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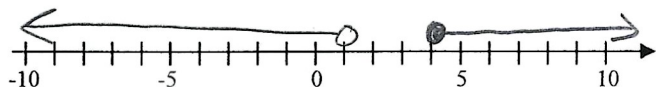
MORE WORK WITH COMPOUND INEQUALITIES
COMMON CORE ALGEBRA I



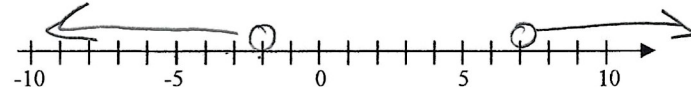
Compound inequalities are used in mathematics for a variety of purposes. It's good to get more practice in them, especially when it comes to visualizing what values of x lie in their solution sets.

Exercise #1: Graph each of the following compound inequalities on the number lines provided. For (c) and (d) write the inequalities as a single statement. *(and)*

(a) $x < 1$ or $x \geq 4$



(b) $x > 7$ or $x < -2$



(c) $x > -3$ and $x < 5$



(d) $x \leq 9$ and $x \geq 0$



Single Inequality: $-3 < x < 5$

Single Inequality: $0 \leq x \leq 9$

Inequalities involving AND are almost always universally written as a single inequality because these tend to show us how all values of x are between two numbers.

Exercise #2: Graph each of the following. First, rewrite as two inequalities involving the AND connector.

(a) $-4 \leq x < 6$

Two Inequalities: $x \geq -4$ and $x < 6$



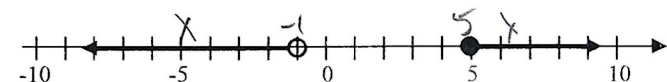
(b) $-5 \leq x \leq 9$

Two Inequalities: $x \geq -5$ and $x \leq 9$

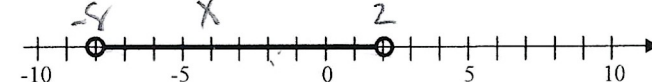


Exercise #3: For each of the following graphs, write a compound inequality that describes all of the numbers shown graphed.

(a) Compound Inequality: $x < -1$ or $x \geq 5$
or



(b) Compound Inequality: $-8 < x < 2$
AND

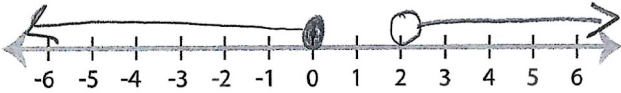


Graphing Compound Inequalities

ES1

Graph the compound inequalities.

1) $x \leq 0$ or $x > 2$

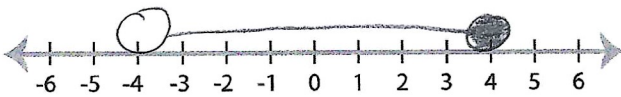


2) $x > -1$ and $x < 3$

$-1 < x < 3$ write as single inequality 1st in numerical order



3) $-4 < x \leq 4$ "And"



4) $x \geq 5$ or $x \leq -6$



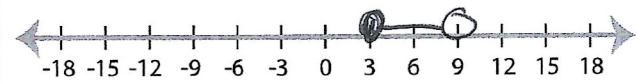
5) $10 > x > -8$

$-8 < x < 10$ swap order so #'s are in numerical order



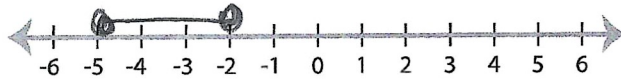
6) $x < 9$ and $x \geq 3$

$3 \leq x < 9$ write as single inequality 1st in numerical order



7) $x \leq -2$ and $x \geq -5$

$-5 \leq x \leq -2$ write as single inequality 1st in numerical order

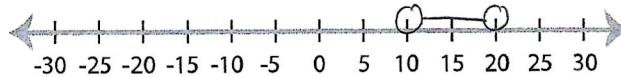


8) $x \geq 12$ or $x < -16$



9) $x > 10$ and $x < 20$

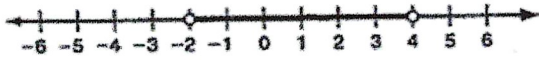
$10 < x < 20$ write as single inequality 1st in numerical order



10) $-3 \leq x < 1$



1. Write the compound inequality shown by the graph.



And

$$-2 < x < 4$$

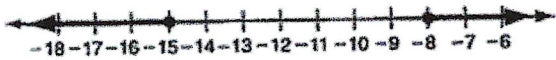
2. Write the compound inequality shown by the graph.



or

$$x < -3 \text{ or } x \geq 3$$

3. Write the compound inequality shown by the graph.



or

$$x \leq -15 \text{ or } x \geq -8$$

4. Write the compound inequality shown by the graph.



And

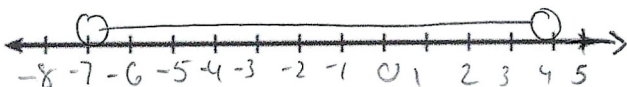
$$0 \leq x < 20$$

5. Solve the compound inequality, then graph the solution and write it in interval notation.

$$\begin{array}{r} -15 < x - 8 < -4 \\ +8 \quad +8 \quad +8 \\ \hline \end{array}$$

$$-7 < x < 4$$

$$\text{IN: } (-7, 4)$$

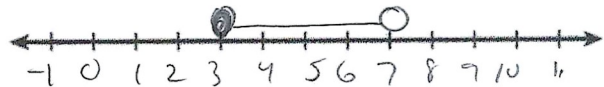


6. Solve the compound inequality, then graph the solution and write it in interval notation.

$$\begin{array}{r} 12 \leq 4n < 28 \\ \frac{12}{4} \quad \frac{4n}{4} \quad \frac{28}{4} \\ \hline \end{array}$$

$$3 \leq n < 7$$

$$\text{IN: } [3, 7)$$



7. Solve the compound inequality, then graph the solution and write it in interval notation.

$$\begin{array}{r} -2 \leq 3b + 7 \leq 13 \\ -7 \quad -7 \quad -7 \end{array}$$

$$\begin{array}{r} -9 \leq 3b \leq 6 \\ \frac{-9}{3} \quad \frac{3b}{3} \quad \frac{6}{3} \end{array}$$

$$\begin{array}{l} -3 \leq b \leq 2 \\ \text{IN: } [-3, 2] \end{array}$$

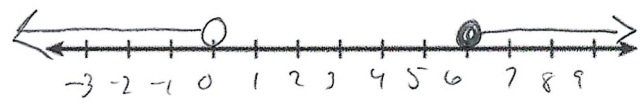


8. Solve the compound inequality, then graph the solution and write it in interval notation.

$$\begin{array}{r} x - 3 < -3 \text{ or } x - 3 \geq 3 \\ +3 \quad +3 \quad | \quad +3 \quad +3 \end{array}$$

$$x < 0 \text{ or } x \geq 6$$

$$\text{IN: } (-\infty, 0) \cup [6, \infty)$$

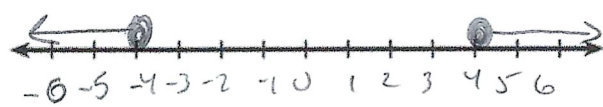


9. Solve the compound inequality, then graph the solution and write it in interval notation.

$$\begin{array}{r} 5k \leq -20 \text{ or } 2k \geq 8 \\ \frac{5k}{5} \leq \frac{-20}{5} \quad | \quad \frac{2k}{2} \geq \frac{8}{2} \end{array}$$

$$k \leq -4 \text{ or } k \geq 4$$

$$\text{IN: } (-\infty, -4] \cup [4, \infty)$$



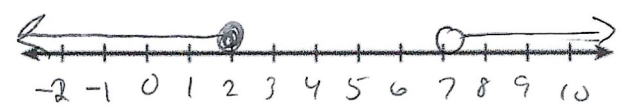
10. Solve the compound inequality, then graph the solution and write it in interval notation.

$$\begin{array}{r} 2s + 3 \leq 7 \text{ or } 3s + 5 > 26 \\ -3 \quad -3 \quad | \quad -5 \quad -5 \end{array}$$

$$\begin{array}{r} 2s \leq 4 \\ \frac{2s}{2} \leq \frac{4}{2} \end{array} \quad \begin{array}{r} 3s > 21 \\ \frac{3s}{3} > \frac{21}{3} \end{array}$$

$$s \leq 2 \text{ or } s > 7$$

$$\text{IN: } (-\infty, 2] \cup (7, \infty)$$



11. The human ear can distinguish sounds between 20 Hz and 20,000 Hz, inclusive. Write a compound inequality that represents this problem. Then graph the solution and write it in interval notation.

$$\begin{array}{l} 20 \leq H_z \leq 20,000 \\ \text{IN: } [20, 20,000] \end{array}$$



12. For a man to box as a welterweight, he must weigh more than 140 lbs., but at most 147 lbs. Write a compound inequality that represents this problem. Then graph the solution and write it in interval notation.

$$\begin{array}{l} x > 140 \\ 140 < x \leq 147 \\ \text{IN: } (140, 147] \end{array}$$

