Sample Test: Solving "AND" and "OR" Inequalities

Name: _____ Date: _____

Calculate all values of 'x' which will satisfy the following inequalities:

1. $2 \leq 2x + 5 < 17$

Graph the answer to Number 1:

2. $1 > 3 - \frac{x}{2} \geq -3$

Graph the answer to Number 2:

3. $2x - 3 > 14$ ***OR*** $3x + 10 \leq -5$

Graph the answer to Number 3:

Calculate all values of 'x' which will satisfy the following inequalities:

4. $9-2x \geq 3$ ***OR*** $\frac{x+5}{3} > 7$

Graph the answer to Number 4:

5. $\frac{x}{2}+3 < 2$ ***OR*** $3(1-2x) \leq -39$

Graph the answer to Number 5:

6. $x+6 > 2$ ***AND*** $4x-11 \leq 19$

Graph the answer to Number 6:

7. $\frac{x}{3} - 1 \geq 2$ ***AND*** $\frac{x+1}{5} < 3$

Graph the answer to Number 7:

8. $3(x+1)+5 \geq 2$ ***AND*** $3-2x > -11$

Graph the answer to Number 8:

Calculate all values of 'x' which will satisfy the following absolute value inequalities:

9. $|2x+9| < 5$

Graph the answer to Number 9:

10. $|x+7|-3 \leq -1$

Graph the answer to Number 10:

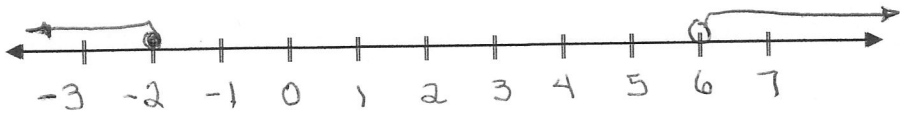
11. $\left|3+\frac{x}{4}\right| \geq 2$

Graph the answer to Number 11:

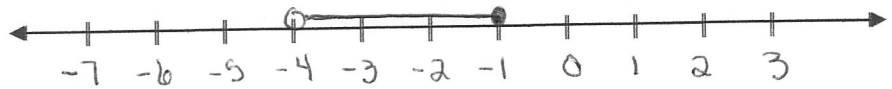
12. $\left|\frac{2x-1}{3}\right|+2 > 6$

13. **Write the compound inequality shown by each graph below:**

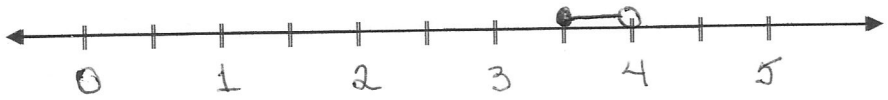
a.



b.



c.



Algebra Sample Test:

1. $2 \leq 2x + 5 < 17$

$-5 \quad -5 \quad -5$ → subtract 5 from all 3 sides

$\frac{-3}{2} \leq \frac{2x}{2} < \frac{12}{2}$ → $-1.5 \leq x < 6$

Graph:

2. $1 \cdot 2 > 2 \cdot 3 - \frac{x \cdot 2}{2} \geq -3 \cdot 2$ → multiply all terms, all 3 sides by 2 (denominator)

$2 > 6 - x \geq -6$

$-6 \quad -6 \quad -6$

$\frac{-4}{-1} > \frac{-x}{-1} \geq \frac{-12}{-1}$ → to get rid of the negative sign, divide all 3 sides by -1

$4 < x \leq 12$ → divide by a negative, so all inequalities are reversed

Graph:

3. $2x - 3 > 14$ OR $3x + 10 \leq -5$

$+3 \quad +3$ $\quad -10 \quad -10$

$\frac{2x}{2} > \frac{17}{2}$ $\quad \frac{3x}{3} \leq \frac{-15}{3}$

$x > 8.5$ OR $x \leq -5$

Graph:

$x \leq -5$ $\quad x > 8.5$

4. $9 - 2x \geq 3$ OR $3\left[\frac{x+5}{3}\right] > 7 \cdot 3$

$-9 \quad -9$

$-2x \geq -6$

$\frac{-2x}{-2} \geq \frac{-6}{-2}$ → reverse the inequality

$x \leq 3$

$x + 5 > 21$

$-5 \quad -5$

$x > 16$

OR

Graph:

$x \leq 3$ $x > 16$

5. $2 \cdot \frac{x}{2} + 3 \cdot 2 < 2 \cdot 2$ OR $3(1 - 2x) \leq -39$

$x + 6 < 4$

$-6 \quad -6$

$x < -2$

$3 - 6x \leq -39$

$-3 \quad -3$

$\frac{-6x}{-6} \leq \frac{-42}{-6}$ → reverse the inequality

$x \geq 7$

OR

Graph:

$x < -2$ $x \geq 7$

6. $x + 6 > 2$ and $4x - 11 \leq 19$

$-6 \quad -6$

$x > -4$

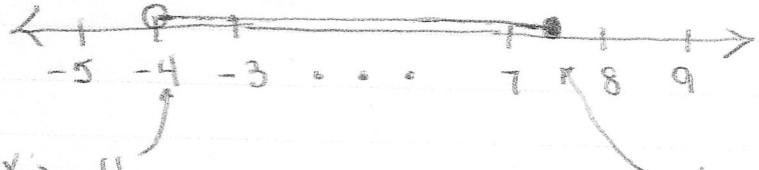
$+11 \quad +11$

$\frac{4x}{4} \leq \frac{30}{4}$

$x \leq 7.5$

And

Graph:



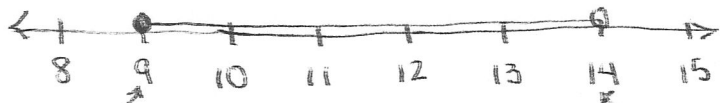
$x > -4$ $x \leq 7.5$

7. $\frac{x}{3} - 1 \geq 2$ (·3) and $\frac{x+1}{5} < 3$ (·5)

$x - 3 \geq 6$ (+3) and $x + 1 < 15$ (−1)

$x \geq 9$ and $x < 14$

Graph:



$x \geq 9$ $x < 14$

8. $3(x+1) + 5 \geq 2$ and $3 - 2x > -11$

$3x + 3 + 5 \geq 2$ -3 -3

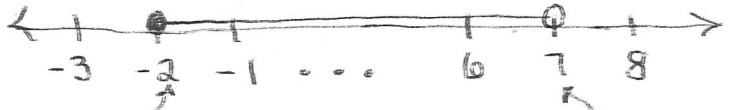
$3x + 8 \geq 2$ $-2x > -14$

-8 -8 -2 -2

$\frac{3x}{3} \geq \frac{-6}{3}$ $x < 7$

$x \geq -2$ and

Graph:



$x \geq -2$ $x < 7$

9. $|2x + 9| < 5$ → A "less than Absolute Value Inequality" means an "AND" Inequality

$2x + 9 < 5$ (And) $2x + 9 > -5$

-9 -9 -9 -9

$\frac{2x}{2} < \frac{-4}{2}$ $\frac{2x}{2} > \frac{-14}{2}$

$x < -2$ (AND) $x > -7$

Graph:

10. $|x+7| - 3 \leq -1$ → isolate the absolute value piece

$+3 \quad +3$

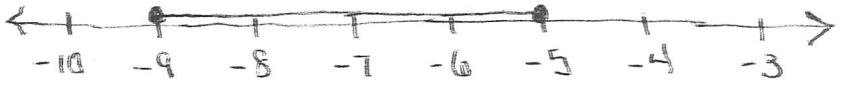
$|x+7| \leq 2$ → Now: solve this as an "ADD" inequality

$x+7 \leq 2$ and $x+7 \geq -2$

$-7 \quad -7 \qquad -7 \quad -7$

$x \leq -5$ ← (and) → $x \geq -9$

Graph:



11. $\left|3 + \frac{x}{4}\right| \geq 2$ → A "greater than Absolute Value Inequality" means an "OR" inequality.

$4 \cdot 3 + \frac{x}{4} \cdot 4 \geq 2 \cdot 4$

$12 + x \geq 8$

$-12 \quad -12$

$x \geq -4$ ← (OR) → $4 \cdot 3 + \frac{x}{4} \cdot 4 \leq -2 \cdot 4$

$12 + x \leq -8$

$-12 \quad -12$

$x \leq -20$

Graph:

$x \leq -20$ $\qquad$ $x \geq -4$

12. $\left|\frac{2x-1}{3}\right| + 2 > 6$ → Isolate the absolute value piece

$-2 \quad -2$

$\left|\frac{2x-1}{3}\right| > 4$ → Set up the "OR" inequalities

$3 \cdot \left[\frac{2x-1}{3}\right] > 4 \cdot 3$ $\qquad$ $3 \cdot \left[\frac{2x-1}{3}\right] < -4 \cdot 3$

$2x - 1 > 12$ $\qquad$ -OR- $\qquad$ $2x - 1 < -12$

$+1 \quad +1 \qquad +1 \quad +1$

$\frac{2x}{2} > \frac{13}{2} \qquad \frac{2x}{2} < \frac{-11}{2}$

$x > 6.5$ ← (OR) → $x < -5.5$

13. • Two lines on a graph — one going left (less than) and one going right (greater than) — means an "OR" inequality.
• One line on a graph means an "AND" inequality.

a. Two lines means "OR": $x \leq -2$ OR $x > 6$
b. One line means "AND": $x > -4$ AND $x \leq -1$
c. One line means "AND": $x \geq 3\frac{1}{2}$ AND $x < 4$