

Solving Multi-Step Inequalities

Algebra 1 • Section 3.2

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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 $3x + 5 < 20$.

6. Solve $2(3n - 1) < 16$.

2. Solve $7 - 2y \geq 15$.

7. Solve $9 - 4r > 21$.

3. Solve $4(a - 3) > 20$.

8. Solve $5 + \frac{m}{2} \leq 13$.

4. Solve $-5p + 2 \leq 17$.

9. Solve $8x - 3 \geq 5x + 12$.

5. Solve $\frac{x+1}{3} \geq 4$.

10. Solve $10 - 2(k + 4) < 6$.

◆ Word Problems

11. A student needs at least 90 points. She has 34 and earns 7 per task. Write and solve.

12. A rental costs \$15 plus \$4 per hour and must stay under \$47. How many hours?



Answer Keys

1. $x < 5$

2. $y \leq -4$

3. $a > 8$

4. $p \geq -3$

5. $x \geq 11$

6. $n < 3$

7. $r < -3$

8. $m \leq 16$

9. $x \geq 5$

10. $k > -2$

11. $34 + 7t \geq 90; t \geq 8$

12. $h < 8$

Step-by-Step Explanations

1. Subtract 5 first, then divide by 3; since 3 is positive, the $<$ stays put.
2. After taking 7 off you have $-2y \geq 8$ — dividing by a negative flips \geq into \leq .
3. Dividing both sides by 4 keeps the direction; $a - 3 > 5$ then adds up to $a > 8$.
4. Clear the $+2$, then divide by -5 — and remember a negative divide turns the sign around.
5. Multiply both sides by the positive 3 to lift the fraction, then subtract 1; the sign holds.
6. Distribute to $6n - 2 < 16$, add 2, then divide by the positive 6 — direction unchanged.

7. Move the 9 to get $-4r > 12$; the divide by -4 is the moment $>$ becomes $<$.
8. Subtract the 5, then multiply by the positive 2 to undo the halved m — no flipping needed.
9. Collect the x terms by subtracting $5x$, add 3, and $3x \geq 15$ gives $x \geq 5$.
10. Distribute to $2 - 2k < 6$, peel off the 2, then the negative divide swings $<$ to $>$.
11. 'At least' means \geq , so $34 + 7t \geq 90$; subtracting 34 shows she needs $t \geq 8$ tasks.
12. 'Under' means a strict $<$: write $15 + 4h < 47$, then peel the \$15 and divide by 4.



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