NAME CLASS DATE

Algebra 1 Unit 1 Practice

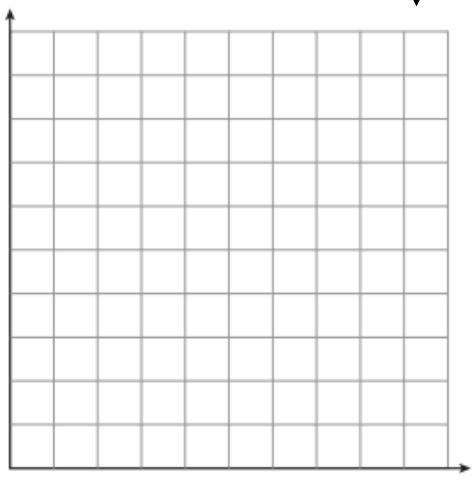
LESSON 1-1

The periodic comet named Johnson has been seen at every return since its discovery in 1949, as shown in the table below.

Occurrence	Year Seen
1	1949
2	1956
3	1963
4	1970

Use the table for Items 1–5.

1. Describe any patterns you see in the table.
2. Write the values in the second column of the table as a sequence. Identify the common difference.
3. If the pattern continues, in which of the following years will the comet be visible again?
   - **A.** 2017
   - **B.** 2018
   - **C.** 2019
   - **D.** 2020
4. About how many times would the Johnson comet be visible during a typical person's lifetime? Explain your reasoning.
5. **Reason abstractly.** A man was born during a year in which the Johnson comet was visible in the sky. The next time that the comet was visible after the man's birth year was in 2005. In what year was the man born?



LESSON 1-2

Emilio is using pennies to make a pattern. He arranges his pennies as shown below.

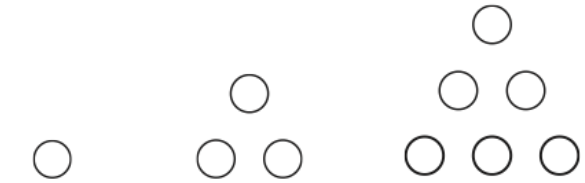


Figure 1 Figure 2 Figure 3

Use the pattern for Items 6–11.

6. Draw the next three figures in the pattern. Make a table to show the relationship between the figure number and the number of pennies.
7. **Attend to precision.** Graph the pattern on a coordinate grid. Be sure to label your scales and your axes.
8. Write the numbers of pennies as a sequence. Does your sequence have a common difference? If so, identify it. If not, explain why not.
9. Emilio is using a guess and check strategy to write an expression for the number of pennies in any figure. He writes the expression $n(n + 1)$, where n represents the figure number.
   - **a.** Make a table to show the value of Emilio's expression for $n = 1, 2, 3, 4, 5$, and 6. How does this show that Emilio's expression is incorrect?
   - **b.** Compare the values you found for Emilio's expression in part a to the number of pennies in each figure. Use what you observe to modify Emilio's expression so that it is correct. Explain your reasoning.
10. How many pennies would be required to make Figure 25?
    - **A.** 50
    - **B.** 125
    - **C.** 325
    - **D.** 650
11. Suppose that you have 100 pennies. What is the figure number of the largest figure in Emilio's pattern that you can make? Will you use all 100 pennies? Explain.