Spot the Pattern

Outputs for inputs 0, 1, 2, 3, read left to right

PA.A.1.3 "Identify a function as linear if it can be expressed in the form y = mx + b or if its graph is a non-vertical straight line."

NAME _____ DATE _____

LINEAR

Each function uses only the inputs 0, 1, 2, and 3. If its outputs change by the same amount each step, a rule in the form y = mx + b fits all four inputs.

Outputs: 1, 3, 5, 7.



NONLINEAR

Each function uses only the inputs 0, 1, 2, and 3. If its outputs do not change by the same amount each step, no rule in the form y = mx + b fits all four inputs.

Outputs: 1, 2, 4, 8.



1 SORT

8 items

Circle LINEAR or NONLINEAR for each figure; in Part 2, choose one figure from each category and explain how you knew.

1.

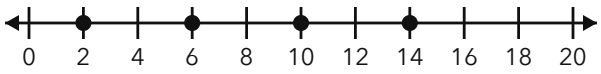


Figure 1

LINEAR NONLINEAR

2.



Figure 2

LINEAR NONLINEAR

3.



Figure 3

LINEAR NONLINEAR

4.

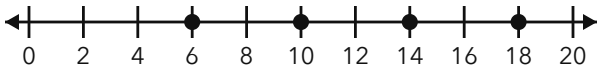


Figure 4

LINEAR NONLINEAR

5.

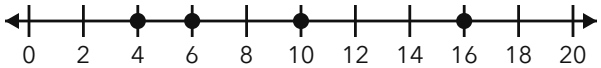


Figure 5

LINEAR **NONLINEAR**

6.



Figure 6

LINEAR **NONLINEAR**

7.



Figure 7

LINEAR **NONLINEAR**

8.



Figure 8

LINEAR **NONLINEAR**

2 PROVE IT

Explain your thinking

Choose one figure from each category and explain how you knew.

ITEM # _____ **HOW I KNEW** _____

ITEM # _____ **HOW I KNEW** _____

3 MAKE YOUR OWN

One of each

Write one new set of four outputs for a linear function and one for a nonlinear function, using inputs 0, 1, 2, 3 in that order.

LINEAR

NONLINEAR

CHALLENGE

For your linear example, write a rule in the form y = mx + b that gives all four outputs.

ANSWER KEY

Spot the Pattern

GRADE 8 · PA.A.1.3

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	Figure 1 (numberline)	**LINEAR**	The outputs increase by 4 each step.
2	Figure 2 (numberline)	**LINEAR**	The outputs increase by 4 each step.
3	Figure 3 (numberline)	**NONLINEAR**	The outputs increase by 2, then 4, then 6.
4	Figure 4 (numberline)	**LINEAR**	The outputs increase by 4 each step.
5	Figure 5 (numberline)	**NONLINEAR**	The outputs increase by 2, then 4, then 6.
6	Figure 6 (numberline)	**NONLINEAR**	The outputs increase by 4, then 2, then 8.
7	Figure 7 (numberline)	**LINEAR**	The outputs increase by 6 each step.
8	Figure 8 (numberline)	**LINEAR**	The outputs increase by 6 each step.

PART 2 · PROVE IT

Task: Choose one figure from each category and explain how you knew.
Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 · MAKE YOUR OWN (SAMPLE ANSWERS)

- **LINEAR**: 3, 8, 13, 18.
- **NONLINEAR**: 3, 5, 9, 17.

Challenge: For the sample linear outputs 3, 8, 13, 18, the rule is $y = 5x + 3$.

For Part 2, accept explanations that compare the changes between consecutive outputs. Because each function is defined only for inputs 0, 1, 2, and 3, equal changes show that $y = mx + b$ fits its entire domain.