Math 3 1.7 Absolute Value Inequalities Unit 1

*SWBAT write and solve absolute value inequalities and graph solutions on a number line.*

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| --- | --- |
| Case #1: Less Than < | Case #2: Greater Than > |
| Suppose you're asked to graph the solution to |*x*|< 3. The solution is going to be all the points that are less than three units away from zero. Look at the number line:  number line  Translating this picture into algebraic symbols, you find that the solution is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  This pattern for "less than" absolute-value inequalities always holds: Given the inequality | x |< a, the solution is always of the form –a < x < a. Even when the exercises get more complicated, the pattern still holds. | The other case for absolute value inequalities is the "greater than" case. Let's first return to the number line, and consider the inequality |x|> 2.  number line  Translating this picture into algebraic symbols, you find that the solution is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. That is, the solution is TWO inequalities, not one. **DO NOT** try to write this as one inequality.  The pattern for "greater than" absolute value inequalities always holds: the solution is always in two parts. Given the inequality | x | > a, the solution always starts by splitting the inequality into two pieces: x < –a or x > a. |

**Example 1:** Solve and graph the solution on a number line: |2x + 3| < 6

number line

**Example 2:** Solve and graph the solution on a number line: |2x – 3 | > 5

number line

|  |  |
| --- | --- |
| Special Case #1: Less than a Negative | Special Case #2: Greater than a Negative |
| Example: |x + 2| < -1 | Example: |x – 2| > -3 |
| Solution: | Solution: |
| number line | number line |

**Practice:** Solve and graph each solution on a number line.

1.  number line
2.  number line
3.  number line

|  |  |
| --- | --- |
| Tolerance Word Problems: | |actual – ideal| < tolerance |

**Example 3:** A carpenter is using a lathe to shape the final leg of a hand-crafted table. In order for the leg to fit, it needs to be 150 mm wide, allowing for a margin of error of 2.5 mm. Write an absolute value inequality that models this relationship, and then find the range of widths that the table leg can be.

**Example 4:** A manufacturer allows a maximum of 18.5 oz of cereal and a minimum of 16.25 oz of cereal per box. Write an absolute value inequality that demonstrates the manufacturer’s constraints.