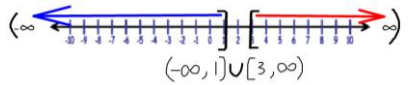
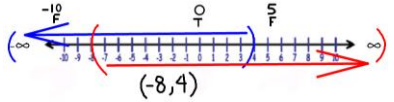
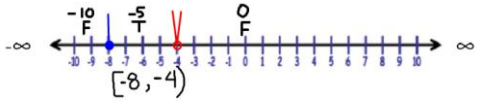
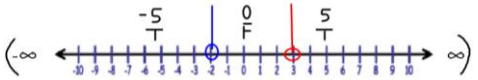
Graphing Compound Inequalities
(including Absolute Value, Rational and Quadratic)

Type	Key Points	Example
Compound, including AND/OR	• General rules, and • If 3 part, keep *x* in center; if it stays < or ≤, graph as AND • Graph using AND/OR rules	$3x+2\le 5$ or $5x-7\ge 8$ $3x\le 3$ $\quad 5x\ge 15$ $x\le 1$ $\quad x\ge 3$  $(-\infty,1]\cup[3,\infty)$
Inequalities with Absolute Values	• First, isolate the absolute value • Second, separate into 2 equations ○ 1) original w/o absolute value ○ 2) multiply right side by negative & reverse inequality • Solve, using algebra and general rules • Graph using AND/OR rules or graph by using test points • **NOTE**: Once isolated, absolute value cannot equal a negative or be less than zero so answer is "no solution;" however, if set to > or ≥ a negative, "all real numbers."	$\lvert x+2\rvert+9<15$ $\lvert x+2\rvert<6$ $x+2<6$ $\quad x+2>-6$ $x<4$ *(and)* $\quad x>-8$  (-8,4)
Rational Inequalities (fractions)	• Set right side to 0 • Use LCD on the left side to create a single fraction • Set each – numerator and denominator – to ***equal*** 0 and solve separately, using general rules • Use solutions to establish test points, use open/closed circles (with verticals, if you want), not ( ) [ ] • Denominator *cannot include* point that makes it = 0, alter the inequality to exclude it • Graph using test points	$\frac{x}{x+4}\ge 2 \quad (x\ne -4)$ $\frac{x}{x+4}-2\ge 0$ $\frac{x}{x+4}-\frac{2(x+4)}{x+4}\ge 0$ $\frac{x-2x-8}{x+4}\ge 0$ $\frac{-x-8}{x+4}\ge 0$ ↗ $-(x+8)=0$ $\quad x+4=0$ $x+8=0$ $\quad x=-4$ $x=-8$ ● $\quad$ ** $x\ne -4$, so use ○  [-8,-4)
Quadratic Inequalities	• Set right side to 0 • Factor the left side • Set each factor to 0 and solve using general rules • If it is also rational (fraction), then incorporate those rules • Graph using test points	$x^2-x>6$ $x^2-x-6>0$ $(x-3)(x+2)>0$ $x-3>0$ $\quad x+2>0$ ↗ $x>3$ $\quad x>-2$  $(-\infty,-2)\cup(3,\infty)$