# Number Lines Lesson 4
# Compound Inequalities

## Important Note

For all braille examples, emboss the "L4-NL-Problems-Only.brf" file as a supplement to this lesson.

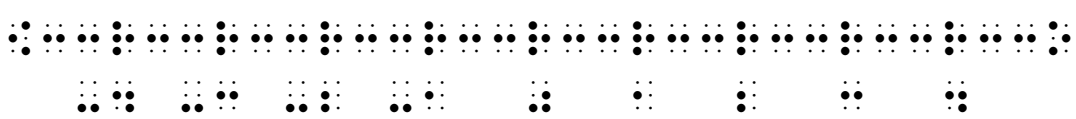
## Background

After completing the "Lesson 1 Creating a Braille Number Line," the "Lesson 2 Graphing Points on a Braille Number Line," and the "Lesson 3 Graphing Inequalities" focused lessons, you are ready to expand your skills with graphing inequalities on a braille number line to include **compound inequalities**. A compound inequality is an inequality that combines two simple inequalities.

As a quick review, the following symbols are used to create number lines:

- left-pointing arrowhead (dots 2-4-6) 
- line (axis line) (dots 2-5) 
- scale mark (dots 1-2-3-5) 
- right-pointing arrowhead (dots 1-3-5) 

A braille number line is shown with arrows on both ends. The scale marks are in increments of 1 starting with -4 and ending with 4.



To review, the next symbols are used to graph inequalities (including compound inequalities) on the number line:

- solid, filled-in, or closed circle (point included) placed above the number line, which you already learned about (dots 1-2-3-4-5-6) 
- open circle (point not included) placed above the number line, which is only necessary when graphing an inequality involving <, >, or "not equal to" (dots 1-3-4-6) 

- bold shaded line segment, which is used for shading the rest of the points included in the solution on the number line itself (dots 2-3-5-6) ⠸⠸
- bold left-pointing arrowhead, which is placed on the left side of the number line (dots 2-4-6 twice) ⠸⠪⠸⠪
- bold right-pointing arrowhead, which is placed on the right side of the number line (dots 1-3-5 twice) ⠸⠕⠸⠕

## Basic Rules

When graphing inequalities on a number line use the following steps:

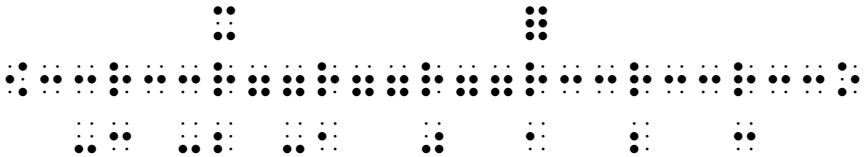
1. Number your problem and possibly write the inequality you are graphing.
2. Space down three lines.
3. Create your number line.
4. Place the proper number under each scale mark.
5. Above the number line, indicate whether your solution will include an open or closed circle at the appropriate scale mark(s).
6. "Shade" on the number line all of the points that represent the solution, except for the area directly under the boundary point(s) designated with open or closed circles.
7. To designate that the shading continues infinitely to the left or right, use an additional appropriate arrowhead (or bold left- or right-pointing arrowhead). If the graph needs an additional left-pointing arrowhead, you will need to think ahead and include it when you create the number line or always leave an extra space in front just in case you discover that you need one later.

## Examples

When you write a compound inequality, such as those in Examples 1 and 2 below, you want to write it such that the inequality signs are less than or less than or equal to signs instead of greater than or greater than or equal to.

1. Graph negative 2 is less than x is less than or equal to 1.

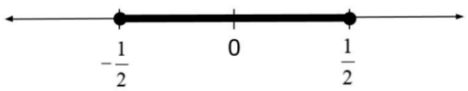
$-2 < x \leq 1$

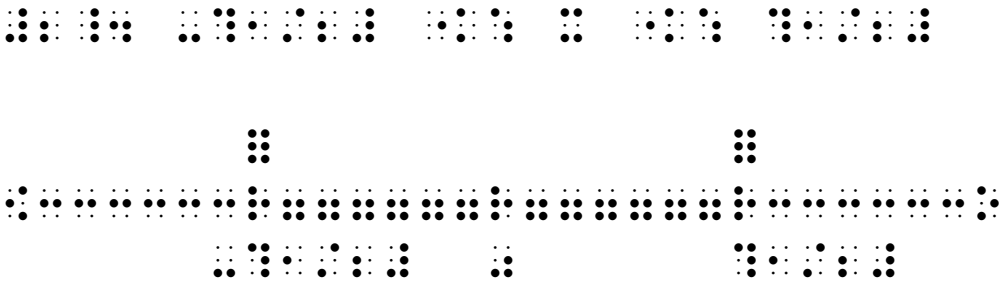



A braille number line is shown. The scale marks are in increments of 1 starting with -3 and ending with 3. An open circle is placed above the scale mark at -2 and a closed circle is placed above the scale mark at 1. Shading goes from just to the right of -2 to just to the left of 1.

2. Graph negative one-half is less than or equal to x is less-than or equal to one-half.

$-\frac{1}{2} \leq x \leq \frac{1}{2}$



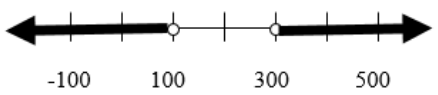



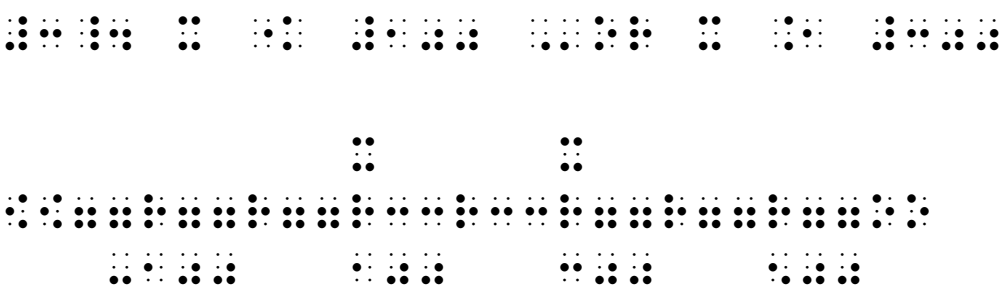
A braille number line is shown. The scale marks are in increments of one-half starting with negative one-half and ending with one-half. A closed circle is placed above the scale marks at negative one-half and one-half. Shading goes from just to the right of negative one-half to just to the left of one-half.

When you write a compound inequality, such as those in Examples 3 and 4 below, you want to use the word "or" between the two inequalities. This requires the use of the **single-word switch indicator** (dot 6, dot 3) before "or" when using Nemeth Code within UEB Contexts.

3. Graph x is less than 100 or x is greater than 300.

   $x < 100$ or $x > 300$

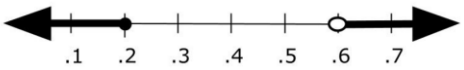


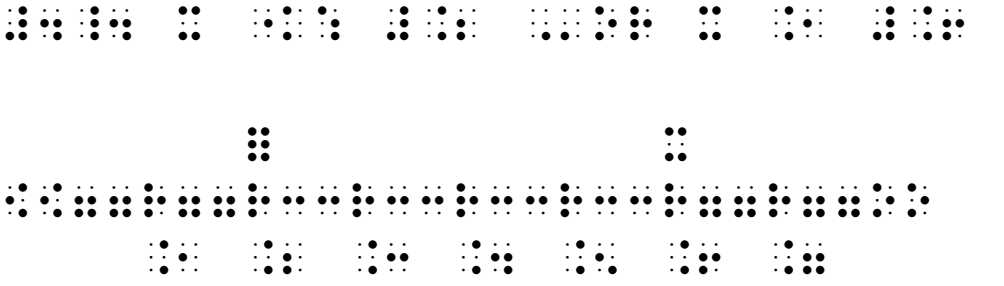



   A braille number line is shown. The scale marks are in increments of 100 starting with -100 and ending with 500, but only every other scale mark is labeled. An open circle is placed above the scale marks at 100 and 300. An additional left-pointing arrowhead and an additional right-pointing arrowhead are added. Shading goes left of 100 and right of 300 not including the arrowheads.

4. Graph x is less than or equal to .2 or x is greater than .6.

   $x \leq .2$ or $x > .6$



   A braille number line is shown. The scale marks are in increments of .1 starting with .1 and ending with .7. A closed circle is placed above the

scale mark at .2 and an open circle is placed above the scale mark at .6. An additional left-pointing arrowhead and an additional right-pointing arrowhead are added. Shading goes left of .2 and right of .6 not including the arrowheads.

## Activity Time

Okay, let's see if you can re-create all of the compound inequality graphs on number lines in this lesson. You can also make up some of your own compound inequality graphs for even more practice. Then head to the games to have even more fun with compound inequality graphs on number lines.