

Teacher Notes.

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	6
3	9
4	12
B	$B \times 3$ or $3B$.

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

If $B = 25$ then $3(25) = 75$ The market had 75 apples to sell.

- 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?

$a \div 3$ bags are needed. If there are 1 or 2 apples left over, an extra bag will be needed. (it may not be full).

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

$600 \text{ apples} \div 3 \text{ apples/bag} = 200 \text{ bags}$.

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

Part d gives # of apples and asks for the number of bags. Therefore, we need to divide by 3. Part b gives the # of bags and asks for # of apples. Therefore, we need to multiply the number of bags by 3.

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	0.05
2	0.10
3	0.15
4	0.20
10	0.50
50	2.50
100	5.00
C	$0.05C$

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

$$0.05C$$

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

$$\text{If } C = 222 \text{ then } 0.05C = 0.05(222) = 11.10.$$

Brett would receive \$11.10 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?

$$4.50 \div 0.05 = 90 \quad \text{Gavin needs to collect \& return 90 cans.}$$

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

Part d gives the amount of money \& asks for the number of cans. Therefore, we divide the amount of money by 0.05. Part c gives the number of cans and asks for the amount of money. Therefore, we need to multiply the number of cans by 0.05.

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	\$ 2.50
2	\$ 5.00
3	\$ 7.50
4	\$ 10.00
5	\$ 12.50
10	\$ 25.00
30	\$ 75.00
R	$2.50R$ or $2.5R$

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

$$2.50R \text{ or } 2.5R$$

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

$$R=60 \quad 2.50R = 2.50(60) = 150.00$$

Sixty rides would cost \$150.00

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

$$175.00 \div 2.50 = 70$$

The commuter took 70 trips.

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

Part d gives the amount of money & asks for the # of rides. We need to divide the amount of money by cost of each ride (\$2.50). Part c gives the number of rides and asks for the amount of money. We multiply the # of rides by \$2.50.

Challenge Problem

3. A pendulum swings through 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.

Number of Cycles	Time in Seconds
12	15
24	30
36	45
48	60
C	$\frac{15C}{12}$

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

$$C = 16 \quad \frac{15 \cdot 16}{12} = 20 \quad \text{The elapsed time is 20 seconds.}$$

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

$$\frac{12}{15}S \quad \text{or} \quad \frac{4}{5}S \quad \text{or} \quad 0.8 \cdot S$$

- 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?

$$S = 35 \quad 0.8 \cdot 35 = 28$$

They counted 28 cycles.