Symmetry Signals

Sort functions by how their outputs reflect.

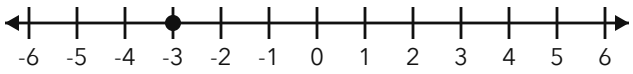
A3.G.41 "Relate symmetry of the behavior of even and odd functions."

NAME _____ DATE _____

EVEN FUNCTION

An even function has f(-x) = f(x), so its graph mirrors across the y-axis. When the inputs are -1 and 1, both outputs land on the same dot.

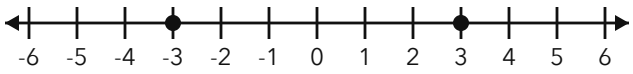
For inputs -1 and 1, both outputs are -3.



ODD FUNCTION

An odd function has f(-x) = -f(x), so its graph matches after a half-turn about the origin. When the inputs are -1 and 1, the outputs land on opposite sides of 0 at equal distances.

For inputs -1 and 1, the outputs are -3 and 3.



1 SORT

8 items

Each number line shows all outputs for a function whose only inputs are -1 and 1; circle EVEN or ODD for each figure, remembering that one dot means both outputs land there.

1.

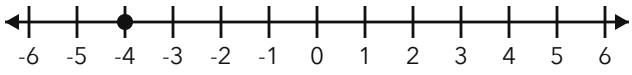


Figure 1

EVEN ODD

2.

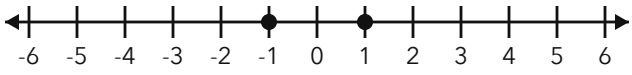


Figure 2

EVEN ODD

3.

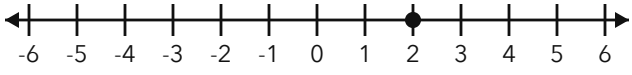


Figure 3

EVEN ODD

4.

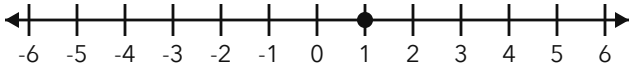


Figure 4

EVEN ODD

5.

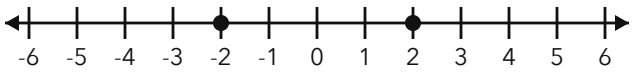


Figure 5

EVEN **ODD**

6.



Figure 6

EVEN **ODD**

7.



Figure 7

EVEN **ODD**

8.



Figure 8

EVEN **ODD**

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

PROVE IT: Pick one EVEN figure and one ODD figure, and explain how you know each category. MAKE YOUR OWN: Write one new even function and one new odd function on the domain {-1, 1}; give both outputs for each.

EVEN

ODD

CHALLENGE

Extend an odd function with f(-1) = -1 and f(1) = 1 to the domain {-2, -1, 0, 1, 2}. Give the three missing outputs and explain why f(0) has only one possible value.

Symmetry Signals

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	Figure 1 (numberline)	**EVEN**	Both inputs have output -4.
2	Figure 2 (numberline)	**ODD**	The outputs -1 and 1 are opposites.
3	Figure 3 (numberline)	**EVEN**	Both inputs have output 2.
4	Figure 4 (numberline)	**EVEN**	Both inputs have output 1.
5	Figure 5 (numberline)	**ODD**	The outputs -2 and 2 are opposites.
6	Figure 6 (numberline)	**ODD**	The outputs -4 and 4 are opposites.
7	Figure 7 (numberline)	**EVEN**	Both inputs have output -2.
8	Figure 8 (numberline)	**EVEN**	Both inputs have output 5.

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)

- **EVEN**: f(-1) = 6 and f(1) = 6.
- **ODD**: f(-1) = 5 and f(1) = -5.

Challenge: For example, f(-2) = -4, f(0) = 0, and f(2) = 4. The outputs at -2 and 2 are opposites. Since 0 is its own opposite, f(0) must be 0.

For PROVE IT, accept any correctly identified even and odd figures with explanations that compare their outputs. The figures use only inputs -1 and 1; a zero-only function would be both even and odd, so it is not included.