Absolute Value Equations & Inequalities

**Motivation:** There are several methods to solve solutions absolute value inequalities. By “seeing” the interval(s) containing solutions to inequalities of the form $\left|x\right|\leq a$ and $\left|x\right|\geq a$, translations can be used to easily solve inequalities of the form $\left|x-c\right|\leq a$ and $\left|x-c\right|\geq a$.

**Objectives**: Students will understand the nature of absolute value inequalities and write their solutions in interval notation.

**Activity 1: Equations and Inequalities of the form** $\left|x\right|=a$**,** $\left|x\right|\leq a$**, and** $\left|x\right|\geq a$

1. Your instructor will hold up one card one at a time and the students at the number line whose number solves the equation will raise their right hand. If you are at your desk, you will graph the solution and write the solution in interval notation for each example.
2. With your group, discuss how to write each of the following without absolute values symbols: $\left|x\right|=a$, $\left|x\right|\leq a$, and $\left|x\right|\geq a$. Record these on your group’s worksheet.

**Activity 2: Equations and Inequalities of the form** $\left|x-c\right|=a$**,** $\left|x-c\right|\leq a$**, and** $\left|x-c\right|\geq a$

1. Again, your instructor will hold up one card one at a time and the students at the number line whose number solves the equation will raise their right hand. If you are at your desk, you will graph the solution and write the solution in interval notation for each example. Notice that the center of the interval has “shifted” to a new position.
2. With your group, discuss how to write each of the following without absolute value symbols: $\left|x-c\right|=a$, $\left|x-c\right|\leq a$, and $\left|x-c\right|\geq a$. Record these on your group’s worksheet.

**Activity 3: Mixed Practice**

**Activity 4: Follow-up discussion**

1. What is the difference between “$<$” and “$\leq "$ and between “$>$” and “$\geq $” in rewriting the inequality without absolute value? How do these effect the interval notation?
2. How can you use your results from Activity 2 to solve the inequality $\left|2x-1\right|\leq 3$?