

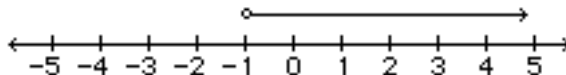
Assignment #20: Inequalities

Recall the meanings of the following symbols:

$<$	less than	$>$	greater than	\neq	does not equal
\leq	less than or equal to	\geq	greater than or equal to	\emptyset	empty set

When expressions are related with the symbols $<$, $>$, \leq , \geq , or \neq , the resulting statement is called an **inequality** instead of an equation. The solution set is generally expressed in the form of another (simpler) inequality. To find the solution set, we use the same tools we used to solve equations, with one notable exception: **when we multiply or divide an inequality by a negative number, we reverse the inequality.**

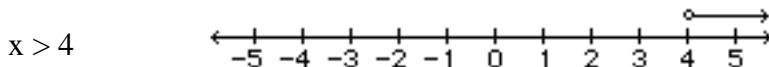
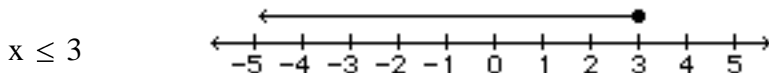
Example: $-6x+8 < 14$ Original problem
 $-8 \quad -8$ Add -8 to both sides
 $-6x < 6$ Now we divide both sides by -6
 $x > -1$ (Note the $<$ changed to $>$ because we divided by a negative.)



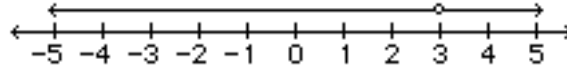
Expression of solutions

Generally, when we solve an inequality, we are asked to express the solution as an inequality, and also to graph it on a number line.

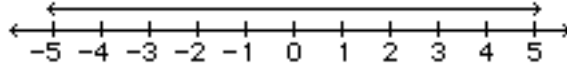
Examples of how to represent solution sets of inequalities on the number line:



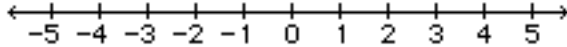
$x \neq 3$



\mathbb{R}



\emptyset



Problems

1. Andrew can tie-dye a bicycle alone in two hours, but Aran takes two and a half hours (alone). One day, Andrew and Aran work together for an hour (on one bike), then Andrew leaves in a Huff™. How long does Aran take to finish the bike alone?
2. A TurboChicken can go 50 mph on an empty stomach, but only 35 mph on a full stomach. Suppose a certain TurboChicken runs full speed to a restaurant, stuffs himself, then runs home (taking 2 hours longer to get home than he took to get to the restaurant). How far from home was the restaurant?
3. A train (1 mile long, 55 mph) is 4 miles behind another train (2 miles long, 45 mph) going in the same direction on a parallel track. How much time (from now) does the first train take to completely pass the other train? (*Hint: draw a picture. The back of the first train must "catch up with" the front of the second train.*)
4. A train (2 miles long, 35 mph) is 6 miles from another train (3 miles long, 75 mph) going towards each other on a parallel track. How much time (from now) does the first train take to completely pass the other train? (*Hint: draw a picture. The back of the first train must "meet" the back of the second train.*)

Solve for the lower-case letter. You may assume that no variables cause a denominator to be zero.

5. a. $By+C = Ay+D$

b. $Ay+D = y-H$

Find the solution set and graph on a number line.

6. a. $5c+11 < 17c+2$

b. $4x+8 > 50x+6$