

New Topic: Systems of Linear Equations

Consider:

Two linear equations, if graphed on the same set of coordinate axes will have 1 of 3 outcomes:

1. $y = 3x - 6$
 $y = -x + 6$

$y = 3x - 6$

$m = \frac{3}{1} = \frac{\Delta y}{\Delta x}$

$b = (0, -6)$

$(3, 3)$

$3 = 3(3) - 6$

$3 = 9 - 6$

$3 = 3 \checkmark$

$y = -x + 6$

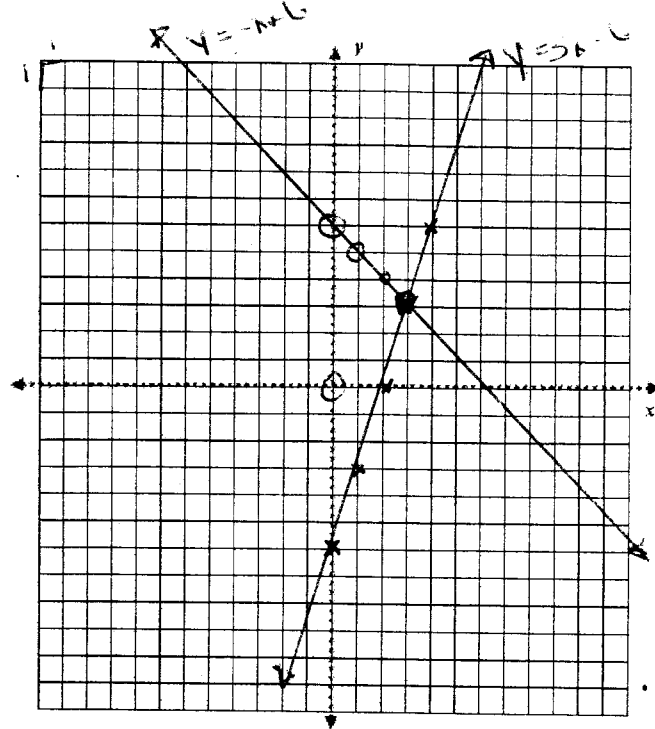
$m = \frac{-1}{1} = \frac{\Delta y}{\Delta x}$

$b = (0, +6)$

$3 = -(3) + 6$

$3 = -3 + 6$

$3 = 3 \checkmark$



These Two Equations are known as:

CONSISTENT - INTERSECT

2. $4x - y = 5$
 $2y = 8x - 10$

$4x - y = 5$

$-1[-y = -4x + 5]$

$y = +4x - 5$

$m = \frac{4}{1} = \frac{\Delta y}{\Delta x}$

$b = (0, -5)$

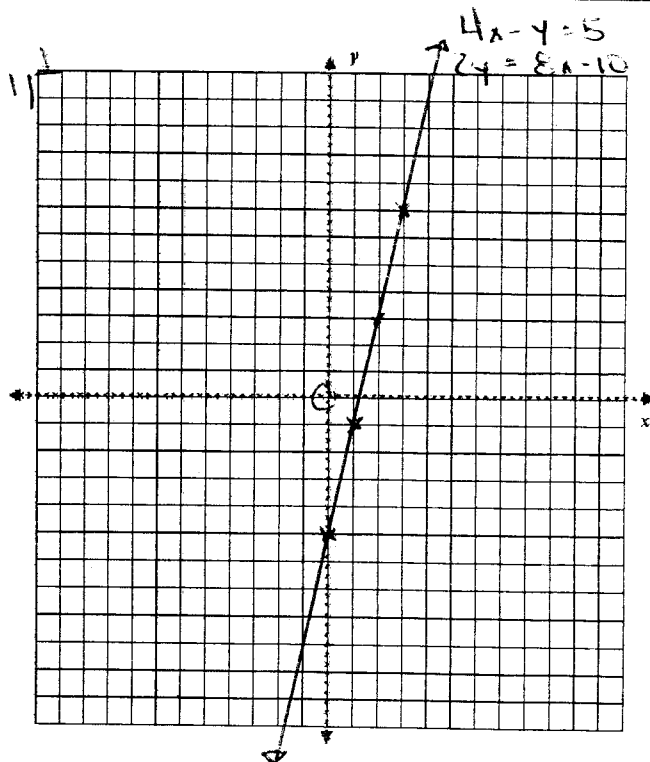
$\frac{2y}{2} = \frac{8x - 10}{2}$

$y = 4x - 5$

$m = \frac{4}{1} = \frac{\Delta y}{\Delta x}$

$b = (0, -5)$

Infinite Solutions



These Two Equations are known as:

DEPENDENT - SAME LINE

3. $4x = 4y - 12$
 $-8x + 8y = 8$

$$4x = 4y - 12$$

$$4y - 12 = 4x$$

$$4y = 4x + 12$$

$$\frac{4y}{4} = \frac{4x + 12}{4}$$

$$y = x + 3$$

$$m = \frac{1}{1} = \frac{\Delta y}{\Delta x}$$

$$b = (0, +3)$$

$$-8x + 8y = 8$$

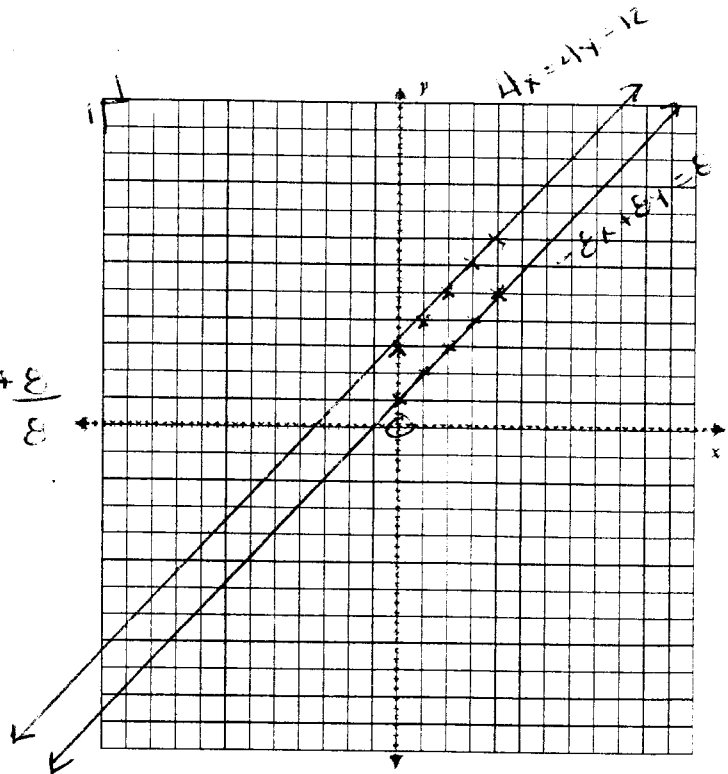
$$\frac{8y}{8} = \frac{+8x + 8}{8}$$

$$y = 1x + 1$$

$$m = \frac{1}{1} = \frac{\Delta y}{\Delta x}$$

$$b = (0, +1)$$

No Solution



These Two Equations are known as: INCONSISTENT - PARALLEL

Section 2. Some Practice:

1. Express each equation in slope-intercept form. Without graphing the equations, state whether the system of equations has exactly one solution (consistent), no solution (inconsistent), or an infinite number of solutions (dependent).

a. $2y = 3x + 3$
 $y = \frac{2}{3}x - 2$

$$\frac{2y}{2} = \frac{3x + 3}{2} \quad y = \frac{2}{3}x - 2$$

$$y = \frac{3}{2}x + \frac{3}{2}$$

$$m = \frac{3}{2} = \frac{\Delta y}{\Delta x} \quad m = \frac{2}{3} = \frac{\Delta y}{\Delta x}$$

$$b = (0, \frac{3}{2}) \quad b = (0, -2)$$

Consistent

b. $x = 3y + 4$
 $2x - 6y = 8$

$$x = 3y + 4$$

$$3y + 4 = x$$

$$\frac{3y}{3} = \frac{x - 4}{3}$$

$$y = \frac{1}{3}x - \frac{4}{3}$$

$$m = \frac{1}{3} = \frac{\Delta y}{\Delta x}$$

$$b = (0, -\frac{4}{3})$$

$$2x - 6y = 8$$

$$\frac{2x - 6y}{2} = \frac{-2x + 8}{2}$$

$$-3y = -x + 4$$

$$y = \frac{1}{3}x - \frac{4}{3}$$

$$y = \frac{1}{3}x - \frac{4}{3}$$

$$m = \frac{1}{3} = \frac{\Delta y}{\Delta x}$$

$$b = (0, -\frac{4}{3})$$

DEPENDENT

Solve the Systems of Linear Equations Graphically. Be sure to check the result. If the equations are inconsistent or dependent, so state.

1. $y = 2x + 4$
 $y = -3x - 6$

$y = 2x + 4$ $y = -3x - 6$

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

$b = (0, 4)$ $b = (0, -6)$

@ $(-2, 2)$

(x, y)

$0 = 2(-2) + 4$

$0 = -3(-2) - 6$

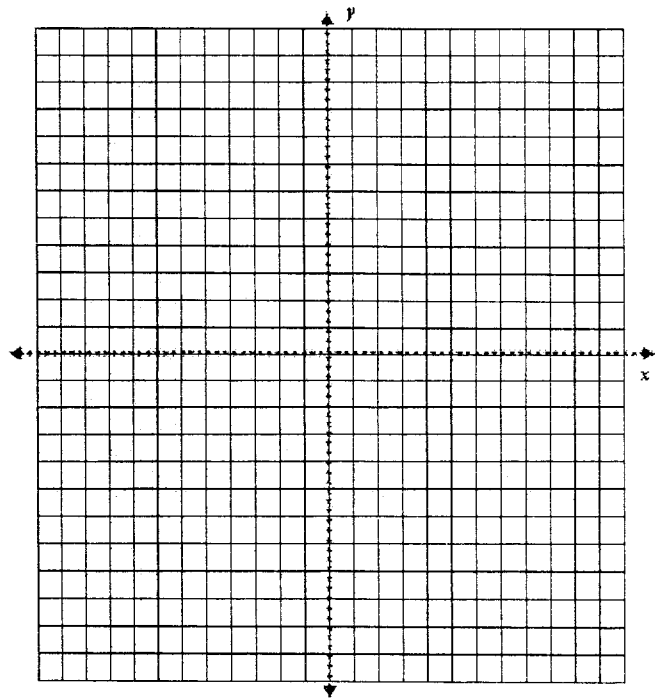
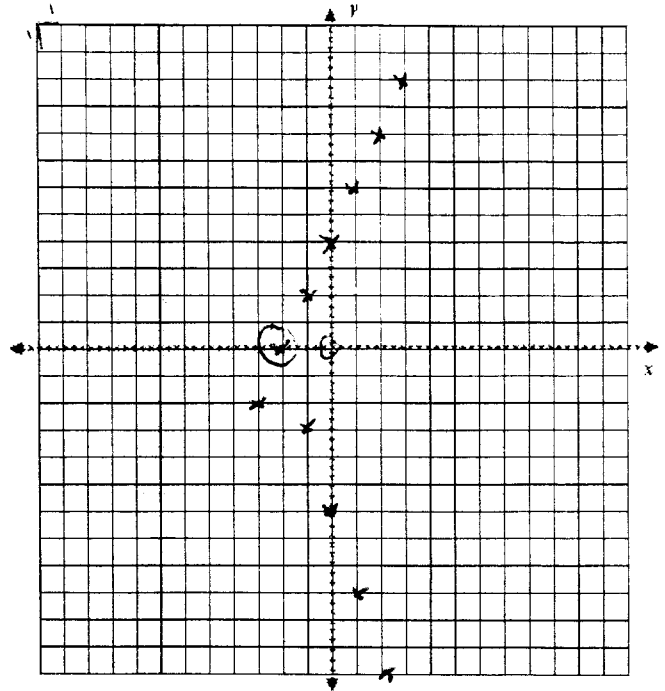
$0 = -4 + 4$

$0 = +6 - 6$

$0 = 0 \checkmark$

$0 = 0 \checkmark$

2. $2x + y = 6$
 $2x - y = -2$



$$3. \quad \begin{aligned} 3x + y &= -6 \\ 2x &= 1 + y \end{aligned}$$

$$3x + y = -6$$

$$y = -3x - 6$$

$$m = \frac{-3}{1} = \frac{\Delta y}{\Delta x}$$

$$b = (0, -6)$$

$$a(-1, -3)$$

$$3(-1) + (-3) = -6$$

$$-3 - 3 = -6$$

$$-6 = -6 \checkmark$$

$$2x = 1 + y$$

$$1 + y = 2x$$

$$y = 2x - 1$$

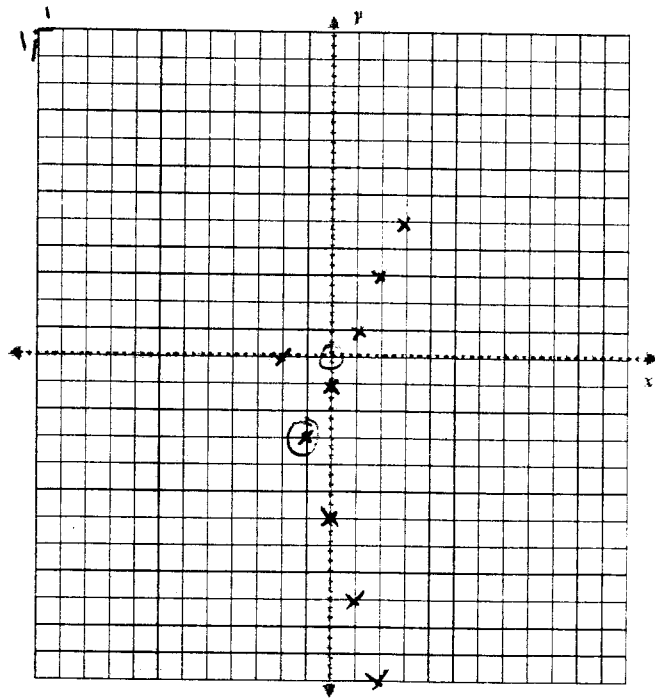
$$m = \frac{2}{1} = \frac{\Delta y}{\Delta x}$$

$$b(0, -1)$$

$$2(-1) = 1 + (-3)$$

$$-2 = 1 - 3$$

$$-2 = -2 \checkmark$$



Homework Section

Section(s)	Page(s)	Problem(s)
9.1	560 → 561	25 – 59 Odd