Names: _____ _____ _____

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

1. Find all solutions of the following inequality.

$$|4x - 7| + 6 \leq 11$$

Solution: First, solve for the absolute value expression by subtracting 6 from both sides.

$$|4x - 7| \leq 5.$$

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

$$4x - 7 \leq 5 \quad \text{AND} \quad 4x - 7 \geq -5.$$

Solving each of these for x, we have

$$1/2 \leq x \quad \text{AND} \quad x \leq 3.$$

In interval notation, the solution is $\boxed{[1/2, 3]}$.

2. Find all solutions of the following inequality.

$$|3x - 1| + 13 \geq 15$$

Solution: First, solve for the absolute value expression by subtracting 13 from both sides.

$$|3x - 1| \geq 2.$$

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

$$3x - 1 \geq 2 \quad \text{OR} \quad 3x - 1 \leq -2.$$

Solving each of these for x, we have

$$x \leq -1/3 \quad \text{OR} \quad 1 \leq x.$$

In interval notation, the solution is $\boxed{(-\infty, -1/3] \cup [1, \infty)}$.

3. Find all solutions of the following inequality.

$$2|4x - 8| + 12 < 28$$

Solution: First, solve for the absolute value expression by subtracting 12 from both sides and then dividing by 2.

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

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

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

Solving each of these for x, we have

$$0 \leq x \quad \text{AND} \quad x \leq 4.$$

In interval notation, the solution is $\boxed{(0, 4)}$.

4. Find all solutions of the following inequality.

$$2|2x - 2| + 8 > 28$$

Solution: First, solve for the absolute value expression by subtracting 8 from both sides and then dividing by 2.

$$|2x - 2| > 10.$$

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

$$2x - 2 > 10 \quad \text{OR} \quad 2x - 2 < -10.$$

Solving each of these for x, we have

$$x < -4 \quad \text{OR} \quad 6 < x.$$

In interval notation, the solution is $\boxed{(-\infty, -4) \cup (6, \infty)}$.

5. Find all solutions of the following inequality.

$$| - 2x - 4| + 14 \leq 26$$

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

$$| - 2x - 4| \leq 12.$$

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

$$-2x - 4 \leq 12 \quad \text{AND} \quad -2x - 4 \geq -12.$$

Solving each of these for x, we have

$$4 \geq x \quad \text{AND} \quad x \geq -8.$$

(Remember to change the direction of the inequality when dividing by -2!) In interval notation, the solution is $\boxed{[-8, 4]}$.

6. Find all solutions of the following inequality.

$$| - 4x + 4| + 8 \geq 28$$

Solution: First, solve for the absolute value expression by subtracting 8 from both sides.

$$| - 4x + 4| \geq 20.$$

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

$$-4x + 4 \geq 20 \quad \text{OR} \quad -4x + 4 \leq -20.$$

Solving each of these for x, we have

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

(Remember to change the direction of the inequality when dividing by -4!) In interval notation, the solution is $\boxed{(-\infty, -4] \cup [6, \infty)}$.