Pick the Piece

Sort inputs, explain your choices, then graph.

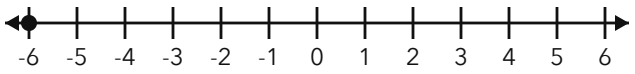
A1P.AF.H.30.b "Graph piecewise-defined functions, including step functions and absolute value functions."

NAME _____ DATE _____

CONSTANT PIECE

Choose this category when the marked input uses a rule that gives the same output every time. That piece of the graph is horizontal.

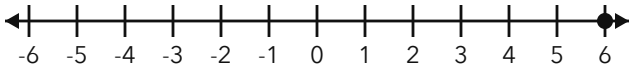
If $g(x)=7$ for $x<-1$ and $g(x)=|x+1|$ for $x\geq -1$, the marked input -6 uses $g(x)=7$.



ABSOLUTE-VALUE PIECE

Choose this category when the marked input uses a rule with absolute-value bars. Depending on the allowed inputs, that piece of the graph may be a V or one side of a V.

If $h(x)=2$ for $x<3$ and $h(x)=|x-3|$ for $x\geq 3$, the marked input 6 uses $h(x)=|x-3|$.



1 SORT

8 items

SORT: For $f(x)=3$ when $x<1$ and $f(x)=|x-1|-2$ when $x\geq 1$, circle the rule used at each marked input; PROVE IT: choose one item from each category and explain how you knew.

1.

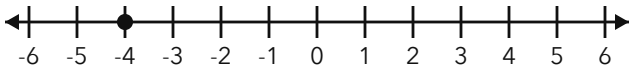


Figure 1

CONSTANT ABSOLUTE

2.

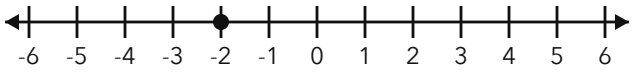


Figure 2

CONSTANT ABSOLUTE

3.

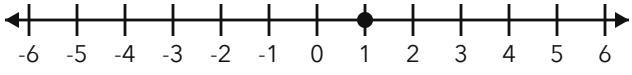


Figure 3

CONSTANT ABSOLUTE

4.

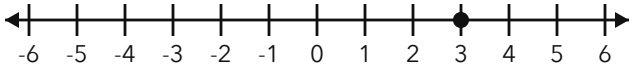


Figure 4

CONSTANT ABSOLUTE

5.

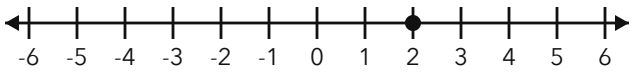


Figure 5

CONSTANT **ABSOLUTE**

6.



Figure 6

CONSTANT **ABSOLUTE**

7.



Figure 7

CONSTANT **ABSOLUTE**

8.



Figure 8

CONSTANT **ABSOLUTE**

2 PROVE IT

Explain your thinking

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

ITEM # _____ **HOW I KNEW** _____

ITEM # _____ **HOW I KNEW** _____

3 MAKE YOUR OWN

One of each

MAKE YOUR OWN: Choose one new input for each category, mark each input on a number line, and write its f(x) value.

CONSTANT

ABSOLUTE

CHALLENGE

On coordinate axes, graph f(x) for $-4 \le x \le 4$, showing an open circle and a filled circle at x=1 and labeling three other points on each piece.

ANSWER KEY # Pick the Piece

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	Figure 1 (numberline)	**CONSTANT**	$-4<1$, so $f(-4)=3$.
2	Figure 2 (numberline)	**CONSTANT**	$-2<1$, so $f(-2)=3$.
3	Figure 3 (numberline)	**ABSOLUTE**	$1\geq 1$, so $f(1)=\lvert 1-1\rvert-2=-2$.
4	Figure 4 (numberline)	**ABSOLUTE**	$3\geq 1$, so $f(3)=\lvert 3-1\rvert-2=0$.
5	Figure 5 (numberline)	**ABSOLUTE**	$2\geq 1$, so $f(2)=\lvert 2-1\rvert-2=-1$.
6	Figure 6 (numberline)	**CONSTANT**	$-3<1$, so $f(-3)=3$.
7	Figure 7 (numberline)	**CONSTANT**	$-1<1$, so $f(-1)=3$.
8	Figure 8 (numberline)	**ABSOLUTE**	$4\geq 1$, so $f(4)=\lvert 4-1\rvert-2=1$.

PART 2 · PROVE IT

Task: Choose one item 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)

- **CONSTANT**: Mark $x=-5$; $f(-5)=3$.
- **ABSOLUTE**: Mark $x=5$; $f(5)=\lvert 5-1\rvert-2=2$.

Challenge: Draw $y=3$ from $(-4,3)$ to an open circle at $(1,3)$, labeling $(-3,3)$, $(-2,3)$, and $(-1,3)$. Draw $y=x-3$ from a filled circle at $(1,-2)$ to $(4,1)$, labeling $(2,-1)$, $(3,0)$, and $(4,1)$.

For PROVE IT, accept any two items from different categories whose explanations compare the marked inputs with 1 and identify the matching rules. The absolute-value piece of this graph is one side of a V because its domain begins at its vertex.