Solve One-Variable Inequalities and Graph Solution Sets

Original tasks 1, 2, 3 / complete keys

Task 1

Solve $2x + 3 > 11$, graph the solution on a number line, and write it in interval notation.

Answer: $x > 4$; open circle at 4, shade right; interval notation $(4, \infty)$.

Reason: Subtract 3 from both sides to get $2x > 8$, then divide by 2 (positive) to get $x > 4$. The strict inequality means an open circle at 4 and shading to the right. Interval notation uses a parenthesis at 4 and at infinity.

Check: Test $x = 5$: $2(5)+3 = 13 > 11$, true. Test $x = 3$: $2(3)+3 = 9 > 11$, false. The endpoint 4 is excluded, matching the open circle and parenthesis.

Task 2

Solve $-3x \geq 12$, graph the solution on a number line, and write it in interval notation.

Answer: $x \leq -4$; closed circle at -4, shade left; interval notation $(-\infty, -4]$.

Reason: Divide both sides by -3. Because the divisor is negative, reverse $\geq$ to $\leq$, giving $x \leq -4$. The inclusive symbol means a closed circle at -4 and shading to the left. Interval notation uses a bracket at -4 and a parenthesis at $-\infty$.

Check: Test $x = -5$: $-3(-5) = 15 \geq 12$, true. Test $x = -3$: $-3(-3) = 9 \geq 12$, false. The endpoint -4 is included, matching the closed circle and bracket.

Task 3

Solve $5 - x < 2$, graph the solution on a number line, and write it in interval notation.

Answer: $x > 3$; open circle at 3, shade right; interval notation $(3, \infty)$.

Reason: Subtract 5 from both sides to get $-x < -3$. Multiply or divide by -1 and reverse the symbol to get $x > 3$. The strict inequality gives an open circle at 3 and shading to the right. Interval notation is $(3, \infty)$.

Check: Test $x = 4$: $5 - 4 = 1 < 2$, true. Test $x = 2$: $5 - 2 = 3 < 2$, false. The endpoint 3 is excluded, matching the open circle and parenthesis.

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Original tasks 4 / complete keys

Task 4

Solve $7x - 4 \leq 3x + 8$, graph the solution on a number line, and write it in interval notation.

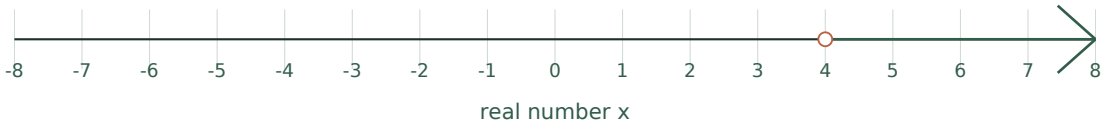
Answer: $x \leq 3$; closed circle at 3, shade left; interval notation $(-\infty, 3]$.

Reason: Subtract $3x$ from both sides to get $4x - 4 \leq 8$. Add 4 to both sides to get $4x \leq 12$. Divide by 4 (positive) to get $x \leq 3$. The inclusive symbol gives a closed circle at 3 and shading to the left. Interval notation is $(-\infty, 3]$.

Check: Test $x = 2$: $7(2)-4 = 10$ and $3(2)+8 = 14$, so $10 \leq 14$, true. Test $x = 4$: $7(4)-4 = 24$ and $3(4)+8 = 20$, so $24 \leq 20$, false. The endpoint 3 is included, matching the closed circle and bracket.

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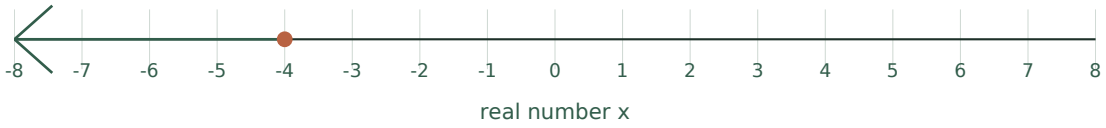
Task 1 / graph key



Number-line solution ray: continuation arrow points toward infinity. Filled endpoint includes the value; white endpoint excludes it.

Solve One-Variable Inequalities and Graph Solution Sets

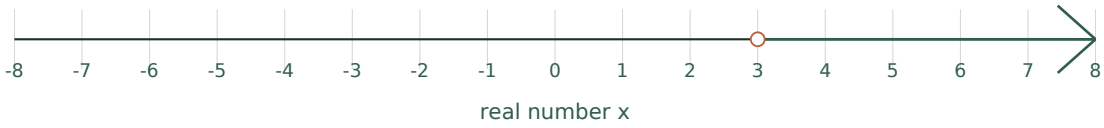
Task 2 / graph key



Number-line solution ray: continuation arrow points toward infinity. Filled endpoint includes the value; white endpoint excludes it.

Solve One-Variable Inequalities and Graph Solution Sets

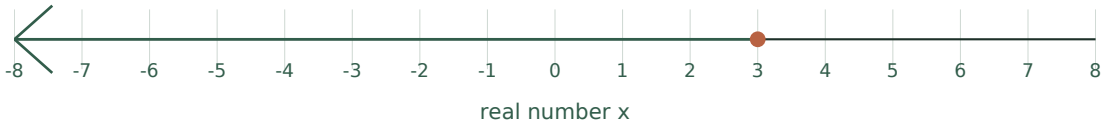
Task 3 / graph key



Number-line solution ray: continuation arrow points toward infinity. Filled endpoint includes the value; white endpoint excludes it.

Solve One-Variable Inequalities and Graph Solution Sets

Task 4 / graph key



Number-line solution ray: continuation arrow points toward infinity. Filled endpoint includes the value; white endpoint excludes it.

Solve One-Variable Inequalities and Graph Solution Sets

Source rubric / reflection

- [ ] Correctly applies inverse operations to isolate the variable.
- [ ] Reverses the inequality symbol only when multiplying or dividing by a negative number.
- [ ] Uses an open circle for $<$ or $>$ and a closed circle for $\leq$ or $\geq$.
- [ ] Shades or arrows in the correct direction on the number line.
- [ ] Writes interval notation with correct parentheses or brackets, including parentheses for infinity.
- [ ] Accepts valid alternative handwriting or shading styles if the endpoint type and direction are clear.

Reflection: What did you check, what did you change, and what will you try next?