

Lesson 15: Solution Sets of Two or More Equations (or Inequalities) Joined by “And” or “Or”

Classwork

Exercise 1

Determine whether each claim given below is true or false.

- a. Right now, I am in math class and English class. b. Right now, I am in math class or English class.
- c. $3 + 5 = 8$ and $5 < 7 - 1$. d. $10 + 2 \neq 12$ and $8 - 3 > 0$.
- e. $3 < 5 + 4$ or $6 + 4 = 9$. f. $16 - 20 > 1$ or $5.5 + 4.5 = 11$

These are all examples of declarative compound sentences.

- g. When the two declarations in the sentences above were separated by “and,” what had to be true to make the statement true?
- h. When the two declarations in the sentences above were separated by “or,” what had to be true to make the statement true?

Example 1

Solve each system of equations and inequalities.

a. $x + 8 = 3$ or $x - 6 = 2$

b. $4x - 9 = 0$ or $3x + 5 = 2$

c. $x - 6 = 1$ and $x + 2 = 9$

d. $2w - 8 = 10$ and $w > 9$.

Exercise 2

a. Using a colored pencil, graph the inequality $x < 3$ on the number line below.



b. Using a different colored pencil, graph the inequality $x > -1$ on the number line below.



c. Using a third colored pencil, darken the section of the number line where $x < 3$ and $x > -1$.



d. Using a colored pencil, graph the inequality $x < -4$ on the number line below.



e. Using a different colored pencil, graph the inequality $x > 0$ on the number line below.



- f. Using a third colored pencil, darken the section of the number line where $x < -4$ or $x > 0$.



- g. Graph the compound sentence $x > -2$ or $x = -2$ on the number line below.



- h. How could we abbreviate the sentence $x > -2$ or $x = -2$?

- i. Rewrite $x \leq 4$ as a compound sentence and graph the solutions to the sentence on the number line below.



Example 2

Graph each compound sentence on a number line.

- a. $x = 2$ or $x > 6$



- b. $x \leq -5$ or $x \geq 2$



Rewrite as a compound sentence and graph the sentence on a number line.

- c. $1 \leq x \leq 3$



Exercise 3

Consider the following two scenarios. For each, specify the variable and say, “ W is the width of the rectangle,” for example, and write a compound inequality that represents the scenario given. Draw its solution set on a number line.

Scenario	Variable	Inequality	Graph
a. Students are to present a persuasive speech in English class. The guidelines state that the speech must be at least 7 minutes but not exceed 12 minutes.			
b. Children and senior citizens receive a discount on tickets at the movie theater. To receive a discount, a person must be between the ages of 2 and 12, including 2 and 12, or 60 years of age or older.			

Exercise 4

Determine if each sentence is true or false. Explain your reasoning.

a. $8 + 6 \leq 14$ and $\frac{1}{3} < \frac{1}{2}$.

b. $5 - 8 < 0$ or $10 + 13 \neq 23$

Solve each system and graph the solution on a number line.

c. $x - 9 = 0$ or $x + 15 = 0$

d. $5x - 8 = -23$ or $x + 1 = -10$

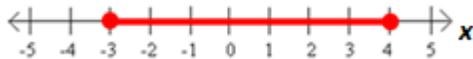
Graph the solution set to each compound inequality on a number line.

e. $x < -8$ or $x > -8$

f. $0 < x \leq 10$

Write a compound inequality for each graph.

g.



h.



- i. A poll shows that a candidate is projected to receive 57% of the votes. If the margin for error is plus or minus 3%, write a compound inequality for the percentage of votes the candidate can expect to get.
- j. Mercury is one of only two elements that is liquid at room temperature. Mercury is non-liquid for temperatures less than -38.0°F or greater than 673.8°F . Write a compound inequality for the temperatures at which mercury is non-liquid.

Lesson Summary

In mathematical sentences, like in English sentences, a compound sentence separated by

AND is true if _____.

OR is true if _____.

Problem Set

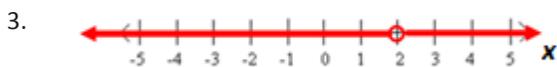
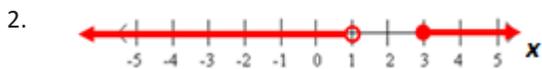
1. Consider the inequality $0 < x < 3$.
 - a. Rewrite the inequality as a compound sentence.

- b. Graph the inequality on a number line.



- c. How many solutions are there to the inequality? Explain.
 - d. What are the largest and smallest possible values for x ? Explain.
 - e. If the inequality is changed to $0 \leq x \leq 3$, then what are the largest and smallest possible values for x ?

Write a compound inequality for each graph.



Write a single or compound inequality for each scenario.

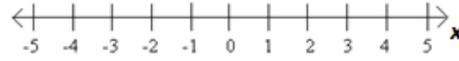
4. The scores on the last test ranged from 65% to 100%.
5. To ride the roller coaster, one must be at least 4 feet tall.
6. Unsafe body temperatures are those lower than 96°F or above 104°F.

Graph the solution(s) to each of the following on a number line.

7. $x - 4 = 0$ and $3x + 6 = 18$



8. $x < 5$ and $x \neq 0$



9. $x \leq -8$ or $x \geq -1$



10. $3(x - 6) = 3$ or $5 - x = 2$



11. $x < 9$ and $x > 7$



12. $x + 5 < 7$ or $x = 2$

