d. In a different experiment, Owen and his pendulum team counted the cycles of the pendulum for 35 seconds. How many cycles did they count?

Problem Set

1. A radio station plays 12 songs each hour. They never stop for commercials, news, weather, or traffic reports.
   a. Write an expression describing how many songs are played by the radio station in H hours.
   b. How many songs will be played in an entire day (24 hours)?
   c. How long does it take the radio station to play 60 consecutive songs?

2. A ski area has a high-speed lift that can move $2{,}400$ skiers to the top of the mountain each hour.
   a. Write an expression describing how many skiers can be lifted in H hours.
   b. How many skiers can be moved to the top of the mountain in 14 hours?
   c. How long will it take to move $3{,}600$ skiers to the top of the mountain?

3. Polly writes a magazine column, for which she earns $\$35$ per hour. Create a table of values that shows the relationship between the number of hours that Polly works, H, and the amount of money Polly earns in dollars, E.

   a. If you know how many hours Polly works, can you determine how much money she earned? Write the corresponding expression.
   b. Use your expression to determine how much Polly earned after working for $3\frac{1}{2}$ hours.
   c. If you know how much money Polly earned, can you determine how long she worked? Write the corresponding expression.
   d. Use your expression to determine how long Polly worked if she earned $\$52.50$.

4. Mitchell delivers newspapers after school, for which he earns $\$0.09$ per paper. Create a table of values that shows the relationship between the number of papers that Mitchell delivers, P, and the amount of money Mitchell earns in dollars, E.

   a. If you know how many papers Mitchell delivered, can you determine how much money he earned? Write the corresponding expression.

   b. Use your expression to determine how much Mitchell earned by delivering 300 newspapers.

   c. If you know how much money Mitchell earned, can you determine how many papers he delivered? Write the corresponding expression.

   d. Use your expression to determine how many papers Mitchell delivered if he earned $\$58.50$ last week.

5. Randy is an art dealer who sells reproductions of famous paintings. Copies of the *Mona Lisa* sell for $\$475$.

   a. Last year Randy sold $\$9{,}975$ worth of *Mona Lisa* reproductions. How many did he sell?

   b. If Randy wants to increase his sales to at least $\$15{,}000$ this year, how many copies will he need to sell (without changing the price per painting)?