

LESSON 2 | MEET THE IDEA

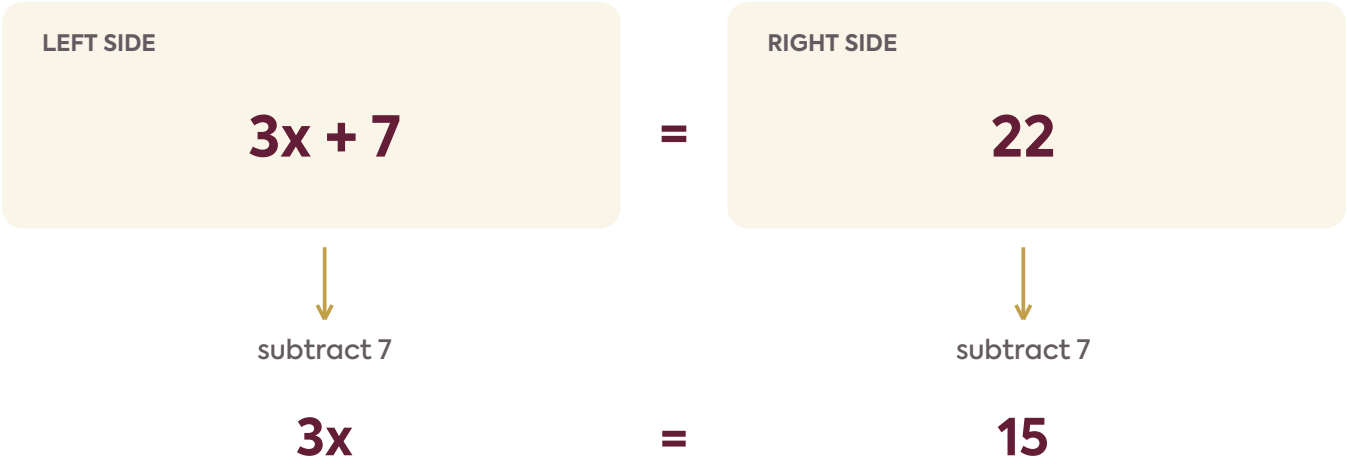
Solving multi-step linear equations

Thursday, October 15, 2026 . 6:00–7:00 PM Central

By the end, I can...

Solve equations with brackets, fractions or variables on both sides, check my solution, and recognize when there is no single solution.

An **equation** states that two expressions are equal. A **solution** is a value that makes the original statement true. Keep the two sides equal by doing the same valid operation to both.



Operation	The operation that undoes it
Add 7	Subtract 7.
Multiply by 3	Divide by 3.
Divide by 4	Multiply by 4.

Remember: division by zero is never a valid step. After solving, substitute into the original equation, not only the last simplified line.

LESSON 2 | WORKED EXAMPLES

Solve one step at a time

Example 1 | Solve $3x + 7 = 22$

$$3x + 7 - 7 = 22 - 7$$

Subtract 7 from both sides.

$$3x = 15$$

Simplify.

$$x = 5$$

Divide both sides by 3.

Check: $3(5) + 7 = 22$, so $x = 5$ is correct.**Example 2 | Solve $2(x + 3) + 4 = 3x + 1$**

$$2x + 6 + 4 = 3x + 1$$

Distribute the 2.

$$2x + 10 = 3x + 1$$

Combine the constants.

$$10 = x + 1$$

Subtract $2x$ from both sides.

$$x = 9$$

Subtract 1 from both sides.

Check: the left side is $2(9 + 3) + 4 = 28$; the right side is $3(9) + 1 = 28$.**A reliable route**

Simplify each side first. Collect variable terms on one side. Collect constants on the other. Undo the remaining multiplication or division. Check the original equation.

LESSON 2 | LOOK BEYOND ONE ANSWER

Fractions and special cases

Example 3 | Solve $(\frac{3}{4})x - 2 = 7$

$(\frac{3}{4})x = 9$	Add 2 to both sides.
$x = 9 \times (\frac{4}{3})$	Multiply both sides by the reciprocal $\frac{4}{3}$.
$x = 12$	Check: $(\frac{3}{4})(12) - 2 = 9 - 2 = 7$.

What remains after simplifying	What it tells you
$x = 5$	One solution: one value makes the statement true.
$6 = 6$	An identity: every real x works for this linear equation.
$-3 = 4$	A contradiction: no x works.

Infinitely many solutions: $2(x + 3) = 2x + 6$ simplifies to $2x + 6 = 2x + 6$, then $6 = 6$.

No solution: $3(x - 1) = 3x + 4$ simplifies to $3x - 3 = 3x + 4$, then $-3 = 4$.

What if the x -terms disappear?

Read the statement that remains. A true statement means every real x works; a false statement means there is no solution. Do not automatically write $x = 0$.

Check in context: $6 + 2m = 2 + 3m$ models two trip prices. It gives $m = 4$ miles, when both prices are \$14.

LESSON 2 | SHORT CHECKS

Your turn

Show equivalent steps. For Questions 1–3, substitute your answer back into the original equation.

1. Solve $5x - 4 = 16$.

2. Solve $3(x - 2) = 2x + 5$.

3. Solve $x/3 + 2 = 5$.

4. Solve $4(x + 1) = 4x + 4$. Explain what your final statement means.

5. Solve $2(x + 3) = 2x + 9$. Explain what your final statement means.

Common mistake

In $3(x - 2)$, the 3 multiplies both terms: $3x - 6$. Writing $3x - 2$ changes the equation.

LESSON 2 | WORKED ANSWERS AND RECAP

Check your thinking

1. $5x - 4 = 16$ gives $5x = 20$, so $x = 4$. Check: $5(4) - 4 = 16$.
2. $3x - 6 = 2x + 5$ gives $x - 6 = 5$, so $x = 11$. Both original sides equal 27.
3. $x/3 = 3$, so $x = 9$. Check: $9/3 + 2 = 5$.
4. $4x + 4 = 4x + 4$ reduces to $4 = 4$. There are **infinitely many solutions: all real numbers**.
5. $2x + 6 = 2x + 9$ reduces to $6 = 9$. This is false, so there is **no solution**.

A solution is a value, not just a final line

The value must make the **original** equation true. Checking both sides also catches errors made when distributing or working with a negative sign.

I can...

- ☐ Keep an equation balanced through each step.
- ☐ Handle a variable on both sides and a fractional coefficient.
- ☐ Distinguish one, no and infinitely many solutions.

Next class: rearrange formulas to make a chosen variable the subject. Curriculum focus: TEKS A.5A.