

Lesson #3: Systems of Equations:

Systems of Equations Sections / Topics:

1. Graphical Method - Graph both equations, the solution is where they intersect. ✓ Completed
2. Substitution Method.
3. Elimination Method (Addition).
4. Special Cases - One, none, or infinitely many solutions.
5. Word Problems / Application.

Systems of Equations - Graphical Method:

1. What is a "System of Equation"?

- A system of equations is two or more equations with the same variables.
- The solution is the ordered pairs (x, y) that makes all equations true.
- Graphically: The solution = where the lines intersect.

2. Outcomes:

- One solution \rightarrow lines intersect at exactly one point.
- No solution \rightarrow lines are parallel (never meet).
- Infinite solutions \rightarrow lines are the same.

3. Steps to Solve Graphically

Step #1 - Rewrite both equations in slope-intercept form.

Step #2 - Graph each line

Step #3 - Find intersection point(s).

Step #4 - Verify by substituting back both equations

4. Worked Examples Below:

Example #1 - One Solution = One Intersection

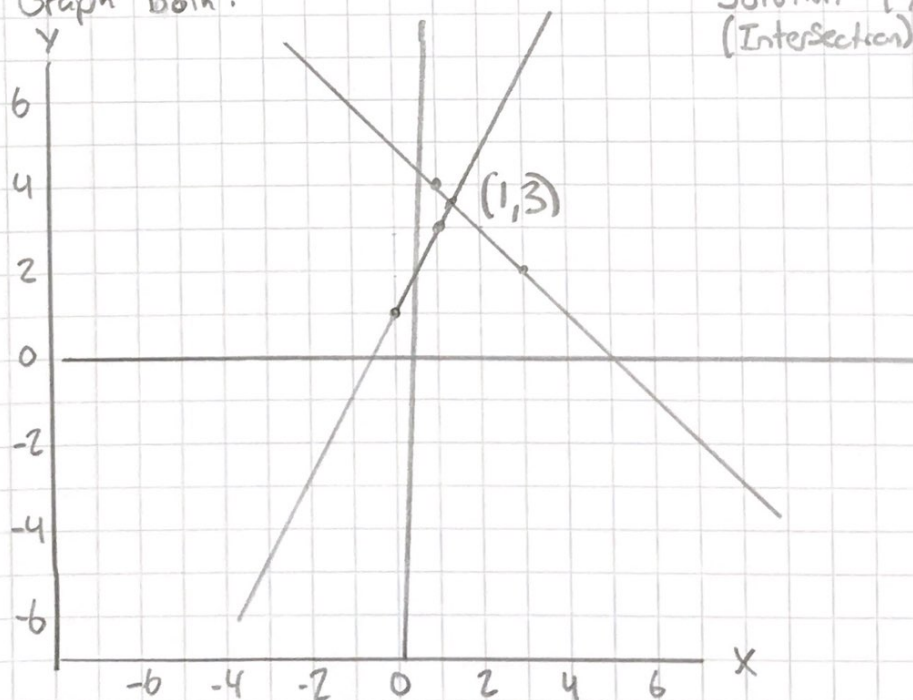
Solve: $y = 2x + 1$, $y = -x + 4$

Step 1: Identify slope + Intercepts

Line 1 = slope: 2, $b = (0, 1)$

Line 2 = slope: -1, $b = (0, 4)$

Step 2: Graph Both:



Solution = $(1, 3)$
(Intersection).

Example #2 - No Solution = Parallel Lines

Solve: $y = 2x + 1$, $y = 2x - 3$

- Both lines have slope = 2 \rightarrow Parallel
- Different Intercepts = (0,1) and (0,-3)
- They never meet. No solution

Example #3 - Infinite Solutions \rightarrow One Line

Solve: $2x + y = 4$, $y = -2x + 4$

- First equation rearranged = $y = -2x + 4$
- Second is already = $y = -2x + 4$
- Same lines = Infinite solutions (All points on one line).