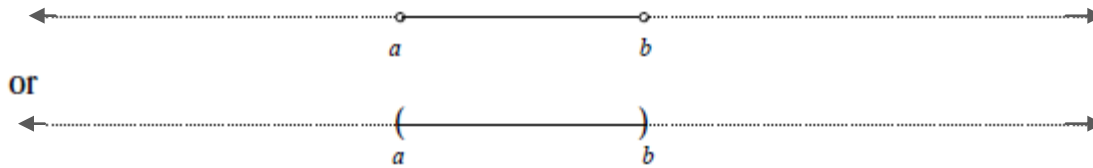


Worksheet: Inequalities and Interval notation

“(a, b)”, the **open** interval of numbers between a and b , not including a and not including b . Expressed using set notation and inequalities we would say

$(a, b) = \{x: a < x < b\}$. When translated into English, this means “all numbers, x , such that x is greater than a and less than b .”

We would draw this illustration to visualize the set:



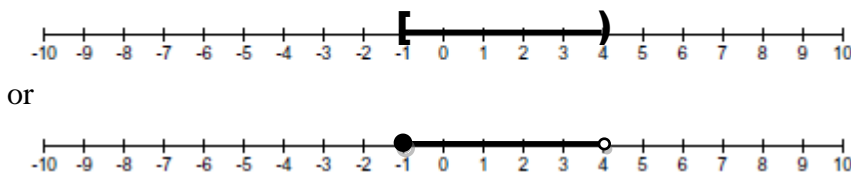
where the or the) and the (symbolize that the end point is not included in the interval.

“ $[a, b]$ ”, the **closed** interval of numbers between a and b , including a and including b . Expressed using set notation and inequalities we would say $[a, b] = \{x: a \leq x \leq b\}$. When translated this means “All numbers, x , such that x is greater than or equal to a and less than or equal to b .”

Example 1: The set of all numbers greater than or equal to -1 and less than 4.

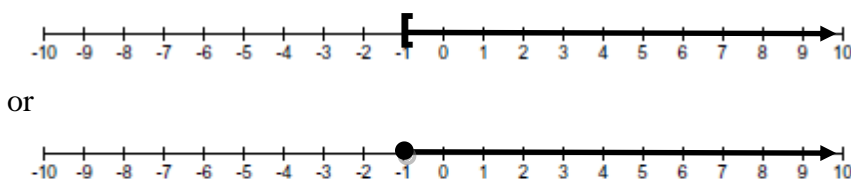
Set notation using inequalities: $\{x: -1 \leq x < 4\}$

Interval notation: $[-1, 4)$



If a set has no end point, then we describe the endpoint as either “infinity”(∞) or “negative infinity”($-\infty$).

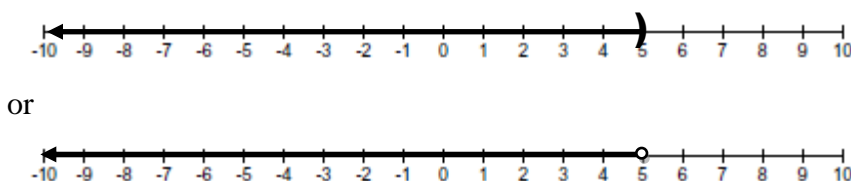
Example 2: The set of all numbers greater than or equal to -1, $\{x: x \geq -1\}$ is written in interval notation as $[-1, \infty)$. Since infinity is not a distinct number, we use the open-ended) in the interval notation. However, the left endpoint includes -1, since the numbers can be greater than or EQUAL to -1, so we use the [for the left side notation. The illustration of this is a half-line:



Example 3: The set of all numbers less than 5, $\{x: x < 5\}$

Interval notation: $(-\infty, 5)$

Since the interval says that the numbers must be less than 5, the interval does not include 5 as the endpoint, so we use) for the right side notation.

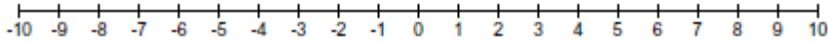


Problems to try:

1. Express the following set in interval notation and draw an illustration for it.

$$\{x: -1 < x < 3\}$$

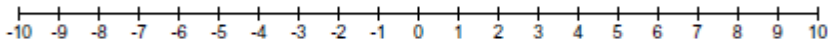
Interval notation: _____



2. Express the following set in interval notation and draw an illustration for it.

$$\{x: -1 \leq x \leq 3\}$$

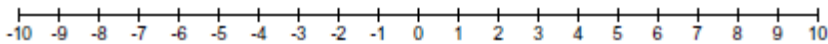
Interval notation: _____



3. Express the following set in interval notation and draw an illustration for it.

$$\{x: -2 \leq x < 1\} =$$

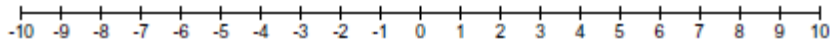
Interval notation: _____



4. Express the following set A in interval notation and using inequalities. Draw an illustration for it. “ A is the set of all numbers bigger than 2 but less than or equal to 5”.

Set notation: $\{x: \underline{\hspace{2cm}}\}$

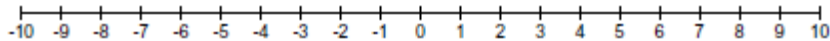
Interval notation: _____



5. Express the following set in interval notation and using inequalities. Draw an illustration for it. “ A is the set of all numbers greater than or equal to -1 but less than 2”.

Set notation: $\{x: \underline{\hspace{2cm}}\}$

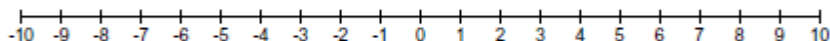
Interval notation: _____



6. Express the following set in interval notation and draw an illustration for it.

$$\{x: -3 < x < \infty\}$$

Interval notation: _____



7. Express the following set in interval notation and draw an illustration for it.

$$\{x: -\infty < x \leq 3\}$$

Interval notation: _____

