Compound inequality review

Work on paper. Read each example, then complete the spaces. About 5 minutes on this page.

Prepare for ELO C1 on October 27. Show your algebra, then graph the combined solution.

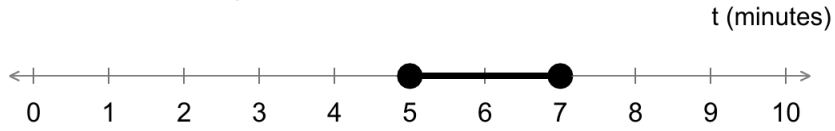
A solution makes the condition true. AND means both conditions. OR means at least one condition.

Mai's tank starts with 16 liters. She adds 4 liters per minute. The model is y = 4t + 16.
t = time in minutes; y = water in liters. Time starts at 0 and may be fractional: t ≥ 0.

AND At least 36 and at most 44 liters

$$36 \le 4t + 16 \le 44$$
$$36 - 16 \le 4t + 16 - 16 \le 44 - 16$$
$$\frac{20}{4} \le \frac{4t}{4} \le \frac{28}{4}$$
$$5 \le t \le 7$$

Keep times that satisfy BOTH conditions.

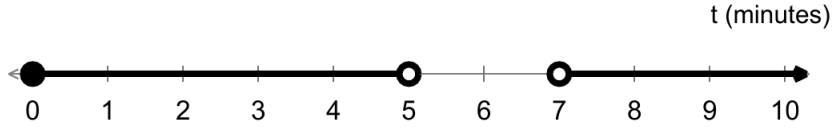


Filled circles include 5 and 7. Every time between them works.

OR Less than 36 or more than 44 liters

$$4t + 16 < 36 \quad or \quad 4t + 16 > 44$$
$$4t < 20 \quad or \quad 4t > 28$$
$$\frac{4t}{4} < \frac{20}{4} \quad or \quad \frac{4t}{4} > \frac{28}{4}$$
$$t < 5 \quad or \quad t > 7$$

Keep either part; remember that t ≥ 0.



Open circles exclude 5 and 7. Include 0: the tank starts with 16 liters.

1 Check the boundary

At t = 5, y = 4(5) + 16 = 36 liters. Why is 5 minutes included in the AND solution but excluded from the OR solution?

Then turn the page. You will solve three problems, with space to show each step.

Solve each inequality, then combine

About 10 minutes. Here x can be any real number; it is not a time variable.

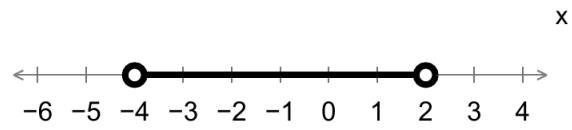
Worked reminder: solve each part. AND keeps only values that satisfy BOTH.

$$4x - 6 < 2$$
$$4x - 6 + 6 < 2 + 6$$
$$\frac{4x}{4} < \frac{8}{4}$$
$$x < 2$$

$$3x - 3 > -15$$
$$3x - 3 + 3 > -15 + 3$$
$$\frac{3x}{3} > \frac{-12}{3}$$
$$x > -4$$

Keep the overlap

$$-4 < x < 2$$



Open at −4 and 2; shade between.

2 Your turn: solve the compound inequality and graph the solution.

$$2x - 2 \leq 8 \quad and \quad 3x - 1 \geq -7$$

First inequality — show operations on both sides.

Second inequality — show operations on both sides.

Combined solution

Graph the solution. Use open or filled circles.



Before moving on, check that x = 0 makes both original inequalities true.

Combine with OR

About 9 minutes. Work independently. Use page 1 if you need the meaning of OR.

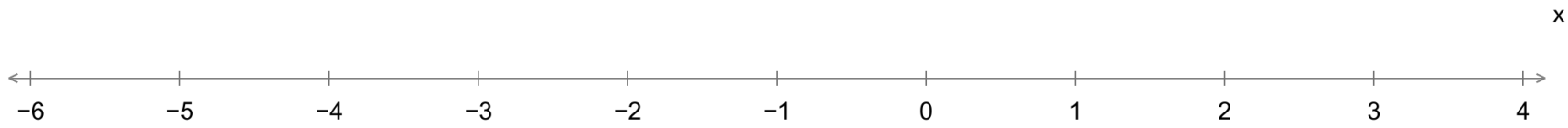
3 Solve the compound inequality. Keep values that satisfy AT LEAST ONE part.

$$3x - 4 \geq -1 \quad or \quad 2x + 2 < -4$$

First inequality — show operations on both sides.	**Second inequality — show operations on both sides.**

Combined solution

Graph the combined solution. Show all values that work.



Is x = 0 a solution? Check both original inequalities to show why.

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One expression between two boundaries

About 8 minutes for Problem 4. Then use 3 minutes to check and correct your packet.

4 Solve the chained inequality. Show the same operation on ALL THREE parts.

$$10 < 4x + 6 \leq 22$$

Combined solution

Graph the solution. Check each endpoint separately.



Is x = 4 included? Substitute 4 into the original chained inequality to show why.

Final 3 minutes: check and correct

Check each graph's endpoints and shading against its solved inequality. Recheck one value in an original problem. Cross out only incorrect work and write the correction beside it.

Optional help outside class: Compound Inequality Studio, Revision 1.1, on Mr. Jackson's website. No website or Studio is needed for this packet.

ALEKS topic: Solving a compound linear inequality: Graph solution, basic