Name _____ Date _____

Performance Task

Describing Change

Instructional Overview	
Launch Question	How can you use algebraic expressions to predict change over time in different real-life situations?
Summary	Students are given data about change over time in a variety of different situations. They use this data to determine how the data changes. Students then write an expression to model the change, if possible. They use the expression to make predictions.
Teacher Notes	Remind students that when writing expressions, they need to determine how the data is changing in order to determine which operation should be used in the expression. If needed, have students work in pairs to discuss each problem, identifying key words that imply math operations as they work.
Supplies	Copies of the task
Mathematical Discourse	Are modeling equations useful even when their predictions are not very accurate?
Writing/Discussion Prompts	1. Data can be presented in many different ways. Which ways do you prefer? Do different presentations make sense in different settings? How would you decide which method of presenting data to use? 2. How does the period of time used for data collection affect the accuracy of the model created from that data?

Curriculum Content	
Content Objectives	• The student will use variables to represent numbers in algebraic expressions. • The student will write algebraic expressions.
Mathematical Practices	• Decipher relationships in problems, solutions, and mathematical representations. Students will evaluate whether data presented in different forms represent linear change. • Discern and employ patterns and structures. Students will look closely to discern a pattern in the data and represent that pattern with an expression.

Chapter 3 **Performance Task** (continued)

Rubric

Describing Change	Points	

1. The student correctly analyzes the change and writes an expression.
  a. $0
  b. The balance increases $25 each week.
  c. The amount in the account after x weeks is $25x$.
  d. The next value, the amount after 6 weeks, will be $25 \bullet 6 = 150$. There will be $150 in the account.
	4	Total possible points

	1	Point for each correct part

2. The student correctly analyzes the change and writes an expression.
  a. $57°F$
  b. The temperature drops about $2°F$ each day.
  c. The temperature on day x is about $57 - 2x$.
  d. The temperature on September 22 will be about $43°F$, but the model will not be accurate for long.
	4	Total possible points

	1	Point for each correct part

3. The student correctly analyzes the change and states why an expression cannot be written.
  a. 27 in.
  b. Your cousin's height changes by a different amount each year.
  c. Because the growth rate is not constant, we cannot write an expression of the form $ax + b$ to model your cousin's growth.
	3	Total possible points

	1	Point for each correct part

4. The student correctly analyzes the changes, states why an expression cannot be written for Plant A, and writes an expression for Plant B.
Plant A:
  a. 2 in.
  b. The plant height increases and then decreases.
  c. Because the growth rate is not constant, we cannot write an expression of the form $ax + b$ to model the growth of this plant.
Plant B:
  a. 2 in.
  b. The height changes by about 0.5 inch every 15 days.
  c. The height of the plant can be approximated by the expression $2 + 0.5x$, where x represents the number of 15-day periods.
  d. The plant's height at 90 days $(x = 6)$ will be about
    $2 + 0.5(6) = 5$ inches.
	7	Total possible points

	1	Point for each correct part
Mathematical Practices: Discern and employ patterns and structures. Students will look closely to discern a pattern in the data and represent that pattern with an expression.	**2**	The student correctly analyzes the situations, organizes the work, and presents ideas clearly. Award partial credit as needed.
Total Points	**20 points**	

Performance Task (continued)
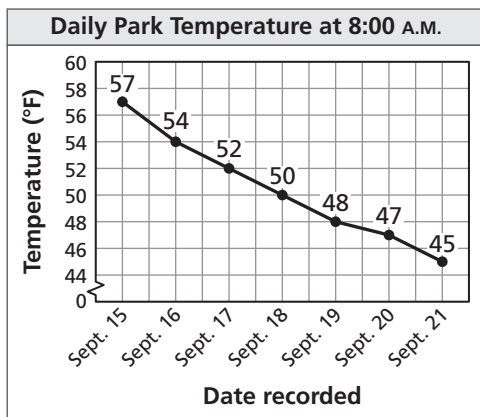
Describing Change

How can you use algebraic expressions to predict change over time in different real-life situations?

Change is everywhere. A teen measures the growth of the balance in a savings account. A park ranger observes changes in temperature. A parent records the growth of a child. A scientist measures the growth of two plants. Answer the following questions for each data set.

    a. What is the first recorded value in the data set?

    b. How much does the recorded value change each time period? Does the recorded value change by approximately the same amount each period?

    c. Write an expression of the form $ax + b$ to model the data set, or explain why this type of expression is not appropriate.

    d. Use your expression to predict the next value, if possible.

1. Your sister is enjoying her first job—especially the paychecks! She opens a savings account and deposits part of her paycheck each week.

Date	Transaction	Deposit	Withdrawal	Interest	Balance
	Starting balance				$0.00
6/2	Deposit #1	$25.00			$25.00
6/9	Deposit #2	$25.00			$50.00
6/16	Deposit #3	$25.00			$75.00
6/23	Deposit #4	$25.00			$100.00
6/30	Deposit #5	$25.00			$125.00

2. Winter is coming, and the park ranger enjoys watching the changing of the seasons. Each morning, the park ranger records the outside temperature and plots it in a graph to watch how it is changing.
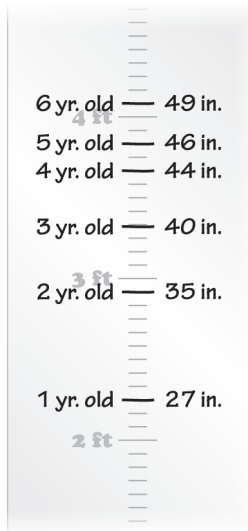

Daily Park Temperature at 8:00 A.M.

Performance Task (continued)

Describing Change

3. Your cousin is starting first grade this year. His parents have been tracking his growth since he was a toddler. They record his height on his birthday each year on a growth chart.

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6 yr. old —— 49 in.
    4 ft
5 yr. old —— 46 in.
4 yr. old —— 44 in.

3 yr. old —— 40 in.

    3 ft
2 yr. old —— 35 in.

1 yr. old —— 27 in.

    2 ft
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4. A botanist, a scientist who studies plants, is conducting an experiment about the effects of different kinds of lighting on the growth of a plant. She starts with two plants of equal size and measures them regularly to compare their growth. The table below shows the data she has recorded in her journal.

	Plant A	Plant B
Day 0	2"	2"
Day 15	2.4"	2.5"
Day 30	2.6"	2.9"
Day 45	2.5"	3.4"
Day 60	2.3"	3.8"
Day 75	2.2"	4.3"