

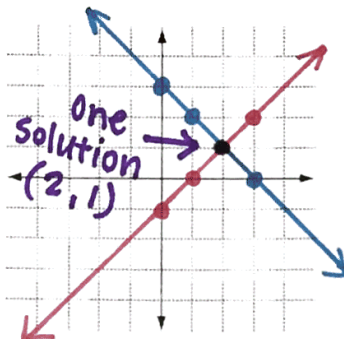
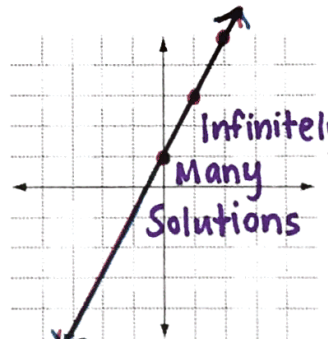
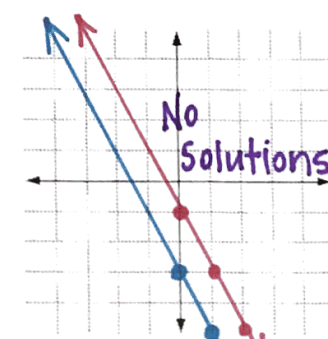
Solving Special Types of Linear Systems

A system of equations can have one solution, no solution, or infinitely many solutions.

A linear system has:

- One solution if the lines intersect.
- No solution if the lines are parallel.
- Infinitely many solutions if the lines coincide (same line).

Example One: *Identifying the Number of Solutions.*

Exactly <u>one</u> Solution	<u>Infinitely</u> Many Solutions	<u>No</u> Solution
<ul style="list-style-type: none"> • Different slopes * Lines intersect at a point 	<ul style="list-style-type: none"> • Same slope • Same y-intercept * Same line 	<ul style="list-style-type: none"> • Same slope • Different y-intercept * Parallel lines
$\begin{cases} x + y = 3 \\ x - y = 1 \end{cases}$ <p>Solve each equation for y.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> $x + y = 3$ $\downarrow -x$ $y = -x + 3$ $m = -1 \quad b = 3$ </div> <div style="text-align: center;"> $x - y = 1$ $\downarrow -x$ $-y = -x + 1$ $\downarrow -1$ $y = x - 1$ $m = 1 \quad b = -1$ </div> </div>	$\begin{cases} 2x = y - 1 \\ 4y - 8x = 4 \end{cases}$ <p>Solve each equation for y.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> $2x = y - 1$ $\downarrow -1$ $2x + 1 = y$ $y = 2x + 1$ $m = 2 \quad b = 1$ </div> <div style="text-align: center;"> $4y - 8x = 4$ $\downarrow +8x$ $4y = 8x + 4$ $\downarrow \frac{1}{4}$ $y = 2x + 1$ $m = 2 \quad b = 1$ </div> </div>	$\begin{cases} y + 2x = -3 \\ y - 1 = -2x \end{cases}$ <p>Solve each equation for y.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> $y + 2x = -3$ $\downarrow -2x$ $y = -2x - 3$ $m = -2 \quad b = -3$ </div> <div style="text-align: center;"> $y - 1 = -2x$ $\downarrow +1$ $y = -2x - 1$ $m = -2 \quad b = -1$ </div> </div>
 <p>one solution (2, 1)</p>	 <p>Infinitely Many Solutions</p>	 <p>No Solutions</p>