**INEQUALITIES**

An inequality is a mathematical statement that compares values that may not be equal.

* < is the symbol for "is less than" 8  <  12



* > is the symbol for "is greater than" −8  >  −12



* ≤ is the symbol for "is less than or equal to"



* ≥ is the symbol for "is greater than or equal to"



Investigate:



Write an inequality, e.g., 3 < 10 or 59 > -16:



Multiply both sides by a negative number:



Did you need to change anything? If so, what?



**The same rules for equations can be applied to inequalities with one exception!**



***When multiplying or dividing both sides of an inequality by negative number,***



***the direction of the inequality symbol must be reversed.***



**To solve any inequality, find all the values of the variable that *satisfies the inequality*.**

example: Solve 7 − 2*x* < 1 and graph its solution set.



* Its graph is on a number line.



exercise: Solve 5 − 3*x* ≥ 23 and graph its solution set.



exercise: Solve 3*x* − 20 > −2*x* and graph its solution set.



**LINEAR INEQUALITIES IN TWO VARIABLES**

**2**

**−2**

*y*

*x*

**To graph the solution of a linear inequality in 2 variables:**

* Draw the **boundary** **line**:



* Change the inequality to “=” and graph that line.



* Use a **solid line** if points on the boundary satisfy the inequality (i.e., **≤** or **≥).**



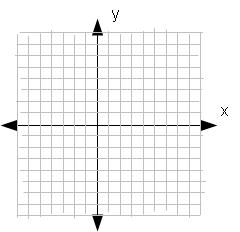
Use a **dashed/broken line** if points on the boundary do not satisfy the inequality (i.e., **<** or **>).**



* **Solution** **region**: Determine the region with the points that satisfy the inequality.
* Choose a point on one side of the boundary and check if its coordinates satisfies the inequality. **Trick**: (0,0) is an easy point to test!



* If the point satisfies the inequality (i.e, is TRUE), shade that region; otherwise, shade the *other* region.





example: Draw the graph of *y* > *x* + 2 .



* Change inequality to ‘=’.



* Graph the boundary line.



* Using the inequality, test a point that’s not on the line. Trick: Test (0,0)!



* Solution region: If inequality is TRUE, shade side with the point tested. If FALSE, shade the other side!



For any inequality statement that is solved for *y,* the solution will include:

* points **above** the boundary line for **> or ≥** inequalities,



* points **below** the boundary line for **< or ≤** inequalities,



exercise: Draw the graph of *y* ≤  − 1 .



exercise: Draw the graph of 2*x* − 3*y* < 12 .



exercise: Write the inequality for each graph.

*x*

*y*

0

-4

4

-4

4

*x*

*y*

0

-4

4

-4

4



HW: p. 496 #1-4, 6abc (no need to explain), 8, 9, 13, 16