Number Lines Lesson 3
Graphing Inequalities

Important Note

For all braille examples, emboss the "L3-NL-Problems-Only.brf" file as a supplement to this lesson.

Background

After completing the "Lesson 1 Creating a Braille Number Line" and the "Lesson 2 Graphing Points on a Braille Number Line" focused lessons, you are ready to start graphing inequalities on a braille number line. 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.

⠸⠂⠒⠒⠶⠂⠒⠒⠶⠂⠒⠒⠶⠂⠒⠒⠶⠂⠒⠒⠶⠂⠒⠒⠶⠂⠒⠒⠶⠂⠒⠒⠶⠂⠒⠒⠶⠂⠒⠒⠇
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The next symbols are used to graph 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

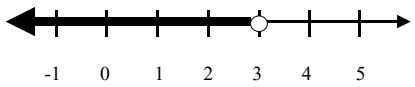
When graphing inequalities on a number line, use the following steps:

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

1. Graph x is less than 3 on a number line.

   $x < 3$



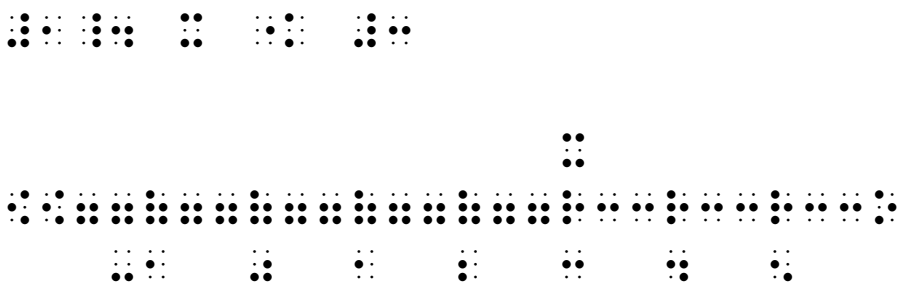
   Step 1: Construct a number line and space it so that you have at least two scale marks larger than 3 and a few smaller than 3.

   Step 2: Label it from -1 through 5, and add an additional left-pointing arrowhead (or bold left-pointing arrowhead).

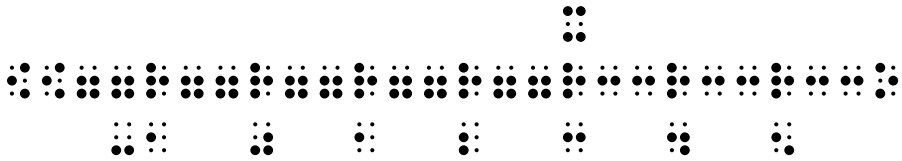
   Step 3: Braille an open circle (point not included) above the scale mark at 3.

   Step 4: Starting just to the right of the 2nd left-pointing arrowhead, "shade" the number line all the way up to, but not including, the 3.

Tip: You may find it easier to shade on top of scale marks, but transcribers do not do that. Our examples will be done as a transcriber, since that is the way you will see number lines graphed in a textbook or on a test.



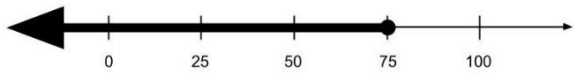
(student)

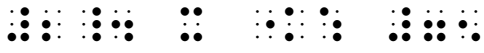


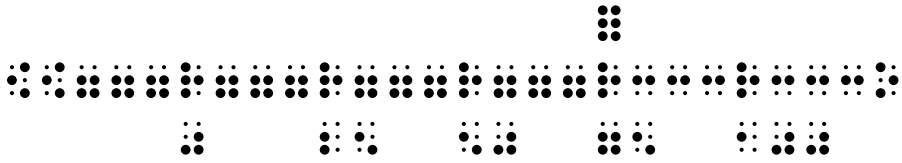
(transcriber)

2. Graph x is less than or equal to 75.

$x \leq 75$



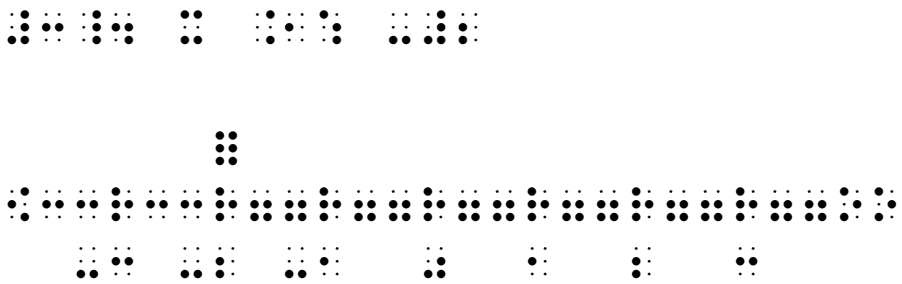




A braille number line is shown. The scale marks are in increments of 25 starting with 0 and ending with 100, and an additional left-pointing arrowhead is added. A closed circle is placed above the scale mark at 75 and shading goes from just to the right of the 2nd left-pointing arrowhead to just to the left of 75.

3. Graph x is greater than or equal to negative 2.

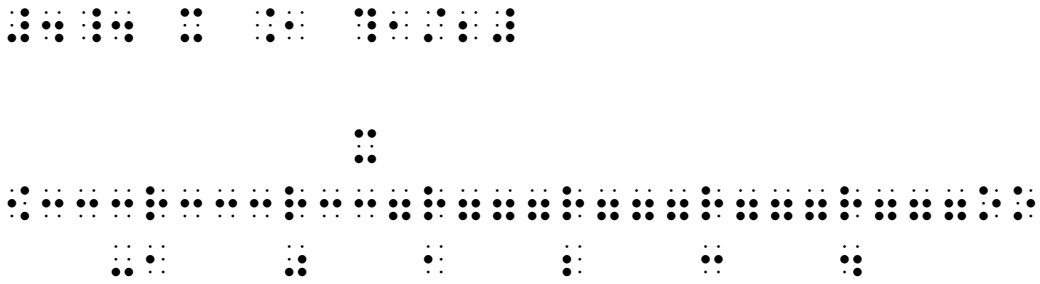
$x \geq -2$



A braille number line is shown. The scale marks are in increments of 1 starting with -3 and ending with 3, and an additional right-pointing arrowhead is added. A closed circle is placed above the scale mark at -2 and shading goes from just to the right of -2 to just to the left of the 1st right-pointing arrowhead.

4. Graph x is greater than one-half.

$x > \frac{1}{2}$



A braille number line is shown. The scale marks are in increments of 1 starting with -1 and ending with 4, and an additional right-pointing arrowhead is added. An open circle is placed above the number line halfway between the scale marks at 0 and 1 and shading goes from just to the right of one-half to just to the left of the 1st right-pointing arrowhead.

Activity Time

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