1.2 Writing Linear Functions

FOCUSING QUESTION What are the characteristics of a linear function?

LEARNING OUTCOMES

- I can determine patterns that identify a linear function from its related finite differences.
- I can determine the linear function from a table using finite differences, including any restrictions on the domain and range.
- I can analyze patterns to connect the table to a function rule and communicate the linear pattern as a function rule.

ENGAGE

Marcus works in an orchard. Each row in the orchard contains 20 trees. How can Marcus use this information to make a table of values to represent the number of trees in the orchard?

EXPLORE

Miranda and her family will spend their summer vacation on the beach. They plan to rent a beach house that has a fixed cleaning fee and a daily rental fee. The table below shows the rental cost for each of a certain number of days.

NUMBER OF DAYS	RENTAL COST
1	$170
2	$285
3	$400
4	$515
5	$630
6	$745
7	$860

1. What is the difference between the numbers of days in consecutive rows in the table?

2. What is the difference between the rental cost in consecutive rows in the table?

3. Use the pattern in the table to predict the rental cost for 0 days.

4. Based on the pattern in the table, what do you think the cleaning fee is? Explain how you know.

5. Based on the pattern in the table, what do you think the daily rental fee is? Explain how you know.

6. Use the pattern in the table to write an equation that shows the relationship between n, the number of days the beach house will be rented and r, the total rental cost.

Miranda and her sister have pooled their money for meals. From the initial amount of money they placed in an envelope, they will spend a certain amount each day on food. The table below shows the balance of money remaining in the envelope after a certain number of days.

NUMBER OF DAYS	BALANCE
1	$225
2	$190
3	$155
4	$120
5	$85
6	$50
7	$15

7. What is the difference between the numbers of days in consecutive rows in the table?

8. What is the difference between the balances in consecutive rows in the table?

9. Use the patterns in the table to predict the balance on day 0.

10. Based on the patterns in the table, how much money do you think Miranda and her sister initially pooled? Explain how you know.

11. Based on the patterns in the table, how much money did Miranda and her sister spend on meals each day? Explain how you know.

12. Use the patterns in the table to write an equation that shows the relationship between n, the number of days of the vacation and b, the balance of pooled money remaining.

REFLECT

- **What do you notice about the differences in values for successive table rows for both the independent and dependent variable?**

- **What relationship exists between the ratio of the differences in the dependent variable to the differences in the independent variable and the equations that you have written?**

NOTES