Graphing Inequalities Notes

Inequalities are anything sign that does not mean "equal". Some examples of inequalities are:

$<$ "less than"

$>$ "greater than"

$\leq$ "less than or equal to"

$\geq$ "greater than or equal to"

$\neq$ "not equal"

We will be focusing on the first four for the next several lessons.

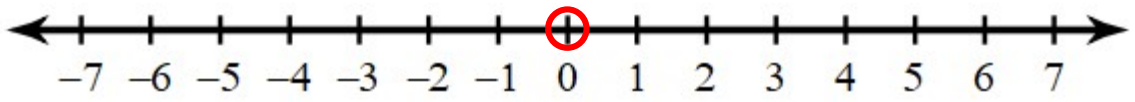
To graph an inequality, we shade the region of the number line that contains values that are consistent with the solution (that are true).

Example 1:

Graph the inequality: $n > 0$

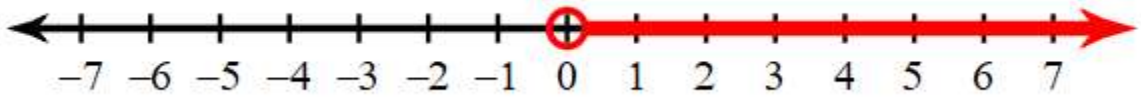
We read this inequality as "n is greater than zero". This means that the solutions to the inequality are any number that is larger than zero.

So, we find 0 on the number line and circle it.



Because our inequality is strictly greater than (not equal to as well), we leave the circle open.

Then we shade all the numbers to the right, because those numbers are greater than zero.



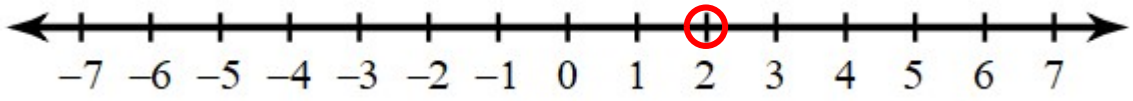
We can see that numbers that are in the shaded region (like 2, 3, 4, and 7) are greater than 0.

Example 2:

Graph the inequality: $n < 2$

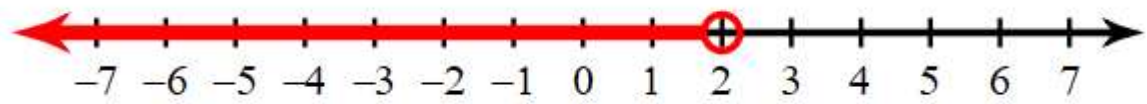
We read this inequality as "n is less than two". This means that the solutions to the inequality are any number that is smaller than 2.

So, we find 2 on the number line and circle it.



Because our inequality is strictly less than (not equal to as well), we leave the circle open.

Then we shade all the numbers to the left, because those numbers are less than two.



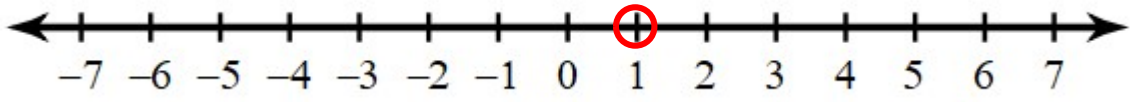
We can see that numbers that are in the shaded region (-2, -7, 0, and 1 for example) are all numbers that are less than 2.

Example 3:

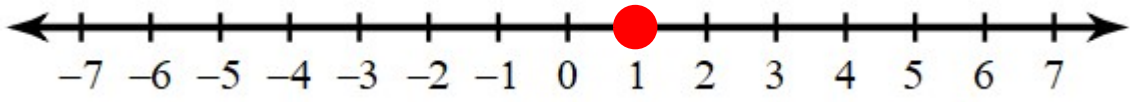
Graph the inequality: $n \leq 1$

We read this inequality as "n is less than or equal to one". This means that the solutions to the inequality are any number that is smaller than 1 or equal to 1.

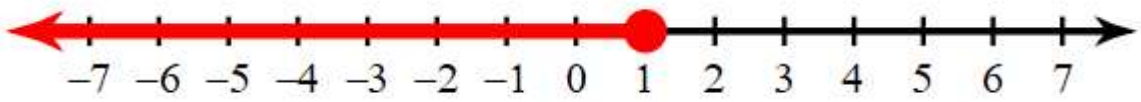
So, we find 1 on the number line and circle it.



Because our inequality is less than ***or equal to*** one, we will shade in the circle to indicate that the number 1 is a solution as well.



Then we shade all the numbers to the left, because those numbers are less than one.



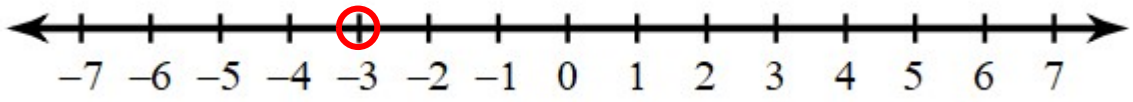
We can see that numbers that are in the shaded region (like -5, -6, 0, and 1) are all numbers that are less than or equal to one.

Example 4:

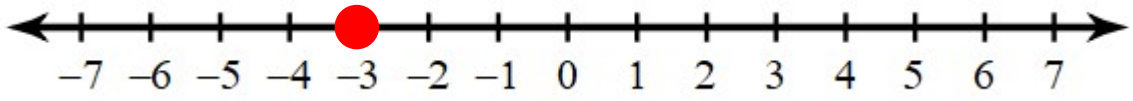
Graph the inequality: $x \geq -3$

We read this inequality as "x is greater than or equal to three". This means that the solutions to the inequality are any number that is larger than -3 or equal to -3.

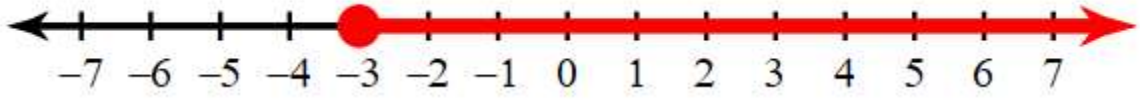
So, we find -3 on the number line and circle it.



Because our inequality is greater than *or equal to* -3, we will shade in the circle to indicate that the number -3 is a solution as well.



Then we shade all the numbers to the right, because those numbers are greater than -3.



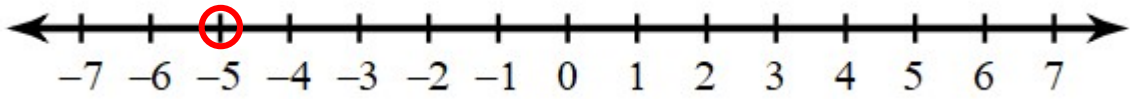
We can see that numbers that are in the shaded region (-3, -2, 0, and 4 for example) are all numbers that are greater than or equal to -3.

Example 5:

Graph the inequality: $-5 < b$

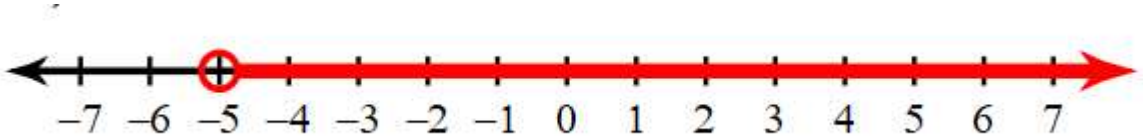
We read this inequality as "negative five is less than b". This means that the solutions to the inequality are any number that is larger than -5. This one is written with the variable on the right-hand side. So, we think about it as the number being less than the variable which also means that the variable is greater than the number. You can also realize that the bigger side of the inequality sign is facing the variable, which means that the solutions will be bigger.

So, we find -5 on the number line and circle it.



Because our inequality is strictly less than (*not equal to* as well), we leave the circle open.

Then we shade all the numbers to the right, because those numbers are greater than -5..

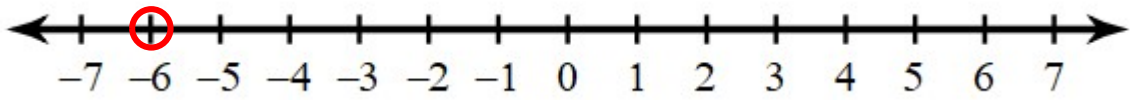


Example 6:

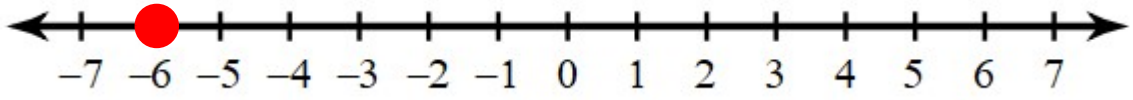
Graph the inequality: $-6 \geq x$

We read this inequality as "negative six is greater than or equal to x". This means that the solutions to the inequality are any number that is smaller than -6. This one is written with the variable on the right-hand side, again. So, the number being greater than the variable also means that the variable is less than the number. You can also realize that the smaller side of the inequality sign is facing the variable, which means that the solutions will be smaller.

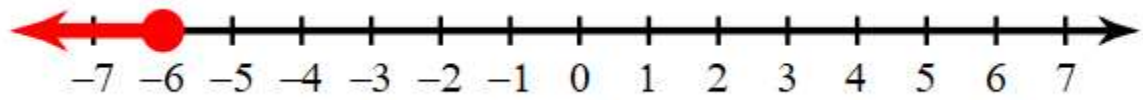
We find -6 on the number line and circle it.



Because our inequality is greater than *or equal to* -6, we will shade in the circle to indicate that the number -6 is a solution as well.



Then we shade all the numbers to the left, because those numbers are less than -6.



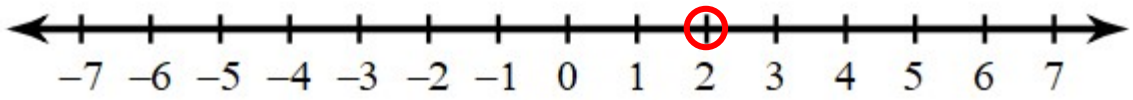
We can see that numbers that are in the shaded region (-7 and -6) are numbers that are less than or equal to -6.

Example 7:

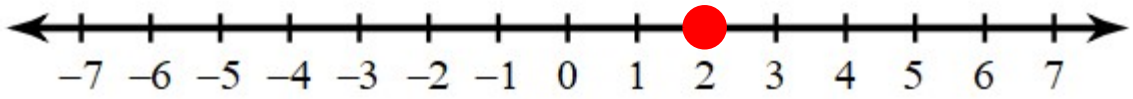
Graph the inequality: $2 \leq r$

We read this inequality as "two is less than or equal to r". This means that the solutions to the inequality are any number that is bigger than 2. This one is written with the variable on the right-hand side, again. So, the number being less than the variable also means that the variable is greater than the number.

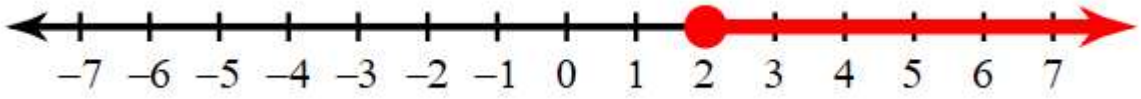
So, we find 2 on the number line and circle it.



Because our inequality is less than *or equal to* 2, we will shade in the circle to indicate that the number 2 is a solution as well.



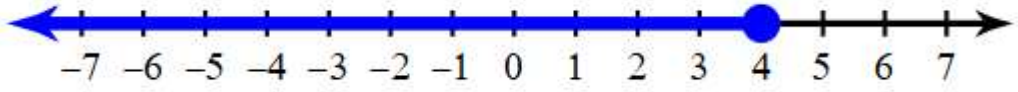
Then we shade all the numbers to the right, because those numbers are greater than 2.



We can see that numbers that are in the shaded region (-2, -7, 0, and 1 for example) are all numbers that are less than 2.

Example 8:

Write an inequality for the graph:

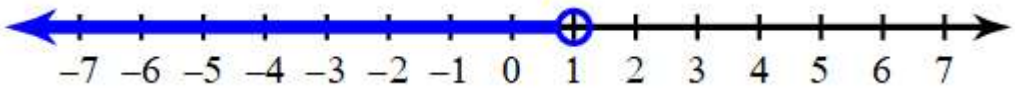


We can see that the circle is on 4 and shaded in. So, we know that our inequality is equal to as well. Since the graph is shaded to the left, we know that the inequality is less than or equal to 4.

$\boldsymbol{x \leq 4}$

Example 9:

Write an inequality for the graph:

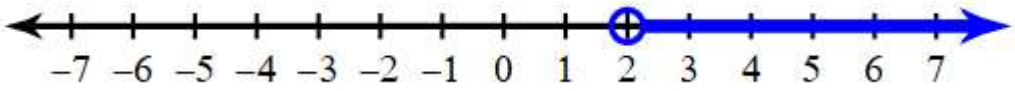


We can see that the circle is on 1 and not shaded in. Since the graph is shaded to the left, we know that the inequality is less than 1.

$\boldsymbol{x < 1}$

Example 10:

Write an inequality for the graph:

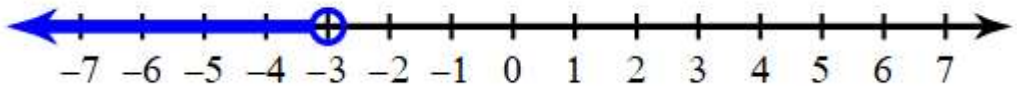


We can see that the circle is on 2 and not shaded in. Since the graph is shaded to the right, we know that the inequality is greater than 2

$\boldsymbol{x > 2}$

Example 11:

Write an inequality for the graph:

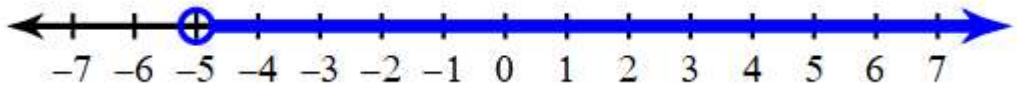


We can see that the circle is on -3 and not shaded in. Since the graph is shaded to the left, we know that the inequality is less than -3.

$\boldsymbol{x < -3}$

Example 12:

Write an inequality for the graph:

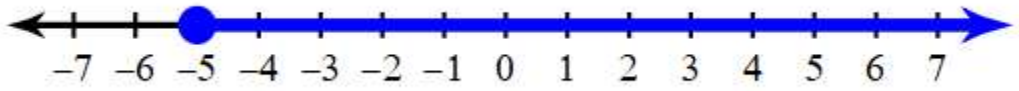


We can see that the circle is on -5 and not shaded in. Since the graph is shaded to the right, we know that the inequality is greater than -5.

$\boldsymbol{x > -5}$

Example 13:

Write an inequality for the graph:



We can see that the circle is on -5 and shaded in. So, we know that the inequality is equal to as well. Since the graph is shaded to the right, we know that the inequality is greater than or equal to -5.

$\boldsymbol{x \geq -5}$