1-18-18

Aim: SWBAT write, solve, and use compound inequalities to represent real world situations.

HW: Packet Pages 25 - 26

Review due tomorrow (except compound inequalities)

Inequalities Test Monday

Do Now: Packet Page 22

Homework – Writing an Inequality to Solve Word Problems

For each of the following, define a variable and write an inequality to solve the problem. Be sure to state your final answer in a complete sentence.

1) Kevin is going to join a swim club. There is a $45 initiation fee. It costs $28 for each month that he is a member. Kevin only has $300 to pay for the membership. For how many months can he be a member? Will he be able to be a member for a full year?

let x = # of months

$45 + 28x \leq 300$

$-45 \quad -45$

$\frac{28x}{28} \leq \frac{255}{28}$

$x \leq 9\frac{3}{28}$

Kevin can be a member for 9 months and he cannot afford a full year.

2) A company spent $762,500 to make a movie that will be shown in theaters for 8 weeks. If the movie makes $1,250,000 in its first week, how much money does the movie need to earn in the next 7 weeks to make a profit of at least $2,000,000?

sales – expenses = profit

let n = amt. of money needed

$(1{,}250{,}000 + n) - 762{,}500 \geq 2{,}000{,}000$

$487{,}500 + n \geq 2{,}000{,}000$

$-487{,}500 \quad -487{,}500$

$n \geq 1{,}512{,}500$

The movie needs to earn at least $1,512,500 in the next 7 weeks

3) Five friends went out to dinner. Altogether, they only had $175 to spend on the entire meal. They each spent $2 on their beverage and decided to give the waitress a $28 tip. How much can each person spend on his or her own dinner if they each spend the same amount?

let x = the cost of a dinner

$5(2 + x) + 28 \leq 175$

$10 + 5x + 28 \leq 175$

$5x + 38 \leq 175$

$-38 \quad -38$

$\frac{5x}{5} \leq \frac{137}{5}$

$x \leq 27.4$

At most, each person can spend $27.40 on their own dinner.

Compound Inequalities.

Aim: SWBAT write, solve and use compound inequalities to represent real world situations.

Do Now: Write an inequality to represent each situation below:

1) Let x = speed of a car

$x \leq 65$

2) Let x = height of a person

$x \geq 52$

3) Write TWO inequalities to represent the situation below:
Let x = the price of a train ride ticket

$x \geq 3.75$ AND $x \leq 5.95$

This situation requires two inequalities because there are two conditions to be met. This is an example of a compound inequality.

A **compound inequality** is an inequality that is formed by joining two inequalities together with either "and" or "or" (for example, $x > 5$ **and** $x < 10$; $x \leq 3$ **or** $x \geq 10$). When two inequalities are joined with *and*, they are often written simply as a double inequality, like: $5 < x < 10$.

Write a compound inequality to represent each of the following situations:
Let x = the "unknown" in each question.

The temperature on Friday will be above 65° and below 80°. $65 < x < 80$

The carousel allows people under 5 or over 21 year of age. $x < 5$ OR $x > 21$

The trip will take no more than 3 hours but at least $2\frac{1}{2}$ hrs. $2\frac{1}{2} \leq x \leq 3$

A small dog should eat BETWEEN 6 and 10 ounces of food each day. $6 < x < 10$

A math bingo game uses the numbers from 1 to 25 INCLUSIVE. $1 \leq x \leq 25$

For BETWEEN we do not include the boundary numbers. We use the symbols $<$, $>$.

For INCLUSIVE we include the boundary numbers. We use the symbols. $\leq$, $\geq$

22

- **Intersection of Inequalities:** *A compound inequality that contains the word* AND. ∧
  This type of compound inequality is true if **both inequalities are true.

  Ex: $x > 6$ **and** $x < 9$ can be combined together and written as ⟶ $6 < x < 9$

  Ex: The ages of the students in this class are greater than 12 but less than 16.
  ⟶ $12 < x < 16$

- **Union of Inequalities:** *A compound inequality that contains the word* OR. ∨
  This type of compound inequality is true if **at least one of the inequalities is true.

  Ex: $x > 2$ **or** $x \leq -1$ cannot be combined together into one inequality.

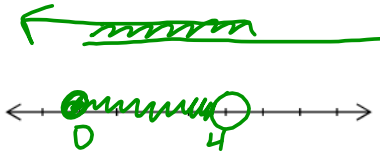
  Ex: The low/high temperature each day in November was either less than 40 degrees or greater than 65 degrees. ⟶ $x < 40$ OR $x > 65$

Examples:
Rewrite each compound inequality as two separate inequalities. Then graph on the number line provided. Write 3 solutions for each inequality.

A) $-6 < x < 1$ $-6 < x$ AND $x < 1$

Solutions: $-5, -4, 0$ $(-6, 1)$

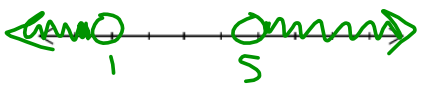
B) $0 \leq x < 4$ $0 \leq x$ AND $x < 4$



Solutions: $1, 2, 3$ $[0, 4)$

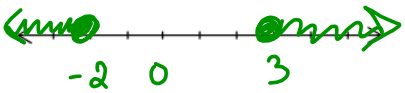
Graph each compound inequality. Write 3 solutions for each inequality.

C) $x < 1$ or $x > 5$



Solutions: $0, 10, 5$

D) $x \leq -2$ or $x \geq 3$

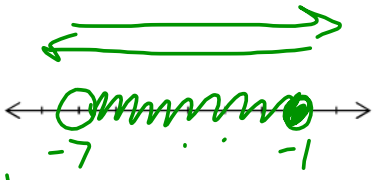


Solutions: $-10, -5, 8$

To solve a compound inequality:

- Rewrite as two separate inequalities
- Solve each inequality
- Then graph the final solution.

Example 1) $-2 < x + 5 \leq 4$



$-2 < x+5$ AND $x+5 \leq 4$

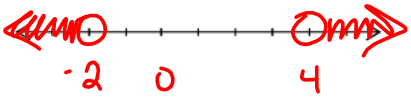
$-5 \quad -5$ $\quad -5 \quad -5$

$-7 < x$ $\quad x \leq -1$

Example 2) $x - 4 < -6$ or $\frac{-3x}{-3} < \frac{-12}{-3}$

$+4 \quad +4$ $\quad x > 4$

$x < -2$

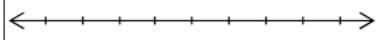


$x < -2$ OR $x > 4$

Homework—Compound Inequalities

Rewrite each compound inequality as two separate inequalities. Then graph.
Write 3 POSSIBLE solutions for each.

1) $-2 < x < 5$

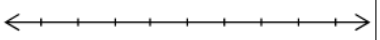


Solutions:

2) $-5 < x \leq 3$

Solutions:

3) $1 \leq x \leq 6$



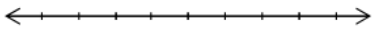
Solutions:

Graph each compound inequality. Write 3 POSSIBLE solutions for each.

4) $x < -1$ or $x > 5$

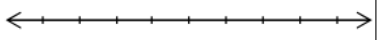
Solutions:

5) $x \leq 0$ or $x > 6$



Solutions:

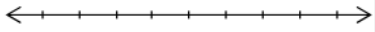
6) $x > -1$ or $x \leq -5$



Solutions:

Solve each inequality. Then, rewrite each inequality as two separate inequalities and graph.
Write 3 POSSIBLE solutions for each.

7) $1 < x + 3 < 5$

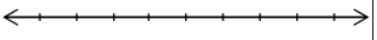


Solutions:

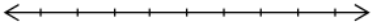
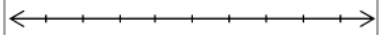
8) $-2 \leq x - 4 < 1$

Solutions:

9) $x + 1 < 3$ or $-2x < -10$



Solutions:

10) $3 < 2x + 1 < 7$	11) $3x - 4 \leq 5$ or $2x - 6 > 6$	12) $-5 \leq 3 - 2x < 11$
		
Solutions:	Solutions:	Solutions:

Write an inequality which describes each graph.

13)

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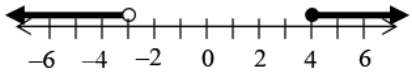
14)



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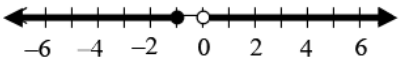
15)



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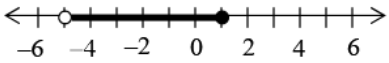
16)



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Write a compound inequality that represents each problem. Then solve each problem and write 3 possible solutions for each.

17) Most snakes must live in places where temperatures range between 75 to 90 degrees.

18) The cost of cell phones are either less than $60 or more than $110.