

Types of Systems

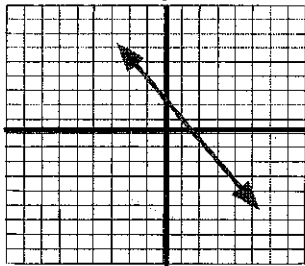
There are 3 different types of systems of linear equations

3 Different Systems:

- 1) Infinite Solutions
- 2) No Solution
- 3) One solution

Type 1: Infinite Solutions

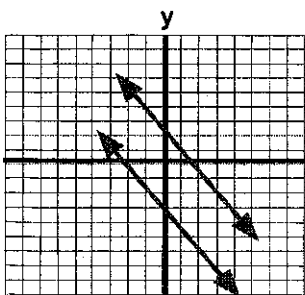
- A system of linear equations having an **infinite number of solutions** is described as being **consistent-dependent**.



← The system has **infinite solutions**, the lines are identical

Type 2: No Solutions

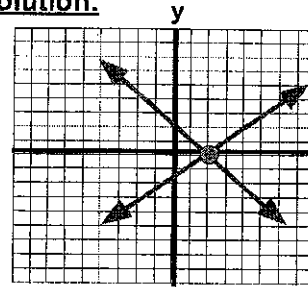
- A system of linear equations having **no solutions** is described as being **inconsistent**.



← The system has **no solution**, the lines are parallel. Remember, parallel lines have **the same slope**

Type 3: One solution

- A system of linear equations having **exactly one solution** is described as being **one solution**.



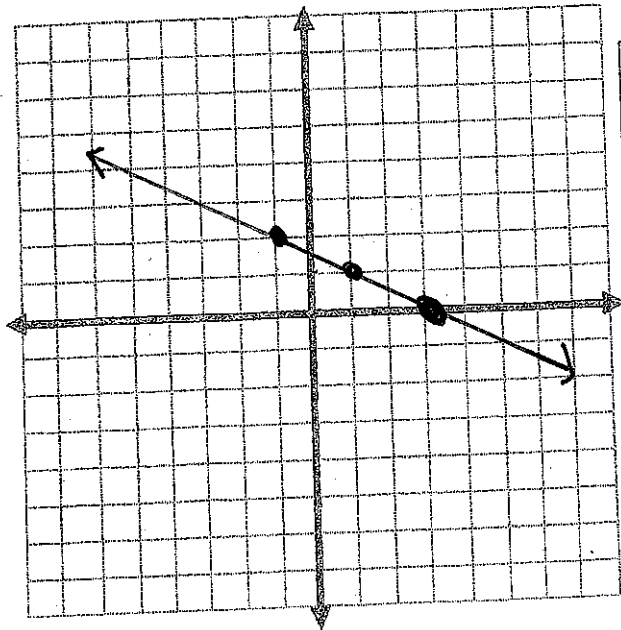
← The system has **exactly one solution** at the point of intersection

So basically...

- If the lines have the same y-intercept b , and the same slope m , then the system has **Infinite Solutions**.
- If the lines have the same slope m , but different y-intercepts b , the system has **No Solution**.
- If the lines have different slopes m , the system has **One Solution**.

$$y = 2x - 3$$

$$y = \frac{1}{2}x - 3$$



Equation 1

$$y = 2x - 3$$

$$m = 2 \quad b = -3$$

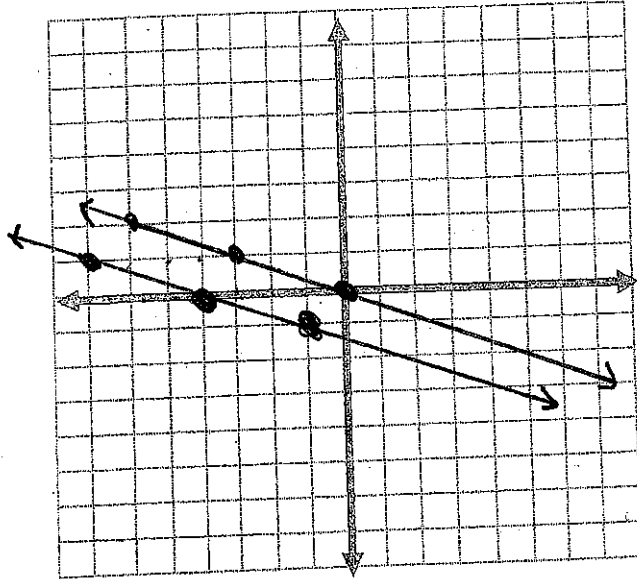
Equation 2

$$y = \frac{1}{2}x - 3$$

Solution: Infinite

$$y = 3x$$

$$y = 3x + 4$$



Equation 1

$$y = 3x$$

$$m = 3 \quad b = 0$$

Equation 2

$$y = 3x + 4$$

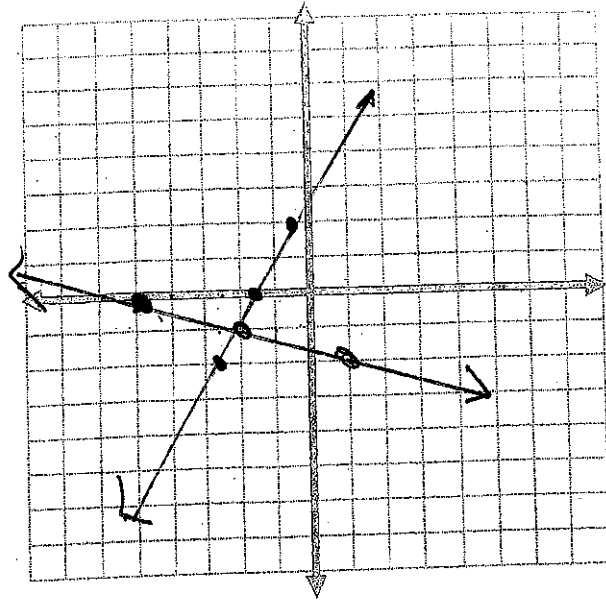
$$m = 3$$

$$b = 4$$

Solution: No Solution

$$y = 3x + 5$$

$$y = -\frac{1}{2}x + 1.5$$



Equation 1

$$y = 3x + 5$$

$$m = 3$$

$$b = 5$$

Equation 2

$$y = -\frac{1}{2}x + 1.5$$

$$m = -\frac{1}{2} \quad b = 1.5$$

Solution: $(-1, 2)$