LESSON MAKER PRO

Distance From Center

Write, solve, and graph absolute value inequalities.

HIGH SCHOOL · MA.912.AR.4.2

MA.912.AR.4.2 "Given a mathematical or real-world context, write and solve one-variable absolute value inequalities. Represent solutions algebraically or graphically."

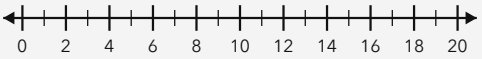
NAME _____ DATE _____

DISTANCE RULES

|x - a| is the distance between x and a on a number line. If |x - a| <= b, x is within b units of a, so a - b <= x <= a + b. If |x - a| > b, x is farther than b units from a, so x < a - b or x > a + b.

WORKED EXAMPLE

Solve |x - 11| <= 7. Use the number line to graph the solution.



1. -7 <= x - 11 <= 7
2. Add 11 to all three parts.
3. 4 <= x <= 18
4. Plot closed points at 4 and 18, then shade between them.

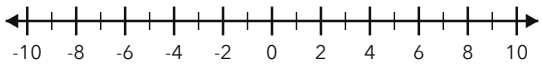
Answer: 4 <= x <= 18, or [4, 18]

PRACTICE 6 problems

1 Solve |x + 5| < 3. Write the solution in interval notation.

ANSWER _____

2 Solve |x - 1| >= 5. Graph the solution on the number line.



ANSWER _____

3 Solve 3|x - 2| <= 15.

ANSWER _____

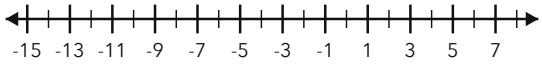
4 Solve |4x + 1| > 9.

ANSWER _____

5 Solve |x/3 + 2| < 5.

ANSWER _____

6 Solve 2|x + 4| >= 18. Graph the solution on the number line.



ANSWER _____

APPLY IT Show your work

1 A music venue keeps the temperature within 3 degrees of 68°F during a concert. Let x be the temperature in °F. Write and solve an absolute value inequality for the possible temperatures.

WORK SPACE

ANSWER _____

2 For an online gaming tournament, a player's internet latency must be less than 8 milliseconds away from 40 milliseconds. Let x be the latency in milliseconds. Write and solve an absolute value inequality for acceptable latency.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Solve 2 < |x - 3| <= 6. Write the solution in interval notation. Then explain why the endpoints at -3 and 9 are included, but the endpoints at 1 and 5 are not.

WORK SPACE AND ANSWER

ANSWER KEY

Distance From Center

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve |x + 5| < 3. Write the solution in interval notation.	**(-8, -2)**
2	Solve |x - 1| >= 5. Graph the solution on the number line.	**x <= -4 or x >= 6, or (-infinity, -4] U [6, infinity)**
3	Solve 3|x - 2| <= 15.	**-3 <= x <= 7**
4	Solve |4x + 1| > 9.	**x < -5/2 or x > 2**
5	Solve |x/3 + 2| < 5.	**-21 < x < 9**
6	Solve 2|x + 4| >= 18. Graph the solution on the number line.	**x <= -13 or x >= 5, or (-infinity, -13] U [5, infinity)**

PART 2 · APPLY IT

1. **|x - 68| <= 3; 65 <= x <= 71** The temperature can be at most 3 degrees away from 68. Solve -3 <= x - 68 <= 3 by adding 68 to all parts.
2. **|x - 40| < 8; 32 < x < 48** The latency must be less than 8 units from 40. Solve -8 < x - 40 < 8 by adding 40 to all parts.

CHALLENGE

[-3, 1) U (5, 9]. The values -3 and 9 are 6 units from 3, so they satisfy <= 6. The values 1 and 5 are 2 units from 3, so they do not satisfy 2 < |x - 3|.

Accept equivalent inequality notation or interval notation. For graphs, accept correct open or closed endpoints and shading in the correct region or regions.