

LESSON 5 | MEET THE IDEA

Solving one-variable linear inequalities

Tuesday, October 27, 2026 . 6:00–7:00 PM Central

By the end, I can...

Solve a linear inequality, draw its solution set on a number line, and explain when the inequality sign must reverse.

An **inequality** compares values. Its solution is usually a **set of numbers**. For example, $x < 3$ includes 2, 0 and -5, but excludes 3 and 4.

Symbol	Read it as	Endpoint on a number line
$<$	less than	Open circle: endpoint excluded.
$\leq$	less than or equal to	Closed circle: endpoint included.
$>$	greater than	Open circle: endpoint excluded.
$\geq$	greater than or equal to	Closed circle: endpoint included.



$x < 3$: open at 3, with the ray extending left toward smaller numbers.

The rule that needs special care

Adding or subtracting the same value keeps the inequality direction. Multiplying or dividing both sides by a **negative** number reverses it.

LESSON 5 | WORKED EXAMPLES

Solve, draw and check

Example 1 | Solve $-2x + 5 \leq 13$

$$-2x \leq 8$$

Subtract 5 from both sides.

$$x \geq -4$$

Divide by -2 and reverse $\leq$ to $\geq$.

Check $x = 0$: $5 \leq 13$ is true. Check $x = -5$: $15 \leq 13$ is false.



Include -4 and all larger real numbers.

Example 2 | Solve $3(x - 2) > x + 4$

$$3x - 6 > x + 4$$

Distribute.

$$2x > 10$$

Subtract x , then add 6, on both sides.

$$x > 5$$

Divide by positive 2; keep the direction.



Exclude 5 and include all larger real numbers.

LESSON 5 | MEANING AND CONTEXT

Why does the sign reverse?

Start with $2 < 5$. Multiplying both sides by -1 gives -2 and -5 . On a number line, -2 is to the **right** of -5 , so $-2 > -5$. Multiplying by a negative reverses their order.

Do not reverse it for every negative number

Subtracting 4 from both sides keeps the direction. Dividing both sides by -4 reverses it. The **operation** is what matters.

Example 3 | A \$35 budget

$$6n + 5 \leq 35$$

Each activity costs \$6, plus a \$5 entry fee.

$$6n \leq 30$$

Subtract the entry fee.

$$n \leq 5$$

Divide by 6.

Here n counts activities, so n must be a nonnegative whole number: 0, 1, 2, 3, 4 or 5. Five is the maximum.

When the variable terms cancel

Always true: $3(x + 2) \geq 3x + 5$ becomes $6 \geq 5$. Every real x works.

Always false: $3(x + 2) < 3x + 1$ becomes $6 < 1$. There is no solution.

A context can narrow the set

For a measurement, decimal values might make sense. For a number of activities, use whole numbers. State the sensible restriction along with the inequality.

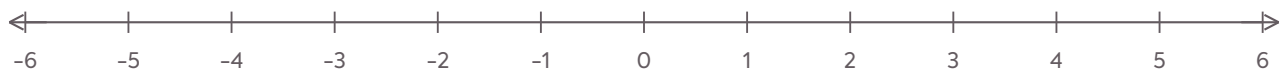
LESSON 5 | SHORT CHECKS

Your turn

Solve Questions 1–3. Graph your solution for Question 2 on the number line and explain whether the endpoint is included.

1. $x + 4 < 9$

2. $-3x \geq 12$



3. $2(x + 1) \leq x + 7$

4. An activity center charges \$4 entry plus \$3 per activity. You have \$19. Write and solve an inequality for n activities. State the possible whole-number values.

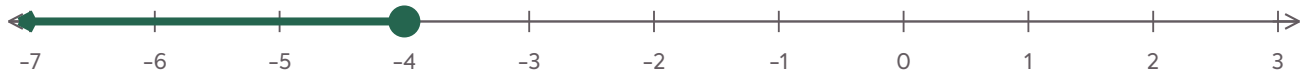
5. A student solves $-2x > 8$ and writes $x > -4$. Correct the answer and explain the error.

Check your graph: is your arrow pointing toward numbers that satisfy the original inequality? Try one number on the shaded side.

LESSON 5 | WORKED ANSWERS AND RECAP

Check your thinking

1. Subtract 4: $x < 5$. The endpoint is open and the ray extends left.
2. Divide by -3 and reverse the sign: $x \leq -4$. Include -4 and shade to the left.



Question 2: -4 is included because the comparison allows equality.

3. $2x + 2 \leq x + 7$ gives $x + 2 \leq 7$, so $x \leq 5$.
4. $3n + 4 \leq 19$ gives $3n \leq 15$, so $n \leq 5$. With n a nonnegative whole number, the options are **0, 1, 2, 3, 4 or 5**.
5. The correct answer is $x < -4$. Dividing by -2 reverses $>$ to $<$. For example, $x = -5$ makes $10 > 8$ true.

I can...

- ☐ Reverse the sign only when the operation requires it.
- ☐ Use open or closed endpoints correctly.
- ☐ Check a solution and interpret restrictions in context.

Next class: review the chapter and repair specific gaps. Curriculum focus: TEKS A.5B.