Spot the Pattern

Sort output patterns by the rules they fit.

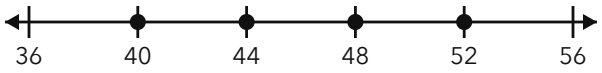
PA.A.1 "Explain the concept of function in mathematical situations and distinguish between the concepts of linear and nonlinear functions. Recognize that a function is a relationship between an independent variable and a dependent variable in..."

NAME _____ DATE _____

LINEAR

Read the four dots from left to right as outputs for inputs 0, 1, 2, and 3. If the gaps between outputs are equal, a rule in the form y = mx + b fits all four.

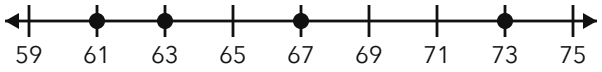
The outputs are 40, 44, 48, and 52. Each gap is 4.



NONLINEAR

Read the four dots from left to right as outputs for inputs 0, 1, 2, and 3. If the gaps between outputs are not all equal, no rule in the form y = mx + b fits all four.

The outputs are 61, 63, 67, and 73. The gaps are 2, 4, and 6.



1 SORT

8 items

Read each figure's four dots from left to right as outputs for inputs 0, 1, 2, and 3; circle LINEAR or NONLINEAR for each, then pick two figures and explain how their gaps prove your choices.

1.

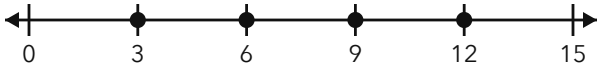


Figure 1

LINEAR NONLINEAR

2.

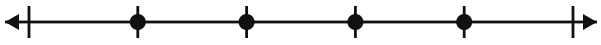


Figure 2

LINEAR NONLINEAR

3.

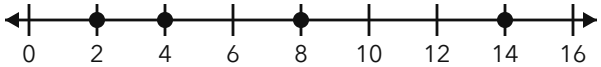


Figure 3

LINEAR NONLINEAR

4.



Figure 4

LINEAR NONLINEAR

5.

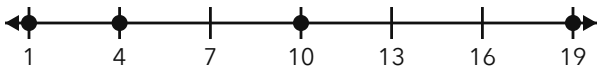


Figure 5

LINEAR **NONLINEAR**

6.

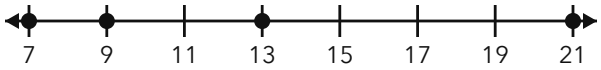


Figure 6

LINEAR **NONLINEAR**

7.

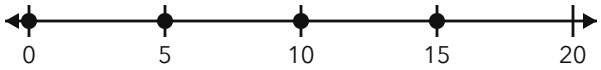


Figure 7

LINEAR **NONLINEAR**

8.



Figure 8

LINEAR **NONLINEAR**

2 PROVE IT

Explain your thinking

Pick two items from Part 1. For each one, tell how you knew where it belonged.

ITEM # _____ **HOW I KNEW** _____

ITEM # _____ **HOW I KNEW** _____

3 MAKE YOUR OWN

One of each

Write four outputs for inputs 0, 1, 2, and 3 that fit a linear rule, then write four that do not; list each set in input order.

LINEAR

NONLINEAR

CHALLENGE

Change exactly one output in Figure 2 so the four outputs become nonlinear; list the new outputs in order and explain why they are nonlinear.

ANSWER KEY # Spot the Pattern

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	Figure 1 (numberline)	**LINEAR**	The output gaps are 3, 3, and 3.
2	Figure 2 (numberline)	**LINEAR**	The output gaps are 2, 2, and 2.
3	Figure 3 (numberline)	**NONLINEAR**	The output gaps are 2, 4, and 6.
4	Figure 4 (numberline)	**LINEAR**	The output gaps are 6, 6, and 6.
5	Figure 5 (numberline)	**NONLINEAR**	The output gaps are 3, 6, and 9.
6	Figure 6 (numberline)	**NONLINEAR**	The output gaps are 2, 4, and 8.
7	Figure 7 (numberline)	**LINEAR**	The output gaps are 5, 5, and 5.
8	Figure 8 (numberline)	**NONLINEAR**	The output gaps are 6, 9, and 9.

PART 2 · PROVE IT

Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 · MAKE YOUR OWN (SAMPLE ANSWERS)

- **LINEAR**: 4, 7, 10, 13.
- **NONLINEAR**: 4, 7, 11, 16.

Challenge: 8, 10, 12, 15. Only the last output changed. The gaps are 2, 2, and 3, so no linear rule fits all four outputs.

For Part 2, accept any two correctly classified figures with explanations that compare their three output gaps. For Part 3, check that each set contains four outputs in input order and has the stated pattern.