Interval Notation

In this lesson you solved inequalities and found that the solution can usually be represented as a piece or "interval" of the number line. You learned to graph this solution set on the number line by shading that piece and placing a circle, open or filled, at an endpoint of that interval.

Another way to represent a solution is using interval notation. Interval notation tells which part of the number line, from left to right, is included in the solution (i.e., which part of the number line is shaded). Parentheses are written next to endpoints which are NOT included in the solution while brackets are written next to included endpoints. Endpoints are separated by commas.

For example, \([-2, 5)\) indicates a piece of the number line from \(-2\) to \(5\). The left bracket, like a closed (filled) circle in the graph, indicates that \(-2\) IS included in this piece. The right parenthesis, like an open circle in the graph, indicates that the number \(5\) IS NOT included in the solution.

If a solution consists of a piece of the number line that extends indefinitely to the left or to the right, we use the symbols \(-\infty\) or \(\infty\), which represent negative or positive infinity, and we mean the set of numbers is "unbounded". For example,

\(( -4, \infty )\) indicates all numbers greater than \(-4\).

\(( -\infty , 3 ]\) indicates all numbers less than or equal to \(3\).

Note that intervals are written in the order they appear from left to right on the number line. The smaller number should always be written to the left of the larger number. The negative sign with \(\infty\) is used to indicate that the set of numbers extends to the left without bound. Without the negative sign, \(\infty\) indicates that the set of numbers extends to the right without bound. Parentheses (not brackets) are always used with the symbol \(-\infty\) or \(\infty\).

In addition to the problems from your Personal Academic Notebook for lesson EII.C, solve each of the following inequalities, graph the solution and write the solution set using interval notation.

1. Solve for \(x\): \(2 + 5x \leq 7x - 8\)
2. Solve for \(v\): \(-2 < 5v - 7 \leq 11\)
3. Solve for \(y\): \(y + 3 \geq 8\)
4. Solve for \(w\): \(9 - 4w \geq 6\)
5. Solve for \(a\): \(3a < 18\)
6. Solve for \(c\): \(-2c > 3\)
**EXERCISE SET EII.C**

**MATD 0390**

**ANSWERS:**

1. \( x \geq 5 \)

   Interval Notation: \([ 5, \infty )\)

2. \( 1 < v \leq \frac{18}{5}, \text{ or } 1 < v \leq 3.6 \)

   Interval Notation: \(( 1, \frac{18}{5} ], \text{ or } ( 1, 3.6 ]\)

3. \( y \geq 5 \)

   Interval Notation: \([ 5, \infty )\)

4. \( w \leq \frac{3}{4}, \text{ or } w \leq 0.75 \)

   Interval Notation: \((-\infty, \frac{3}{4} ], \text{ or } (-\infty, 0.75 ]\)

5. \( a < 6 \)

   Interval Notation: \(( -\infty, 6 )\)

6. \( c < -\frac{3}{2}, \text{ or } c < -1.5 \)

   Interval Notation: \(( -\infty, -\frac{3}{2} ), \text{ or } (-\infty, -1.5 )\)