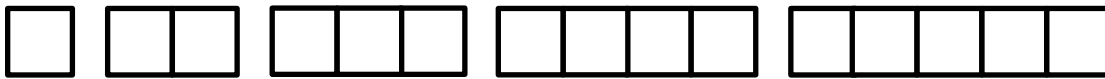


Lesson 21: Writing and Evaluating Expressions—Multiplication and Addition

Classwork

Mathematical Modeling Exercise

The Italian Villa Restaurant has square tables that the servers can push together to accommodate the customers. Only one chair fits along the side of the square table. Make a model of each situation to determine how many seats will fit around various rectangular tables.



| Number of Square Tables | Number of Seats at the Table |
|-------------------------|------------------------------|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 50 | |
| 200 | |
| T | |

Are there any other ways to think about solutions to this problem?

It is impractical to make a model of pushing 50 tables together to make a long rectangle. If we did have a rectangle that long, how many chairs would fit on the long sides of the table?

How many chairs fit on the ends of the long table?

How many chairs fit in all? Record it on your table.

Work with your group to determine how many chairs would fit around a very long rectangular table if 200 square tables were pushed together.

If we let T represent the number of square tables that make one long rectangular table, what is the expression for the number of chairs that will fit around it?

Example 1

Look at Example 1 with your group. Determine the cost for various numbers of pizzas, and also determine the expression that describes the cost of having P pizzas delivered.

- a. Pizza Queen has a special offer on lunch pizzas: \$4.00 each. They charge \$2.00 to deliver, regardless of how many pizzas are ordered. Determine the cost for various numbers of pizzas, and also determine the expression that describes the cost of having P pizzas delivered.

| Number of Pizzas Delivered | Total Cost in Dollars |
|----------------------------|-----------------------|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 10 | |
| 50 | |
| P | |

What mathematical operations did you need to perform to find the total cost?

Suppose our principal wanted to buy a pizza for everyone in our class? Determine how much this would cost.

- b. If the booster club had \$400 to spend on pizza, what is the greatest number of pizzas they could order?
- c. If the pizza price was raised to \$5.00 and the delivery price was raised to \$3.00, create a table that shows the total cost (pizza plus delivery) of 1, 2, 3, 4, and 5 pizzas. Include the expression that describes the new cost of ordering P pizzas.

| Number of Pizzas Delivered | Total Cost in Dollars |
|----------------------------|-----------------------|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| P | |

Problem Set

1. Compact discs (CDs) cost \$12 each at the Music Emporium. The company charges \$4.50 for shipping and handling, regardless of how many compact discs are purchased.
- a. Create a table of values that show the relationship between the number of compact discs that Mickey buys, D , and the amount of money Mickey spends, C , in dollars.

| Number of CDs Mickey Buys (D) | Total Cost in Dollars (C) |
|-----------------------------------|-------------------------------|
| 1 | |
| 2 | |
| 3 | |

- b. If you know how many CDs Mickey orders, can you determine how much money he spends? Write the corresponding expression.
- c. Use your expression to determine how much Mickey spent buying 8 CDs.
2. Mr. Gee's class orders paperback books from a book club. The books cost \$2.95 each. Shipping charges are set at \$4.00, regardless of the number of books purchased.
- a. Create a table of values that show the relationship between the number of books that Mr. Gee's class buys, B , and the amount of money they spend, C , in dollars.

| Number of Books Ordered (B) | Amount of Money Spent in Dollars (C) |
|---------------------------------|--|
| 1 | |
| 2 | |
| 3 | |

- b. If you know how many books Mr. Gee's class orders, can you determine how much money they spend? Write the corresponding expression.
- c. Use your expression to determine how much Mr. Gee's class spent buying 24 books.

3. Sarah is saving money to take a trip to Oregon. She received \$450 in graduation gifts and saves \$120 per week working.
 - a. Write an expression that shows how much money Sarah has after working W weeks.
 - b. Create a table that shows the relationship between the amount of money Sarah has (M) and the number of weeks she works (W).

| Amount of Money Sarah Has (M) | Number of Weeks Worked (W) |
|-----------------------------------|--------------------------------|
| | 1 |
| | 2 |
| | 3 |
| | 4 |
| | 5 |
| | 6 |
| | 7 |
| | 8 |

- c. The trip will cost \$1,200. How many weeks will Sarah have to work to earn enough for the trip?
4. Mr. Gee’s Language Arts class keeps track of how many words per minute are read aloud by each of the students. They collect this Oral Reading Fluency data each month. Below is the data they collected for one student in the first four months of school.
 - a. Assume this increase in Oral Reading Fluency continues throughout the rest of the school year. Complete the table to project the reading rate for this student for the rest of the year.

| Month | Number of Words Read Aloud in One Minute |
|-----------|--|
| September | 126 |
| October | 131 |
| November | 136 |
| December | 141 |
| January | |
| February | |
| March | |
| April | |
| May | |
| June | |

- b. If this increase in Oral Reading Fluency continues throughout the rest of the school year, when would this student achieve the goal of reading 165 words per minute?
 - c. The expression for this student’s Oral Reading Fluency is $121 + 5m$, where m represents the number of months during the school year. Use this expression to determine how many words per minute the student would read after 12 months of instructions.

5. When corn seeds germinate, they tend to grow 5 inches in the first week, then 3 inches per week for the remainder of the season. The relationship between height (H) and number of weeks since germination (W) is shown below.

- a. Complete the missing values in the table.

| Number of Weeks Since Germination (W) | Height of Corn Plant (H) |
|---|------------------------------|
| 1 | 5 |
| 2 | 8 |
| 3 | 11 |
| 4 | 14 |
| 5 | |
| 6 | |

- b. The expression for this height is $2 + 3W$. How tall will the corn plant be after 15 weeks of growth?
6. The Honeymoon Charter Fishing Boat Company only allows newlywed couples on their sunrise trips. There is a captain, a first mate, and a deck hand manning the boat on these trips.
- a. Write an expression that shows the number of people on the boat when there are C couples booked for the trip.
- b. If the boat can hold a maximum of 20 people, how many couples can go on the sunrise fishing trip?