

Algebra 1 · Linear and Compound Inequalities · Worksheet Answer Key

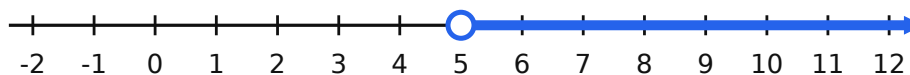
Common Core A-REI.B.3, A-CED.A.1, A-CED.A.3 · mathovore.fr

Each solution shows every step, the graph or interval notation when requested, and a check. When a problem divides by a negative number, notice the line where the inequality sign reverses. If your answer differs, find the first line where your work and the key disagree.

Algebra 1 Common Core: A-REI.B.3 · A-CED.A.1 · A-CED.A.3

Problem 1: One-step graph

Subtract 4: $3x > 15$. Divide by 3: $x > 5$. Interval notation: $(5, \infty)$.



Graph of $x > 5$.

Problem 2: Closed circle

Add 7: $5x \leq 35$. Divide by 5: $x \leq 7$. Interval notation: $(-\infty, 7]$.



Graph of $x \leq 7$.

Problem 3: Divide by a negative

Subtract 9: $-2x < 6$. Divide by -2 and reverse the sign: $x > -3$.

Check: $x = 0$ gives $9 < 15$, true.

Problem 4: Distribute and solve

Distribute: $4x-12 \geq 2x+6$. Subtract $2x$: $2x-12 \geq 6$. Add 12: $2x \geq 18$. Divide by 2: $x \geq 9$.

Problem 5: Variables on both sides

Add $3x$: $7 > 5x-8$. Add 8: $15 > 5x$. Divide by 5: $3 > x$, which is $x < 3$.

Check: $x=0$ gives $7 > -8$, true.

Problem 6: Fraction coefficient

Add 2: $\frac{x}{3} \leq 6$. Multiply by 3: $x \leq 18$.

Problem 7: Negative fraction

Multiply by $-\frac{3}{2}$ and reverse the sign: $x \leq 8 \cdot \left(-\frac{3}{2}\right)$, so $x \leq -12$.

Check: $x=-12$ gives $8 \geq 8$, true.

Problem 8: Negative outside parentheses

Distribute: $-2x-8 < 6$. Add 8: $-2x < 14$. Divide by -2 and reverse: $x > -7$.

Problem 9: Fractions on both sides

Multiply by 6: $3(x+1) \geq 2(2x-1)$. Distribute: $3x+3 \geq 4x-2$. Subtract $3x$: $3 \geq x-2$. Add 2: $5 \geq x$, so $x \leq 5$.

Problem 10: Decimal inequality

Subtract $0.2x$: $0.4x-1.5 < 2.5$. Add 1.5: $0.4x < 4$. Divide by 0.4: $x < 10$.

Problem 11: All or none

- a. Distribute: $3x+6 > 3x+1$. Subtract $3x$: $6 > 1$, always true: **all real numbers**.
- b. Subtract $2x$: $5 < -1$, never true: **no solution**.

Problem 12: Read the graph

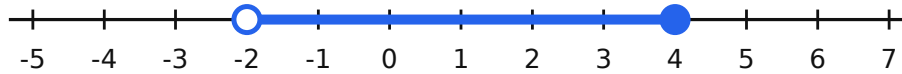
- a. $x \geq -4$, interval $[-4, \infty)$.
- b. $x < 3$, interval $(-\infty, 3)$.



Graph of $x \geq -4$.

Problem 13: Compound with and

Subtract 1 from all three parts: $-4 < 2x \leq 8$. Divide by 2: $-2 < x \leq 4$. Interval notation: $(-2, 4]$.

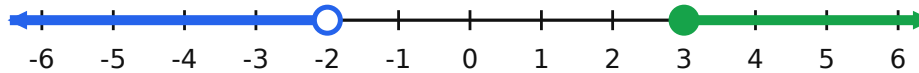


Graph of $-2 < x \leq 4$.

Problem 14: Compound with or

First part: $2x < -4$, so $x < -2$. Second part: $3x \geq 9$, so $x \geq 3$.

Solution: $x < -2$ or $x \geq 3$.



Graph of $x < -2$ or $x \geq 3$.

Problem 15: Three-part inequality

Add 2 to all parts: $6 \leq 3x < 15$. Divide by 3: $2 \leq x < 5$. Interval notation: $[2, 5)$.



Graph of $2 \leq x < 5$.

Problem 16: Overlap of two conditions

First: $x > -2$. Second: $x \leq 5$. Both must hold, so the solution is $-2 < x \leq 5$.

Problem 17: School store budget

$18.50 + 6.25t \leq 50$. Subtract 18.50: $6.25t \leq 31.50$. Divide: $t \leq 5.04$.

Diego can buy at most 5 T-shirts. Check: $18.50 + 6.25(5) = 49.75$, but 6 shirts cost \$56.00.

Problem 18: Weekend job

$12h - 15 \geq 150$. Add 15: $12h \geq 165$. Divide: $h \geq 13.75$.

She must work at least 13.75 hours (13 hours 45 minutes). Check: $12(13.75) - 15 = 150$.

Problem 19: Elevator limit

$180 + 35b \leq 1200$. Subtract 180: $35b \leq 1020$. Divide: $b \leq 29.14$.

At most 29 boxes. Check: $180 + 35(29) = 1195$, while 30 boxes give 1230.

Problem 20: Car rental

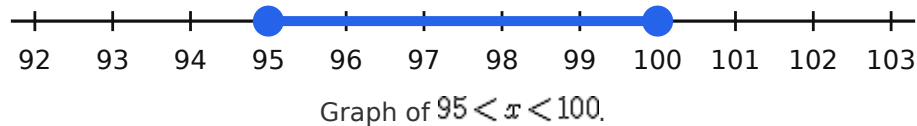
$30 + 0.20m < 45$. Subtract 30: $0.20m < 15$. Divide: $m < 75$.

A is cheaper for fewer than 75 miles. At 75 miles both cost \$45.

Problem 21: Test average

$\frac{88+92+85+s}{4} \geq 90$. Multiply by 4: $265 + s \geq 360$. Subtract: $s \geq 95$.

With the maximum of 100: $95 \leq s \leq 100$.



Problem 22: Saving up

$100 \leq 35 + 5w \leq 150$. Subtract 35: $65 \leq 5w \leq 115$. Divide by 5: $13 \leq w \leq 23$.

From week 13 to week 23. Check: $35 + 5(13) = 100$ and $35 + 5(23) = 150$.