So far, we have looked at equations where there is exactly one solution. Sometimes there are special cases when an equation may have many solutions or no solutions at all.

Let's take a look at all three cases...

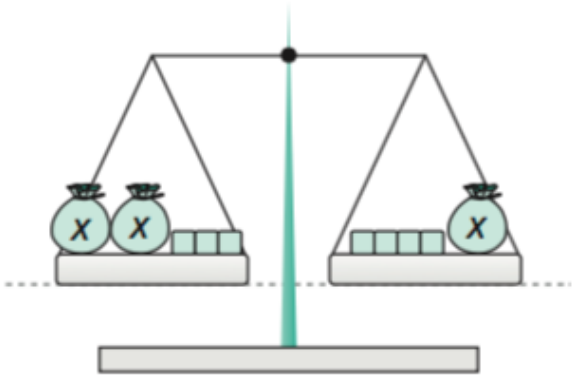
Solving Multi-Step Equations: Special Cases

One Solution
Many Solutions
No Solution

One Solution

- The final answer will result in the form "x = a" (the variable will equal SOMETHING)
- Only one real number can make the equation true.

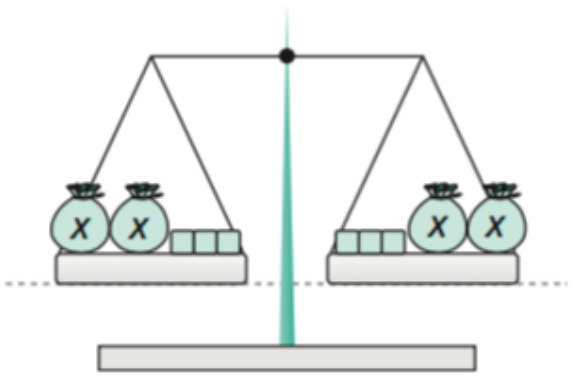
$$2(x-3)+9=5+x-1$$



Infinitely Many Solutions

- The final answer will result in the form "a = a" (the same number will be on both sides of the equal sign).
- Any real number can make the equation true.

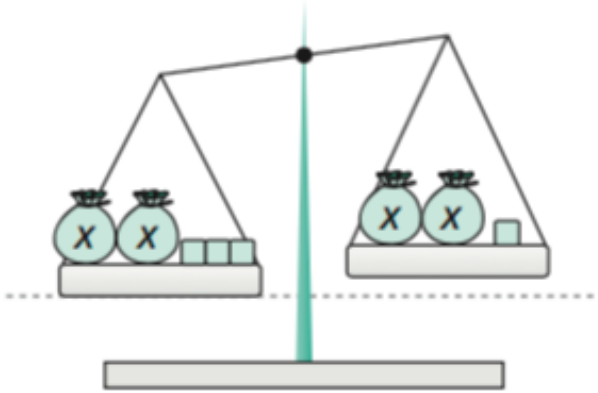
$$2(x+10)-17=5+2x-2$$



No Solution

- The final answer will result in the form "a = b" (where a is a different number than b).
- There is no possible answer for this equation.

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



Solving Equations: Special Cases - Guided Practice

Determine if each equation has one solution, many solutions, or no solution. If the equation has a solution, determine the solution to the equation.

1. $2x + 2x + 2 = 4x + 2$

2. $3(x - 1) = 2x + 9$

3. $4(x+3)-4=8\left(\frac{1}{2}x+1\right)$

4. $\frac{3}{2}(2x+6)=3x+9$

5. $3+\frac{3}{2}x+4=4x-\frac{5}{2}x$

6. Draw lines to match each linear equation to its correct number of solutions. How can you tell when an equation has no solution or many solutions?

$5(4-x)=-5x+20$	no solutions
$-5(4-x)=-5x+20$	infinitely many solutions
$5(5-x)=-5x+20$	one solution