Inequalities containing Absolute Value

Algorithm

1. **Isolate the absolute value**
2. **Using the definition of Absolute Value, set the expression and the opposite of the expression on the inside of the absolute value signs using the given inequality sign to the number on the outside**
3. **Solve the resulting two inequalities.**
4. **Abs V less than is "and"; Abs V greater then is an "or" statement**

2 Examples – Remember when you multiply or divide an inequality by a negative number to reverse the sign of the inequality

Example 1. Solve $|2x - 5| < 11$

If $2x - 5$ is positive, then **AND** **If $2x - 5$ is negative, then**

$2x - 5 < 11$ $-(2x - 5) < 11$

$2x < 16$ $2x - 5 > -11$

$x < 8$ $2x > -6$

$x > -3$

The solution is all the numbers between –3 and 8, $\{-3 < x < 8\}$

Example 2. SAME problem with a ">" sign: Solve $|2x - 5| > 11$

If $2x - 5$ is positive, then **OR** **If $2x - 5$ is negative, then**

$2x - 5 > 11$ $-(2x - 5) > 11$

$2x > 16$ $2x - 5 < -11$

$x > 8$ $2x < -6$

$x < -3$

The solution is all the numbers less than –3 or greater than 8, written $\{x < -3 \cup x > 8\}$

Solve and graph the following inequalities.

Hint, first determine, by inspection, if it is an "and" or "or" statement.

1. $|x| < 7$

2. $|x-1| \geq 8$

3. $|2x + 1| \leq 13$

4. $|x - 2| + 4 < 10$

5. $|2x - 3| \geq 13$

6. $|3(x-2)| > 12$

7. $4|3x - 3| < 12$

8. $2|2x - 1| + 1 > 15$

9. $|-4x| < 10$

10. $|3x - 1| \geq 5x + 15$

11. $|2x - 6| < 0$

12. $|5(2x + 3)| \geq -10$

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Remember when you multiply or divide an inequality by a negative number to reverse the sign of the inequality

Solve and graph the following.

1. $|x| < 5$
2. $|x| > 7$
3. $|x| \leq 3$
4. $|x| \geq 8$
5. $|x + 2| < 6$
6. $|x - 4| > 5$
7. $|x + 1| \leq 7$
8. $|x - 3| \geq 4$
9. $|x + 5| < 9$
10. $|x - 2| > 8$
11. $|x + 4| \leq 6$
12. $|x - 1| \geq 7$

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Solve and graph the following.

1. $|2x| < 10$
2. $|3x| > 12$
3. $|2x| \leq 14$
4. $|4x| \geq 20$
5. $|2x + 3| < 11$
6. $|3x - 2| > 10$
7. $|2x + 1| \leq 9$
8. $|4x - 5| \geq 7$
9. $|3x + 6| < 15$
10. $|2x - 4| > 8$
11. $|5x + 5| \leq 20$
12. $|2x - 1| \geq 9$

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Remember when you multiply or divide an inequality by a negative number to reverse the sign of the inequality

Solve and graph the following.

1. $|2x + 5| < 17$
2. $|3x - 4| > 14$
3. $|4x + 1| \leq 21$
4. $|5x - 6| \geq 19$
5. $|2(x - 3)| < 12$
6. $|3(x + 2)| > 15$
7. $|4(x - 1)| \leq 16$
8. $|2(x + 5)| \geq 18$
9. $|3x + 9| < 24$
10. $|4x - 8| > 20$
11. $|5x + 10| \leq 30$
12. $|6x - 12| \geq 24$

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6. $|3(x-2)| > 12$

7. $|-4x| < 10$

8. $|3x - 1| \geq 5x + 15$

CAUTION!, 9 and 10

9. $|2x - 6| < 0$

10. $|5(2x + 3)| \geq -10$