Names: _____ _____ _____

Activity #3: Compound Equations (Solutions) **College Algebra**

1. Find all solutions of the following inequality.

$$|4x + 2| + 12 \leq 30$$

Solution: First, solve for the absolute value expression by subtracting 12 from both sides.

$$|4x + 2| \leq 18.$$

This is an absolute value inequality of the form "absolute value less than", so we can now rewrite as a compound inequality as follows.

$$4x + 2 \leq 18 \quad \text{AND} \quad 4x + 2 \geq -18.$$

Solving each of these for x, we have

$$-5 \leq x \quad \text{AND} \quad x \leq 4.$$

In interval notation, the solution is $\boxed{[-5, 4]}$.

2. Find all solutions of the following inequality.

$$|5x - 3| + 7 \geq 9$$

Solution: First, solve for the absolute value expression by subtracting 7 from both sides.

$$|5x - 3| \geq 2.$$

This is an absolute value inequality of the form "absolute value greater than", so we can now rewrite as a compound inequality as follows.

$$5x - 3 \geq 2 \quad \text{OR} \quad 5x - 3 \leq -2.$$

Solving each of these for x, we have

$$x \leq 1/5 \quad \text{OR} \quad 1 \leq x.$$

In interval notation, the solution is $\boxed{(-\infty, 1/5] \cup [1, \infty)}$.

3. Find all solutions of the following inequality.

$$2|5x - 4| + 9 < 25$$

Solution: First, solve for the absolute value expression by subtracting 9 from both sides and then dividing by 2.

$$|5x - 4| < 8.$$

This is an absolute value inequality of the form "absolute value less than", so we can now rewrite as a compound inequality as follows.

$$5x - 4 < 8 \quad \text{AND} \quad 5x - 4 > -8.$$

Solving each of these for x, we have

$$-4/5 \leq x \quad \text{AND} \quad x \leq 12/5.$$

In interval notation, the solution is $\boxed{(-4/5, 12/5)}$.

4. Find all solutions of the following inequality.

$$2|5x - 9| + 14 > 30$$

Solution: First, solve for the absolute value expression by subtracting 14 from both sides and then dividing by 2.

$$|5x - 9| > 8.$$

This is an absolute value inequality of the form "absolute value greater than", so we can now rewrite as a compound inequality as follows.

$$5x - 9 > 8 \quad \text{OR} \quad 5x - 9 < -8.$$

Solving each of these for x, we have

$$x < 1/5 \quad \text{OR} \quad 17/5 < x.$$

In interval notation, the solution is $\boxed{(-\infty, 1/5) \cup (17/5, \infty)}$.

5. Find all solutions of the following inequality.

$$|-3x - 6| + 5 \leq 29$$

Solution: First, solve for the absolute value expression by subtracting 5 from both sides.

$$|-3x - 6| \leq 24.$$

This is an absolute value inequality of the form "absolute value less than", so we can now rewrite as a compound inequality as follows.

$$-3x - 6 \leq 24 \quad \text{AND} \quad -3x - 6 \geq -24.$$

Solving each of these for x, we have

$$6 \geq x \quad \text{AND} \quad x \geq -10.$$

(Remember to change the direction of the inequality when dividing by -3!) In interval notation, the solution is $\boxed{[-10, 6]}$.

6. Find all solutions of the following inequality.

$$|-4x + 2| + 9 \geq 15$$

Solution: First, solve for the absolute value expression by subtracting 9 from both sides.

$$|-4x + 2| \geq 6.$$

This is an absolute value inequality of the form "absolute value greater than", so we can now rewrite as a compound inequality as follows.

$$-4x + 2 \geq 6 \quad \text{OR} \quad -4x + 2 \leq -6.$$

Solving each of these for x, we have

$$x \geq 2 \quad \text{OR} \quad -1 \geq x.$$

(Remember to change the direction of the inequality when dividing by -4!) In interval notation, the solution is $\boxed{(-\infty, -1] \cup [2, \infty)}$.