

PART I GET STARTED**Today's Mathematics**

Use distance and compound inequalities to solve absolute-value inequalities.

Essential Question

Why do some absolute-value solutions lie between two endpoints and others outside them?

Name _____

Date _____

DO NOW

1. Solve $-2 \leq x + 1 < 5$.

2. Solve $2x < -6$ or $x - 1 \geq 3$.

3. Describe the meaning of $[-3, 4)$ and $(-\infty, -3) \cup [4, \infty)$.

SEE IT

A temperature must be within 3 degrees of 20°C , including the boundary. Write the allowable interval and describe the distance from 20.

Quick Write | 2 Minutes

What does $|x - 20| \leq 3$ say about distance? Predict how the answer changes when $\leq$ becomes $>$.

PART II INVESTIGATE**BUILD THE IDEA**

x	$ x - 2 $	$ x - 2 \leq 3?$	$ x - 2 > 3?$
-2			
-1			
2			
5			
6			

1. Use distance to solve and graph $|x - 2| \leq 3$ and $|x - 2| > 3$. Explain the choice of and or or.

2. Without case splitting, solve $|2x + 1| < -2$ and $|x - 4| \geq -1$.

3. Isolate the absolute value in $2|x + 1| - 3 \leq 5$. Then write and solve a compound inequality.

COMPARE AND EXPLAIN

Discuss your rule with a partner. Use a specific value or a number-line model to support it.

PART III MAKE SENSE AND PRACTICE

WHAT WE CAN CONCLUDE

For $c > 0$: $|A| < c$ means $-c < A < c$ (and); $|A| > c$ means $A < -c$ or $A > c$. Inclusive signs include both endpoints. Isolate the absolute value first. Because $|A| \geq 0$, examine zero or negative bounds before splitting. Absolute deviation from a target m is $|x - m|$.

WORKED MODEL

$$3|2x - 1| + 2 > 11$$

$$|2x - 1| > 3$$

$$2x - 1 < -3 \quad \text{or} \quad 2x - 1 > 3$$

$$x < -1 \quad \text{or} \quad x > 2$$

The two rays exclude -1 and 2 .

FOCUSED PRACTICE

Show your steps. Draw requested graphs in the workspace.

1. Solve and graph $|x + 3| \leq 4$.

2. Solve and graph $|2x - 1| > 5$.

3. Solve $2|x - 4| + 1 \leq 7$.

4. Solve $|x - 2| < 0$ and $|x - 2| \leq 0$.

5. Solve $|3x + 1| > -2$ and $|3x + 1| > 0$.

6. Prices are \$40, \$45, \$50, \$55, and \$60. Find the mean. Which prices have absolute deviation at most \$6? Write an inequality.

Math Write | 5 Minutes

Explain the distance meaning of less than and greater than absolute-value inequalities. Include why a negative bound needs special attention.

PART IV PUZZLE PRACTICE**Homework****What does absolute value measure?**

Complete each exercise. Match its answer to an answer-bank letter. Write that letter in every decoder box bearing the exercise number.

1. $|x - 1| \leq 3$

2. $|x + 2| > 4$

3. $|2x - 1| < 5$

4. $2|x - 3| + 1 \leq 5$

5. $|x + 7| < -1$

6. $|x - 4| \geq -2$

7. $|x - 2| \leq 0$

8. $|x - 2| > 0$

ANSWER BANKE: $x < 2$ or $x > 2$

A: no solution

S: $-2 < x < 3$ I: $x < -6$ or $x > 2$ D: $-2 \leq x \leq 4$ C: $x = 2$

N: all real numbers

T: $1 \leq x \leq 5$

1	2	3	4	5	6	7	8
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