

Solving Linear Equations

When we're solving a linear equation for "x", the question that is being asked is "What value of 'x' do we plug in to make the left-hand side equal to the right-hand side?"

In solving for x, there are three possibilities outcomes for answers to these equations.

- 1) We get a value for "x", like $x = \underline{\hspace{2cm}}$.
- 2) We end up with a true statement, like $15 = 15$.
- 3) We end up with a false statement, like $24 = 14$.

The first ends up happening anytime the "x" values on the left and right don't cancel completely. This is the most common situation. The lines cross in a point. An example would be $3x + 2 = 4x - 5$. The coefficients of the two x's are different numbers ("3" on the left side of the "=" and "4" on the right side of the "="), so when we move the x's all to one side, they will not completely cancel out.

The second happens in a situation like $2x + 1 = 2x + 1$. Notice how both sides are identical. When we subtract $2x$ from each side, we end up with $1 = 1$, which is always true. This means that for any value of "x" we plug in, we'll get an equality.

So, for the question "What value of 'x' do we plug in to make the left-hand side equal to the right-hand side?" we can see that we can pick any number in the universe and put it in the place of "x" and still get something that's equal. Our answer to this is "All real numbers" because everything works!

The third happens in a situation like $2x - 1 = 2x + 1$. In this case, if we subtract $2x$ from each side, we end up with $-1 = 1$, which is never true (or, it's false). So, no matter what value of "x" we plug in, we won't get anything that's equal.

So, for the question "What value of 'x' do we plug in to make the left-hand side equal to the right-hand side?" we can see that no matter what we plug in, we won't ever get anything equivalent. No "x" value will work, so the answer to this is "No solution."