I can recognize special cases when solving a system of equations.

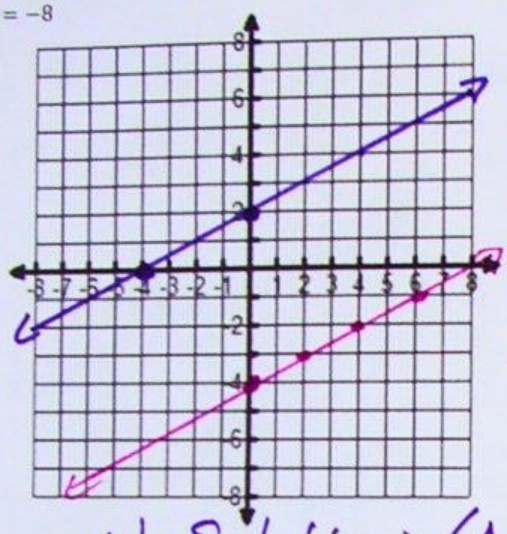
Solving Systems in Special Cases

We learned 3 different ways to solve linear systems of equations: graphing, substitution, and elimination. You know the solution is the point where the two lines intersect. But sometimes, weird things can happen:

Solve each linear system by graphing:

1) $\begin{cases} y = \frac{1}{2}x - 4 \\ 2x - 4y = -8 \end{cases}$ $m = \frac{1}{2}$ $b = -4$ (y-int (start))

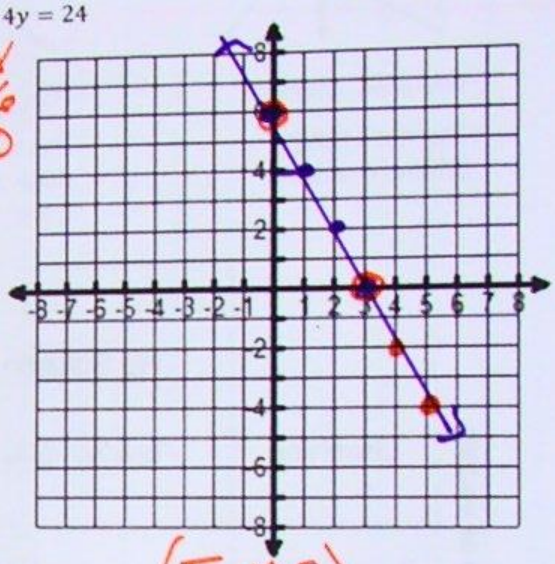
x	y
0	-4
2	0



No Solution (NS)

2) $\begin{cases} y = -2x + 6 \\ 8x + 4y = 24 \end{cases}$ $m = \frac{-2}{1}$ $b = 6$

x	y
0	6
3	0



(IMS)

- If the lines are **parallel**, then you state that there is **No Solution**.
- If the lines are the **same line**, then you state that there are **Infinitely Many Solutions**.

So let's see what the solutions look like when we solve them by substitution or elimination:

1) $\begin{cases} y = \frac{1}{2}x - 4 \\ 2x - 4y = -8 \end{cases}$

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

$2x + -2x + 16 = -8$

$16 \neq -8$ Not true

2) $\begin{cases} y = -2x + 6 \\ 8x + 4y = 24 \end{cases}$

$8x + 4(-2x + 6) = 24$

$8x + -8x + 24 = 24$

$24 = 24$ True

- If the variables cancel out and the result is NOT EQUAL, then you state that there is **No Solution**.
- If the variables cancel out and the result is EQUAL, then you state that there are **Infinitely Many Solutions**.