Compound Inequalities

Algebra 1 •Section 3.3

Name: _____	Date: _____	Score: _____ / 12

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 $-2 < x + 5 < 9$.

2. Solve $3 \le 2x + 1 \le 11$.

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

4. Solve $-6 \le -3x < 12$.

5. Solve $2x + 5 \le 1$ or $x - 3 \ge 8$.

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

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

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

9. Solve $1 \le 3x - 2 \le 16$.

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

1. Whatever you do to the middle, do to both ends — subtract 5 from all three parts at once.
2. Take 1 off all three parts, then divide each by 2; x ends up trapped between 1 and 5.
3. Two separate inequalities here — just add 4 to each one and leave them both as answers.
4. Dividing every part by -3 flips both signs, so the chain turns around as it shrinks.
5. With 'or', solve each piece on its own and keep both — either range satisfies the problem.
6. Strip the $+1$ from all parts, then multiply each by 2 to undo the halving of x.
7. A square bracket means -3 is invited in; the round one shows 5 is left out.
8. Two disconnected pieces call for a union — the $\cup$ glues the separate rays together.
9. Add 2 to every part, then split each by 3 — x settles comfortably from 1 to 6.
10. One side wants $x < 2$, the other wants $x > 3$ — no number can be both, so it's empty.
11. 'From... to' allows either endpoint, so T sits between -4 and 6 with both included.
12. 'More than' keeps 20 out, while 'no more than' lets 35 count — hence one strict, one not.

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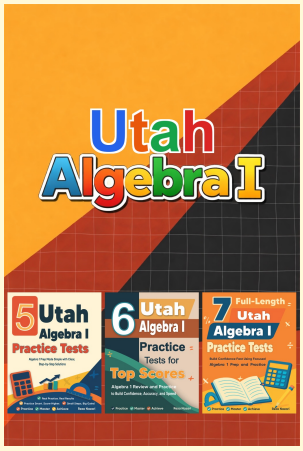

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