**Writing & Evaluating Algebraic Expressions in Data Tables- Part I**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Data tables** are a useful way to help organize data and see patterns between two or more variables. The following data tables help us to find patterns and relationships among the items we are comparing. We can examine how algebraic expressions were used to find the patterns, and predict values not included in the table.

Example 1: Bridget is exactly two years older than her sister, Sarah. Sharing a birthday is both fun and annoying. Every year on their birthday, they have a party, which is fun, but Bridget always brags that she is two years older than Sarah, which is annoying. Shown below is a table of their ages, starting when Sarah born:

|  |  |
| --- | --- |
| **Sarah’s age (in years)** | **Bridget’s age (in years)** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

* 1. Looking at the table, what patterns do you see? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  2. On the day Sarah turned years old, how old was Bridget? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  3. How do you know? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  4. On the day Sarah turned years old, how old was Bridget? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  5. How do you know? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  6. Do we need to extend the table to calculate these answers? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

g. What if you don’t know how old Sarah is? Let = Sarah’s age in years. Can you develop an expression to describe how old Bridget is? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \*\*Please add to the table above.

* 1. When Bridget was 15 years old, how old was Sarah? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     1. How do you know? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  2. If we use the variable for Bridget’s age in years, what expression would describe Sarah’s age in years? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \*\*Fill in the last row of the table with the expression
  3. Calculate how old Sarah was when Bridget was 24.
  4. How old was Bridget when Sarah was 32?

Practice:

1. Noah and Carter are collecting box tops for their school. They each bring in box top per day starting on the first day of school. However, Carter had a head start because his aunt sent him box tops before school began. Noah’s grandma saved box tops, and Noah added those on his first day.
   1. Fill in the missing values that indicate the total number of box tops each boy brought to school.

|  |  |  |
| --- | --- | --- |
| **School Day** | **Number of Box Tops Noah Has** | **Number of Box Tops Carter Has** |
| 0 |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
| 8 |  |  |
| 10 |  |  |
| 25 |  |  |

* 1. If we let be the number of days since the new school year began, on day of school, how many box tops will Noah have brought to school? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  2. On day of school, how many box tops will Carter have brought to school? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  3. Complete the table for the missing days.

1. David was when Marieka was born. Complete the table to show the relationship of their age. Let stand for Mareika’s age and stand for David’s age.

|  |  |
| --- | --- |
| **Marieka’s Age in Years** | **David’s Age in Years** |
|  |  |
|  |  |
|  |  |
|  |  |
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|  |  |

1. Caitlin and Michael are playing a card game. In the first round, Caitlin scored points, and Michael scored points. In each of the next few rounds, they each scored points. Their score sheet is below.

|  |  |
| --- | --- |
| **Caitlin’s Points** | **Michael’s Points** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

* 1. If this trend continues, how many points will Michael have when Caitlin has points?
  2. If this trend continues, how many points will Michael have when Caitlin has points?
  3. If this trend continues, how many points will Caitlin have when Michael has points?
  4. If this trend continues, how many points will Caitlin have when Michael has points?

1. Anne and Damian collect fossils. Before they went on a fossil-hunting trip, Anne had fossils in her collection, and Damian had fossils in his collection. On a -day fossil-hunting trip, they each collected new fossils each day.
   1. Make a table showing how many fossils each person had in their collection at the end of each day.

|  |  |  |
| --- | --- | --- |
| **Day** | **Anne’s number of fossils** | **Damian’s number of fossils** |
| 0 |  |  |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |
| 10 |  |  |
|  |  |  |

* 1. If this pattern of fossil finding continues, how many fossils does Damian have when Anne has fossils?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. If this pattern of fossil finding continues, how many fossils does Damian have when Anne has fossils?

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Example: 3 The farmers’ market is selling bags of apples. In **every** bag, there are apples.

* 1. Complete the table.

|  |  |
| --- | --- |
| **Number of Bags** | **Total Number of Apples** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

* 1. b. What if the market had bags of apples to sell? How many apples is that in all? \_\_\_\_\_\_\_\_\_\_\_\_\_\_
  2. c. If a truck arrived that had some number, , more apples on it, then how many bags would the clerks use to bag up the apples? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  3. d. If a truck arrived that had apples on it, how many bags would the clerks use to bag up the apples?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

**Writing & Evaluating Algebraic Expressions in Data Tables- Part II**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + - 1. 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. If we let represent the number of cans, what is the expression that shows how much money is refunded?
  2. Use the algebraic expression to find out how much money Brett would receive if he returned cans.
  3. If Gavin needs to earn for returning cans, how many cans does he need to collect and return?
  4. How is part (d) different from part (c)?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

|  |  |
| --- | --- |
| Hours worked () | Money earned in dollars () |
|  |  |
|  |  |
|  |  |
|  |  |
| *h* |  |
|  | *e* |

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

Two Step Expressions

3. Pizza Queen has a special offer on lunch pizzas each! They charge an additional delivery fee of , 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 pizzas delivered.

|  |  |
| --- | --- |
| **Number of Pizzas Delivered** | **Total Cost in Dollars** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Mathematical Modeling Exercise**

4. 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. A model is shown below. (Use the model to help when completing the table)

|  |  |
| --- | --- |
| **Number of Square Tables** | **Number of Seats at the Table** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

It is impractical to make a model of pushing tables together to make a long rectangle.

* + - * 1. a. If we did have a rectangle that long, how many chairs would fit on the long sides of the table?
        2. b. How many chairs fit on the ends of the long table?
        3. c. How many chairs fit in all? Record it on your table.
        4. d. Work with your partner to determine how many chairs would fit around a very long rectangular table if square tables were pushed together?
        5. e. If we let represent the number of square tables that make one long rectangular table, what is the
        6. expression for the number of chairs that will fit around it?

5. Mr. Gee’s class orders paperback books from a book club. The books cost each. Shipping charges are set at flat fee of , regardless of the number of books purchased.

* 1. Create a table of values that shows the relationship between the number of books that Mr. Gee’s class buys , and the amount of money they spend, , in dollars.

|  |  |
| --- | --- |
| **Number of Books Ordered ()** | **Amount of Money Spent in Dollars (*c*)** |
|  |  |
|  |  |
|  |  |
| 7 |  |
| 10 |  |
|  |  |

* 1. If you know how many books Mr. Gee’s class orders, can you determine how much money they spend? Write the corresponding expression.
  2. Use your expression to determine how much Mr. Gee’s class spent buying books.

6. A phone case costs on Amazon. The company charges a fixed shipping and handling fee of , no matter how many cases are purchased.

* 1. Create a table of values that shows the relationship between the number of phone cases Uriah buys, , and the amount of money Uriah spends, , in dollars.

|  |  |
| --- | --- |
| **Number of cases Uriah Buys ()** | **Total Cost in Dollars ()** |
|  |  |
|  |  |
|  |  |
| 10 |  |
| 14 |  |
|  |  |
|  |  |

* 1. If you know how many phone cases Uriah orders, can you determine how much money she spends? Write the corresponding expression.
  2. Use your expression to determine how much Uriah spent buying phone cases.