

# 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  $-4^\circ\text{F}$  to  $6^\circ\text{F}$ . 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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