


LESSON 5-5 Inequalities Involving Absolute Value

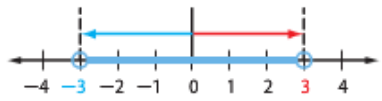
Then	Now	Why?
<ul style="list-style-type: none"> You solved equations involving absolute value. 	<ol style="list-style-type: none"> Solve and graph absolute value inequalities ($<$). Solve and graph absolute value inequalities ($>$). 	<ul style="list-style-type: none"> Some companies use absolute value inequalities to control the quality of their product. To make baby carrots, long carrots are sliced into 3-inch sections and peeled. If the machine is accurate to within $\frac{1}{8}$ of an inch, the length ranges from $2\frac{7}{8}$ inches to $3\frac{1}{8}$ inches.



$|x - mp| \leq d$ and $|x - mp| \geq d$

$mp = \text{midpoint}$
 $d = \text{distance}$

1 Absolute Value Inequalities ($<$) The inequality $|x| < 3$ means that the distance between x and 0 is less than 3.



So, $x > -3$ and $x < 3$. The solution set is $\{x \mid -3 < x < 3\}$.

When solving absolute value inequalities, there are two cases to consider.

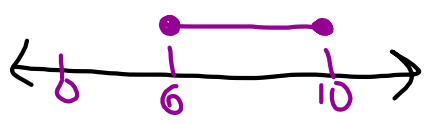
- Case 1** The expression inside the absolute value symbols is nonnegative.
- Case 2** The expression inside the absolute value symbols is negative.

The solution is the intersection of the solutions of these two cases.

Examples

1A. $|n - 8| \leq 2$

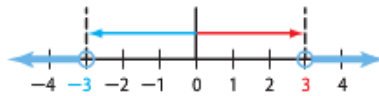
\ominus $n - 8 \geq -2$ \oplus $n - 8 \leq 2$
 $+8$ $+8$ $+8$ -8 -8
 $n \geq 6$ and $n \leq 10$
 $6 \leq n \leq 10$



1B. $|2c - 5| < -3$

\downarrow
 No solutions
 Hey! I don't gotta do this because absolute can't be smaller than a negative

2 Absolute Value Inequalities (>) The inequality $|x| > 3$ means that the distance between x and 0 is greater than 3.



So, $x < -3$ or $x > 3$. The solution set is $\{x | x < -3 \text{ or } x > 3\}$.

As in the previous example, we must consider both cases.

Case 1 The expression inside the absolute value symbols is nonnegative.

Case 2 The expression inside the absolute value symbols is negative.

Guided Practice

Solve each inequality. Then graph the solution set.

3A. $|2k + 1| > 7$

Handwritten work for 3A:

$2k + 1 < -7$ $2k + 1 > 7$

$-1 \quad -1$ -1

$2k < -8$ $2k > 6$

$k < -4$ or $k > 3$

3B. $|r - 6| \geq -5$

∞ solutions
 an absolute value has to be greater than a negative.

Check Your Understanding

= Step-by-Step Solutions begin on page R13.



Examples 1–3 Solve each inequality. Then graph the solution set.

1. $|a - 5| < 3$

2. $|u + 3| < 7$

3. $|t + 4| \leq -2$ ~~NO~~

4. $|c + 2| > -2$

5. $|n + 5| \geq 3$

6. $|p - 2| \geq 8$

Example 2 **7. FINANCIAL LITERACY** Jerome bought stock in his favorite fast-food restaurant chain at \$70.85. However, it has fluctuated up to \$0.75 in a day. Find the range of prices for which the stock could trade in a day.

Handwritten work for Example 2:

$|x - mp| \leq d$ $d = 0.75$
 $MP = 70.85$

$|x - 70.85| \leq 0.75$