Dots Tell Patterns

Sort output patterns on number lines.

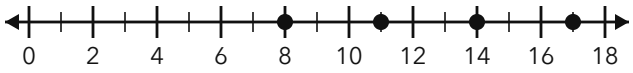
A1.F.2 "Recognize and understand that families of functions are defined by their characteristics. Distinguish between linear and nonlinear (including exponential) functions..."

NAME _____ DATE _____

LINEAR

Read the dots from left to right. If they show outputs at equal input steps, a linear pattern adds the same amount each time.

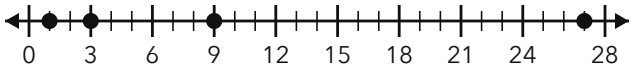
The outputs are 8, 11, 14, and 17.



EXPONENTIAL

Read the dots from left to right. If they show outputs at equal input steps, an exponential pattern multiplies by the same factor each time.

The outputs are 1, 3, 9, and 27.



1 SORT

8 items

For each figure, read the four dots as outputs at equal input steps, then circle Linear or Exponential.

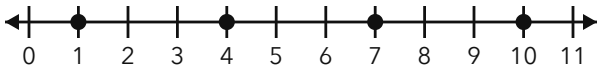
1. 

Figure 1

LINEAR GEOMETRIC

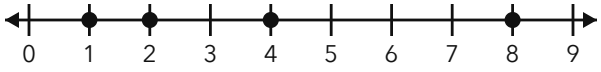
2. 

Figure 2

LINEAR GEOMETRIC

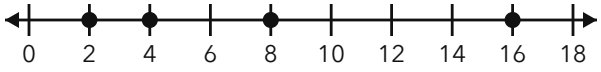
3. 

Figure 3

LINEAR GEOMETRIC

4. 

Figure 4

LINEAR GEOMETRIC

5. 

Figure 5

LINEAR **GEOMETRIC**

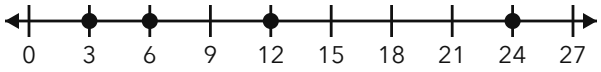
6. 

Figure 6

LINEAR **GEOMETRIC**

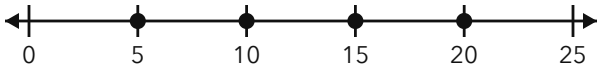
7. 

Figure 7

LINEAR **GEOMETRIC**

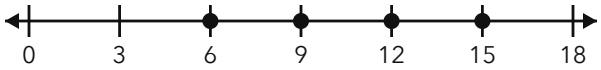
8. 

Figure 8

LINEAR **GEOMETRIC**

2 PROVE IT

Explain your thinking

choose two figures, one from each category, and explain how you knew where each belongs.

ITEM # _____ **HOW I KNEW** _____

ITEM # _____ **HOW I KNEW** _____

3 MAKE YOUR OWN

One of each

write four outputs at equal input steps for one new linear pattern and one new exponential pattern.

LINEAR

GEOMETRIC

CHALLENGE

The dots in Figure 3 show outputs at $x = 0, 1, 2$, and 3. Write a rule in the form $g(x) = a \cdot b^x$ that fits them.

ANSWER KEY # Dots Tell Patterns

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	Figure 1 (numberline)	**LINEAR**	The outputs increase by 3 each time.
2	Figure 2 (numberline)	**GEOMETRIC**	The outputs double each time.
3	Figure 3 (numberline)	**GEOMETRIC**	The outputs double each time.
4	Figure 4 (numberline)	**LINEAR**	The outputs increase by 4 each time.
5	Figure 5 (numberline)	**LINEAR**	The outputs increase by 3 each time.
6	Figure 6 (numberline)	**GEOMETRIC**	The outputs double each time.
7	Figure 7 (numberline)	**LINEAR**	The outputs increase by 5 each time.
8	Figure 8 (numberline)	**LINEAR**	The outputs increase by 3 each time.

PART 2 · PROVE IT

Task: choose two figures, one from each category, and explain how you knew where each belongs. Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 · MAKE YOUR OWN (SAMPLE ANSWERS)

- **LINEAR**: 10, 13, 16, 19.
- **GEOMETRIC**: Exponential: 5, 10, 20, 40.

Challenge: $g(x) = 2 \cdot 2^x$.

For Part 2, an explanation should identify the constant difference or factor. For example, Figure 1 adds 3 each time, while Figure 3 multiplies by 2 each time.