LESSON MAKER PRO

Absolute Value Paths

Solve, graph, and model distance from a center value.

HIGH SCHOOL · MA.912.AR.4

MA.912.AR.4 "Write, solve and graph absolute value equations, functions and inequalities in one and two variables."

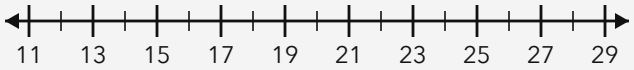
NAME _____ DATE _____

DISTANCE FROM A CENTER

Absolute value shows distance from a center. For |x-a|=b, find the two numbers that are b units from a when b is positive. For an absolute value graph y=a|x-h|+k, the vertex is (h,k), and inequalities use open or solid boundaries based on whether equality is included.

WORKED EXAMPLE

Solve |x-20|=7. Use the number line to plot both solutions.



1. |x-20|=7 means x is 7 units from 20.
2. Write x-20=7 or x-20=-7.
3. Solve: x=27 or x=13.
4. Plot solid points at 13 and 27.

Answer: x=13 or x=27

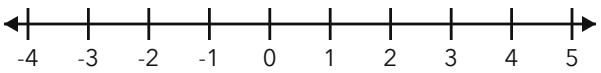
PRACTICE 6 problems

1 Solve |x+8|=2.

ANSWER _____

_____

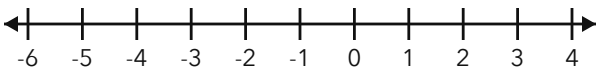
2 Solve |2x-1|=7. Use the number line to plot both solutions.



ANSWER _____

_____

3 Graph $|x+1|<4$ on the number line. Then write the solution as a compound inequality.



ANSWER _____

_____

4 For $f(x)=|x+2|-3$, find $f(-5)$ and $f(1)$.

ANSWER _____

_____

5 Write an absolute value function with vertex (-2,1) that passes through (0,5).

ANSWER _____

6 Solve $|3x+6|\geq 12$. Write the solution using or.

ANSWER _____

_____

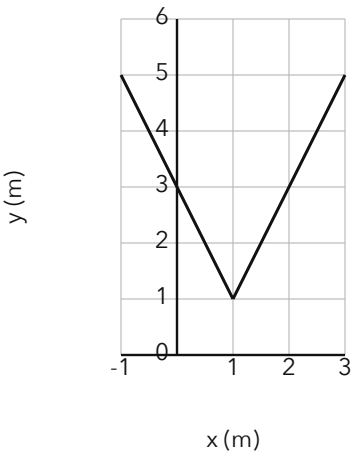
APPLY IT Show your work

1 A phone battery performs normally when its temperature is within 3°C of 18°C. Write an absolute value inequality for the acceptable temperature t, then solve it.

WORK SPACE

ANSWER _____

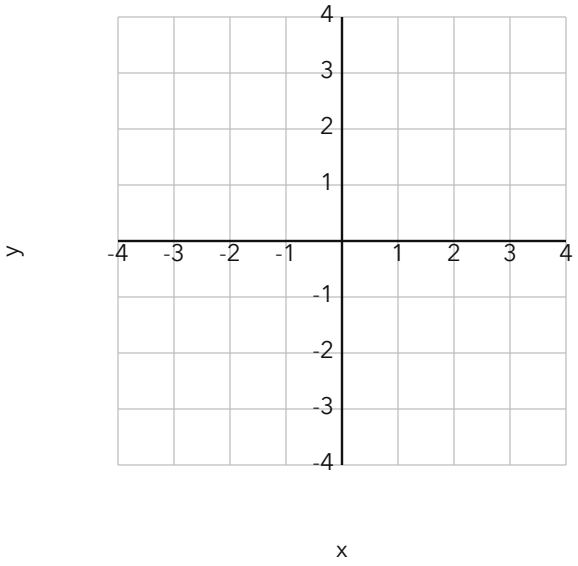
2 A student designs a V-shaped bike ramp. On the graph, x is horizontal position in meters and y is height in meters. Write the function shown, then find the height when x=3.



ANSWER _____

CHALLENGE One step up

Graph y≥|x-1|-2 on the coordinate plane. State the vertex, tell whether the boundary is solid or dashed, and describe the shaded region.



WORK SPACE AND ANSWER

ANSWER KEY

Absolute Value Paths

HIGH SCHOOL · MA.912.AR.4

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve |x+8|=2.	**x=-10 or x=-6**
2	Solve |2x-1|=7. Use the number line to plot both solutions.	**x=-3 or x=4**
3	Graph |x+1|<4 on the number line. Then write the solution as a compound inequality.	**-5<x<3, with open circles at -5 and 3**
4	For f(x)=|x+2|-3, find f(-5) and f(1).	**f(-5)=0 and f(1)=0**
5	Write an absolute value function with vertex (-2,1) that passes through (0,5).	**y=2|x+2|+1**
6	Solve |3x+6|≥12. Write the solution using or.	**x≤-6 or x≥2**

PART 2 · APPLY IT

1. **|t-18|≤3; 15≤t≤21** Within 3°C of 18°C means the distance between t and 18 is at most 3. Subtract and add 3 to 18 to find the endpoints.
2. **y=2|x-1|+1; y=5 when x=3** The vertex is (1,1), and the height changes by 2 for each horizontal unit from the vertex. Substitute x=3 into y=2|x-1|+1.

CHALLENGE

Vertex (1,-2). Draw a solid V-shaped boundary y=|x-1|-2 and shade the region on and above the V.

Accept equivalent equation forms, such as y=2|x+2|+1 or y=2|x-(-2)|+1. For graphs, accept accurate plotted endpoints, vertices, boundary style, and shading.