Name: _____ Date: Nov. 7 Hour: ___Alg 1___

Unit 3b Day 12: Solving Linear Inequalities

Focus Question: How do you solve and graph inequalities?

A. Sandy's Boat House rents canoes at a cost advertised as $14 per hour for trips on the Red Cedar River. The owner actually gives customers a better deal. She was once a mathematics teacher and she uses the equation $C(t) = 0.15t + 2.50$ to find the charge C in dollars for renting a canoe for t minutes.

1. What is the dependent variable in the situation? Cost (ind.)

2. A customer has $25 to spend. How long can she use a canoe?

$25 = 0.15t + 2.50$
$-2.50 \quad -2.50$
$22.50 = 0.15t$
$\frac{22.50}{0.15} = \frac{0.15t}{0.15}$
$t = 150$

150 min
(2½ hrs)

3. For Question 2, Student A said, "The customer can use the canoe for 150 minutes." Student B said "There are other possibilities- for example, 60 minutes or 120 minutes." Who is correct? Explain.

Student B b/c the customer doesn't have to spend the whole $25. They just can't go over $25.

4. So for #2 you actually need to think about an inequality. What inequality would you solve?

$25 \geq 0.15t + 2.50$

B. Solving Inequalities

1. Solve the **inequality** $0.15t + 2.50 \leq 25$. This inequality represents the times for which the rental costs at most $25.

2. Solve the following inequalities and test your solution. Then write your answer in interval notation.

a. $5x - 2 \geq 3$
$+2 \quad +2$
$\frac{5x}{5} \geq \frac{5}{5}$
$x \geq 1$
$[1, \infty)$
Test $x = 2$: $5(2) - 2 \geq 3$, $10 - 2 \geq 3$, $8 \geq 3$, True

b. $6x + 2 < 14$
$-2 \quad -2$
$\frac{6x}{6} < \frac{12}{6}$
$x < 2$
$(-\infty, 2)$
Test $x = 1$: $6(1) + 2 < 14$, $8 < 14$, True

c. $-2x + 5 > 9$
$-5 \quad -5$
$\frac{-2x}{-2} > \frac{4}{-2}$
$x < -2$
Test $x = 0$: $-2(0) + 5 > 9$, $5 > 9$, False

3. On which problem did you encounter a problem? Why do you think this occurred?

C it had a negative coeff.

To solve this problem we could do the following: $-2x + 5 > 9$
$+2x \quad +2x$
$5 > 2x + 9$
$-9 \quad -9$
$-4 > 2x$
$\frac{-4}{2} > \frac{2x}{2}$
$-2 > x$ or $x < -2$

the inequality switched

This seems like extra work! Compare the answer to your answer in 2c. What changed in the answer?

So the "shortcut" is that if you ÷ or multiply by a negative you have to switch the sign.

Q: $-6(4x+6)$
$-6(4x)-6(6)$
$-24x-36$

Solve the following inequalities. Graph your solution and give your answer in interval notation.

4) $9 \geq -2m + 2 - 3$

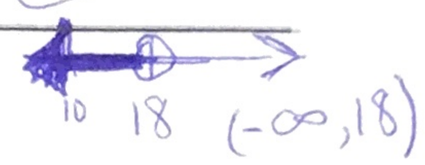
$9 \geq -2m - 1$
$+1 \quad +1$
$10 \geq -2m$
$\frac{}{-2} \quad \frac{}{-2}$
$-5 \leq m$
or
$m \geq -5$

$[-5, \infty)$

5) $-3 - 6(4x + 6) > -111 - 20x$

$-3 - 24x - 36 > -111 - 20x$
$-39 - 24x > -111 - 20x$
$+20x \quad +20x$
$-39 - 4x > -111$
$+39 \quad +39$
$-4x > -72$
$\frac{}{-4} \quad \frac{}{-4}$
$x < 18$

$(-\infty, 18)$



6) $6 - 4(6n + 7) \geq 122$

$6 - 24n - 28 \geq 122$
$-22 - 24n \geq 122$
$+22 \quad +22$
$-24n \geq 144$
$\frac{}{-24} \quad \frac{}{-24}$
$n \leq -6$

$(-\infty, -6]$

7) $3x + 12 - 2(x + 4) < 6(2x - 5) - 11x + 10$

$3x + 12 - 2x - 8 < 12x - 30 - 11x + 10$
$x + 4 < x - 20$
$-x \quad -x$
$4 < -20$

False so $\emptyset$

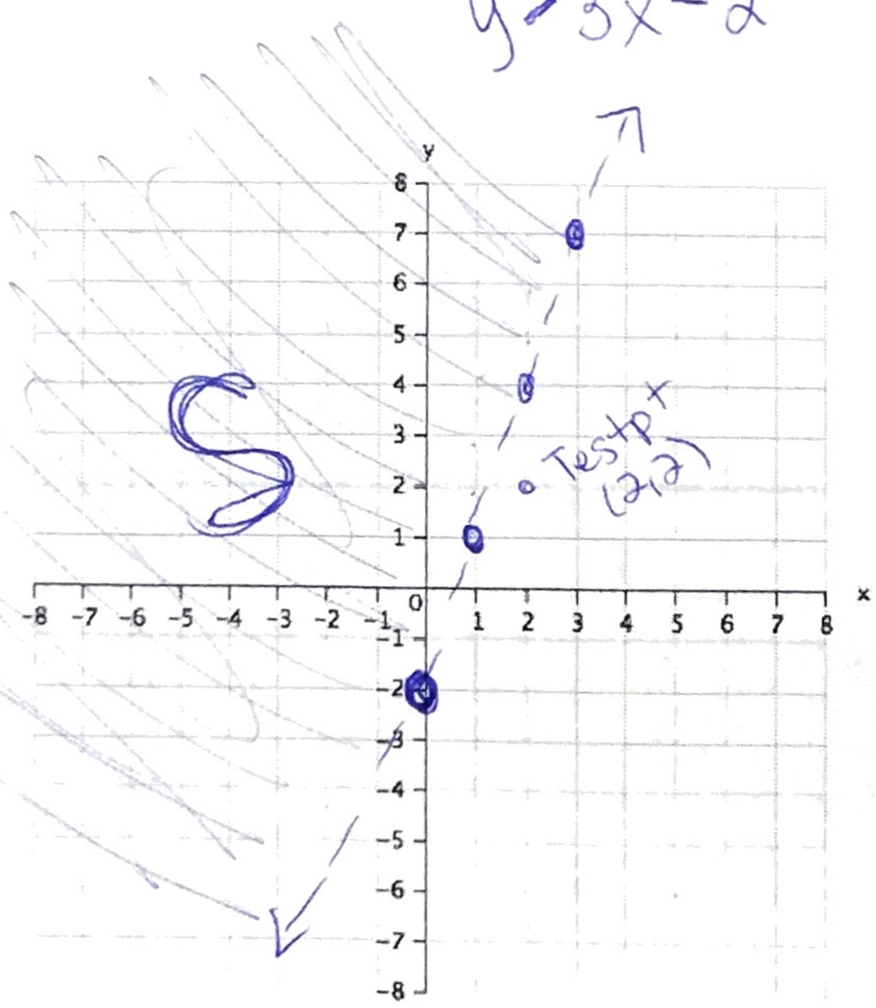
C. Graph the following 2 variable inequalities.

Graph $3x - y < 2$.

$-3x \quad -3x$
$-y < -3x + 2$
$\frac{}{-1} \quad \frac{}{-1} \quad \frac{}{-1}$
$y > 3x - 2$

$y = mx + b$

$3(2) - (2) < 2$
$6 - 2 < 2$
$4 < 2$
False



Graph $x + 5y \leq 10$.

$-x \quad -x$
$5y \leq -x + 10$
$\frac{5y}{5} \leq \frac{-x}{5} + \frac{10}{5}$
$y \leq -\frac{1}{5}x + 2$

$0 + 5(0) \leq 10$
$0 + 0 \leq 10$
$0 \leq 10$
True