Week 6 Tuesday Warm-Up

1. Solve the equation. $4(5x-8)+3x=2(5x+6)-(8-3x)$

2. A shirt on sale costs $29.25. The shirt was on sale for 35% off the original amount. What is the original sales price of the shirt?

3. Solve and graph the following inequalities.

   a. $k-5\leq 4$

   b. $5\geq w+7$

3-3.A Who Rules the Negatives and the Positives?

Complete the following additon and subtraction problems as shown. Be sure to include the correct inequality symbol. yes, we did 1-4 yesterday

1. $-1 < 3$
   $-5 \quad -5$

2. $4 > 0$
   $+3 \quad +3$

3. $-2 < 4$
   $+2 \quad +2$

4. $5 > -2$
   $-6 \quad -6$

5. Make a statement (or rule) regarding the effect that adding or subtracting a number has on an inequality.

Complete the following multiplication and division problems as shown. Be sure to include the correct inequality symbol.

6. $-3 < 2$
   $\times(2) \quad \times(2)$

7. $-6 < 4$
   $\div(2) \quad \div(2)$

8. $0 > -1$
   $\times(-3) \quad \times(-3)$

9. $6 > -12$
   $\div(-3) \quad \div(-3)$

10. Make a statement (or rule) regarding the effect of multiplying or dividing by a positive number on an inequality.

11. Make a statement (or rule) regarding the effect of multiplying or dividing by a negative number on an inequality.

Now consider the same operations on the inequalities of "$\leq$" and "$\geq$". Complete the following including the correct inequality.

12. $5 \leq 7$
    $+4 \quad +4$

13. $-3 \geq -10$
    $-5 \quad -5$

14. $4 \geq -6$
    $\times(-3) \quad \times(-3)$

15. $-8 \leq -6$
    $\div(-2) \quad \div(-2)$

16. Do the same rules apply to "$\leq$" and "$\geq$" that apply to "$<$" and "$>$"?

3-3.B Let the Truth Be Told!

In previous activities, we looked at the effect of adding, subtracting, multiplying, or dividing on an inequality statement. In this activity, we want to examine what it means to "solve" an inequality, and how that process compares to the process of solving an equation.

1. Circle the numbers in the following list that satisfy the condition $x = 3$, and cross out the numbers in the list that do not.

$$\{\, 2,\ 7,\ \tfrac{3}{2},\ -3,\ 0,\ 3,\ -\tfrac{1}{4},\ 3.25,\ -1,\ 2.99,\ \tfrac{2}{3},\ 3.001,\ -4,\ \sqrt{16} \,\}$$

2. Make a new number set, listing only the numbers you circled.

(There is only one number in this truth set, because there is only one number that will make the statement $x = 3$ true, when put in the place of x!)

3. Now circle the numbers in the following list that satisfy the condition $x < 3$, and cross out the numbers in the list that do not.

$$\{\, 2,\ 7,\ \tfrac{3}{2},\ -3,\ 0,\ 3,\ -\tfrac{1}{4},\ 3.25,\ -1,\ 2.99,\ \tfrac{2}{3},\ 3.001,\ -4,\ \sqrt{16} \,\}$$

4. Make a new number set, listing only the numbers you circled.

5. Add 5 more numbers to this set that satisfies the condition $x < 3$.

6. Make a new number set, listing all the numbers from #1 that meet the combined condition $x \le 3$. (Which means $x < 3$ or $x = 3$.)

These values are all in the **truth set** for $x \le 3$, because they all make the statement true when put in the place of x. The *truth set*, or **solution set**, contains all the solutions to the equation or inequality.

7. Give five numbers in the truth set for each of the following inequalities. (List five numbers for x that will make the statement true.)

   a. $x < -5$:

   b. $125 < x$:

   c. $x \ge \frac{9}{2}$:

8. Now list five numbers for x that are not in the truth set for each inequality below.

   a. $x < -5$:

   b. $125 < x$:

   c. $x \ge \frac{9}{2}$:

We have seen that "solving an inequality" means the same thing as "solving an equation", namely, to find all the numbers in the truth set, or all the values for the variable that will make the statement true. With this in mind, how does the process of solving an inequality work, compared to the process of solving an equation? Let's investigate.

9. a. First, solve the equation $2x - 5 = 13$. Show your steps clearly. Give a number in the truth set.

   b. Substitute the value from the truth set in (a) back into the equation. Does it make a true statement?

   c. Now use the same steps as (a) to solve the inequality $2x - 5 > 13$. Give 3 numbers in the truth set.

   d. Now substitute one value back into the inequality. (Show your work.) Do they all make it true?

   e. Compare the process of solving the equation to the process of solving the inequality. What was the same? What was different?

10. Solve the equation $5 - 3x = 14$. Show your steps clearly. Give a number in the truth set.

11. Substitute the value from the truth set in #10 back into the equation. Does it make a true statement?

12. Now use the same steps as you did in #10 to solve the inequality $5 - 3x \geq 14$. Give 3 numbers in the truth set.

13. Now substitute one value from #12 back into the inequality. (Show your work.) Do they all make it true?

14. Compare the process of solving the equation to the process of solving the inequality. What was the same? What was different?

HW: p 181: 7, 9, 13, 21 and p 190: 17, 19, 21, 29, 30

Solve each inequality. Graph and check your solution.

7. $\frac{x}{5} \geq -2$

9. $4 > \frac{p}{8}$

13. $-7 \leq \frac{7}{3}x$

21. $-30 > -5c$

Solve each inequality.

17. $3(k-5)+9k \geq -3$

19. $-3(j+3)+9j < -15$

21. $30 > -(5z+15)+10z$

Solve each inequality, if possible. If the inequality has no solution, write *no solution*. If the solutions are all real numbers, write *all real numbers*.

30. $-5r+6 \leq -5(r+2)$