

Compound Inequalities

Algebra 1 • Section 3.3

Name: _____

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Quick Review and Helpful Hints

Inequalities solve almost like equations, but dividing or multiplying by a negative reverses the sign. For absolute value, think distance: less-than makes a band, while greater-than usually splits into two rays.

▷ **Example:** Solve $-2x + 5 < 13$.

Work: Subtract 5 to get $-2x < 8$. Divide by -2 and reverse the inequality: $x > -4$.

★ **Answer:** $x > -4$

◆ Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

1. Solve $-2 < x + 5 < 9$. _____

6. Solve $4 < \frac{x}{2} + 1 < 10$. _____

2. Solve $3 \leq 2x + 1 \leq 11$. _____

7. Write interval notation for $x \geq -3$ and $x < 5$. _____

3. Solve $x - 4 < -1$ or $x - 4 > 6$. _____

8. Write interval notation for $x < -2$ or $x \geq 4$. _____

4. Solve $-6 \leq -3x < 12$. _____

9. Solve $1 \leq 3x - 2 \leq 16$. _____

5. Solve $2x + 5 \leq 1$ or $x - 3 \geq 8$. _____

10. Solve $5x - 1 < 9$ and $x + 7 > 10$. _____

◆ Word Problems

11. A freezer must stay from -4°F to 6°F . Write a compound inequality for temperature T . _____

12. A club needs more than 20 but no more than 35 members. Write the inequality. _____



Answer Keys

1. $-7 < x < 4$

2. $1 \leq x \leq 5$

3. $x < 3$ or $x > 10$

4. $-4 < x \leq 2$

5. $x \leq -2$ or $x \geq 11$

6. $6 < x < 18$

7. $[-3, 5)$

8. $(-\infty, -2) \cup [4, \infty)$

9. $1 \leq x \leq 6$

10. $3 < x < 2$; no solution

11. $-4 \leq T \leq 6$

12. $20 < m \leq 35$

Step-by-Step Explanations

- Whatever you do to the middle, do to both ends — subtract 5 from all three parts at once.
- Take 1 off all three parts, then divide each by 2; x ends up trapped between 1 and 5.
- Two separate inequalities here — just add 4 to each one and leave them both as answers.
- Dividing every part by -3 flips both signs, so the chain turns around as it shrinks.
- With 'or', solve each piece on its own and keep both — either range satisfies the problem.
- Strip the $+1$ from all parts, then multiply each by 2 to undo the halving of x .

- A square bracket means -3 is invited in; the round one shows 5 is left out.
- Two disconnected pieces call for a union — the \cup glues the separate rays together.
- Add 2 to every part, then split each by 3 — x settles comfortably from 1 to 6.
- One side wants $x < 2$, the other wants $x > 3$ — no number can be both, so it's empty.
- 'From... to' allows either endpoint, so T sits between -4 and 6 with both included.
- 'More than' keeps 20 out, while 'no more than' lets 35 count — hence one strict, one not.



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