Solving Linear Systems with Graphing-7.1

Definition: A Linear System is a set of two linear equations.

Example: $y = -2x$ and $y = x + 3$

x y

1) Does the point (0, 4) make either equation true? Substitute it in and find out. NO solution

$y = -2(x)$ $\quad$ $y = x + 3$

$4 = -2(0)$ → NOT TRUE $\quad$ $4 = 0 + 3$ → NOT TRUE

2) Does the point (2, 5) make either equation true? Explain.

No solution b/c it only works for one equation

$y = -2(x)$ $\quad$ $y = x + 3$

$5 = -2(2)$ $\quad$ $5 = 2 + 3$

$5 = -4$ → NOT TRUE $\quad$ $5 = 5$ yes → TRUE

3) Does the point (-1, 2) make either equation true? Explain.

Solution – points make each equation true

$y = -2(x)$ $\quad$ $y = x + 3$

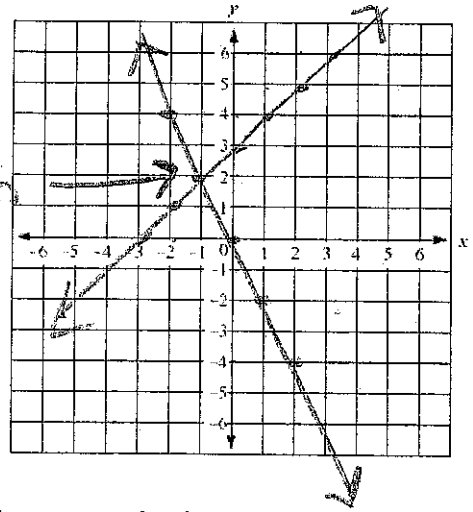
$2 = -2(-1)$ $\quad$ $2 = -1 + 3$

$2 = 2$ → TRUE $\quad$ $2 = 2$ → TRUE

If a point works in *both* equations of a linear system, then that point must be the SOLUTION to the linear system. When you solve a linear system you find that one point makes both equations true.

4) What point is the solution to the system above? (-1, 2) → see #3 above

Plot *both* equations in the same coordinate plane below. $y = -2x$ and $y = x + 3$



Solution point

$y = -2x + 0$

5) At what point do the two lines intersect? (-1, 2) Compare this with your answer for #4...

An ordered pair that makes a linear equation TRUE is called a Solution.

The point that the two lines intersects is the solution to the system!

To solve a system of linear equations, the ordered pair must work for both equations!

Steps for Solving a Linear System Using Graphing:

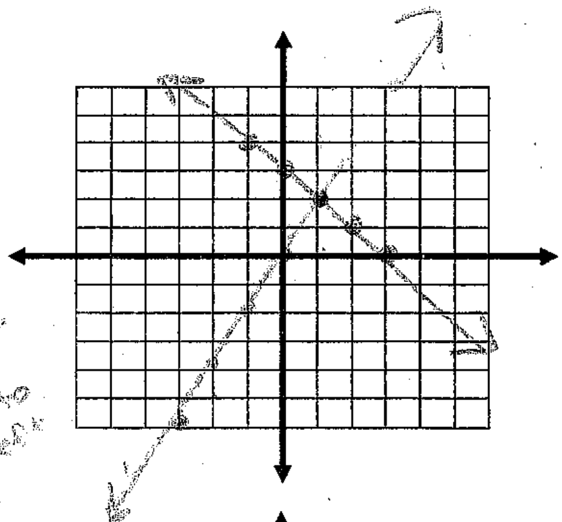
1. Put the equations in slope-intercept or standard form.
2. Graph each equation on the same coordinate system.
3. Locate the point of intersection and write it down.
4. Verify that the point makes both equations true!!

Example: y = 2x + 0

y = –x + 3

x	y
3	0
2	1
1	2
0	3
–1	4
–2	5

down 1 to the right 1 or up 1 to the left 1



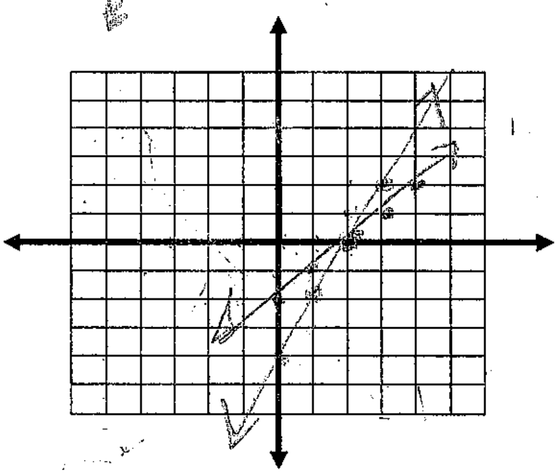
Point (1, 2)

Verify: y = 2x
2 = 2(1)
2 = 2 true

y = –x + 3
2 = –1 + 3
2 = 2 true

Example: y – 2x = – 4 (+2x)

y = x – 2



Point 2, 0

Verify: y – 2x = –4
0 – 2(2) = –4 ✓

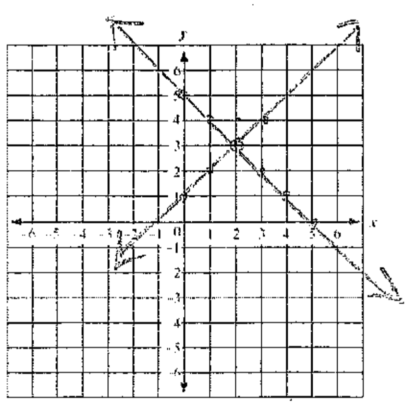
y = x – 2
0 = 2 – 2 ✓

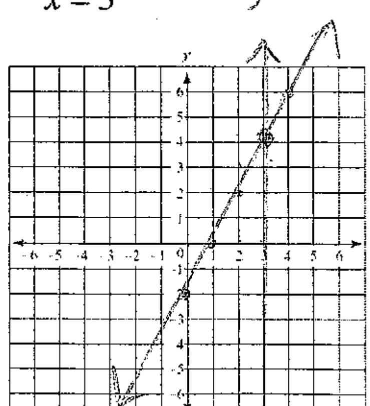
Try these:

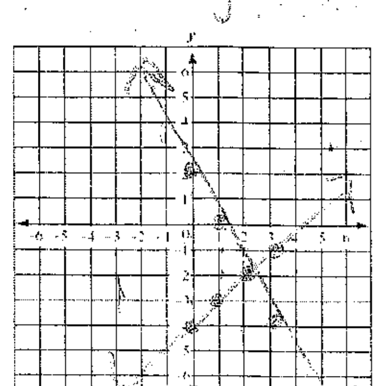
1. $y = -x + 5$ 3 = –2 + 5 ✓
   $y = x + 1$ 3 = 2 + 1 ✓

2. $2x - y = 2$ –y = –2x + 2, y = 2x – 2   2(3) – 4 = 2 ✓
   $x = 3$

3. $2x + y = 2$ y = –2x + 2
   $x - y = 4$ –y = –x + 4, y = x – 4



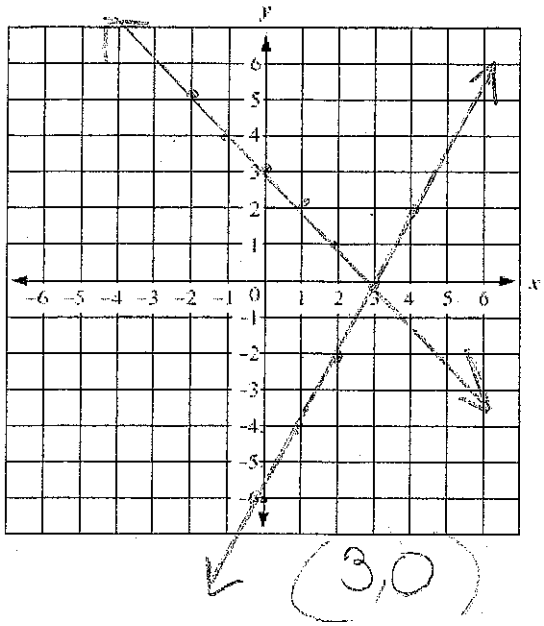




7.1 – Solving Systems of Equations by Graphing Homework
Solve these linear systems by graphing.

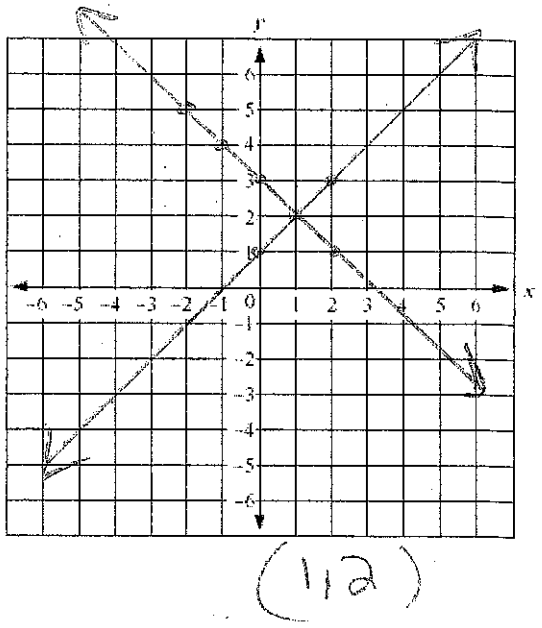
1) $y = -x + 3$ and $y = 2x - 6$

$0 = -3+3$ ✓ $0 = 2(3)-6$ ✓



2) $y = -x + 3$ and $y = x + 1$

$2 = -(1)+3$ ✓ $2 = 1+1$ ✓

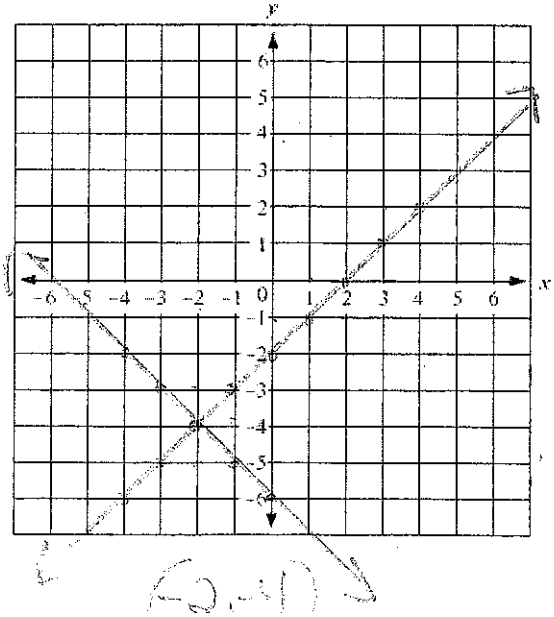


3) $x - y = 2$ and $x + y = -6$

$-x \quad -x \qquad -x \quad -x$

$-y = -x+2 \qquad y = -x-6$

$y = x-2$



4) $x + y = -2$ and $7x - 4y = 8$

$-x \quad -x \qquad -7x \quad -7x$

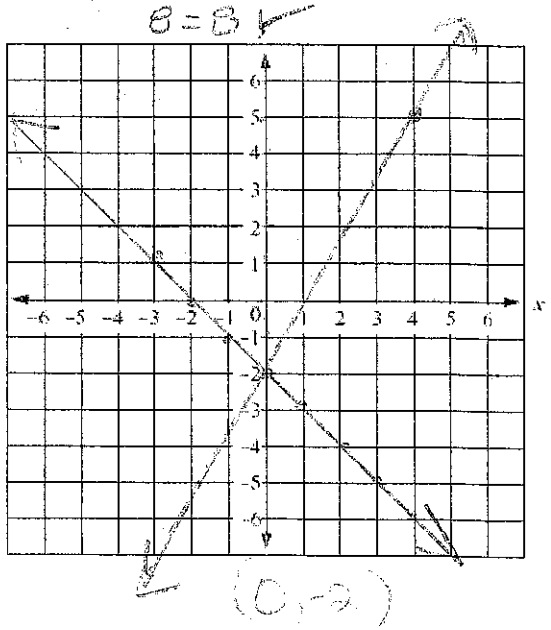
$y = -x-2 \qquad \frac{-4y}{-4} = \frac{-7x+8}{-4}$

$y = \frac{7}{4}x - 2$

$0-2 = -2$ ✓

$7(0)-4(-2) = 8$

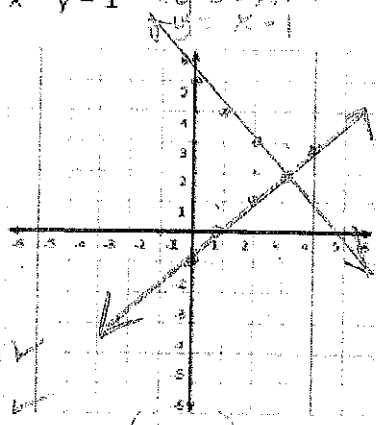
$8 = 8$ ✓



Graphing Systems of Equations

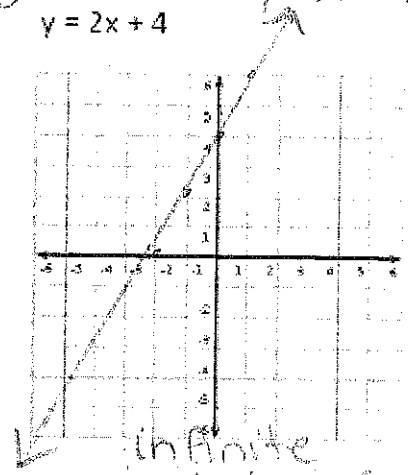
Solve each system of equations by graphing.

1. $x + y = 5$
   $x - y = 1$



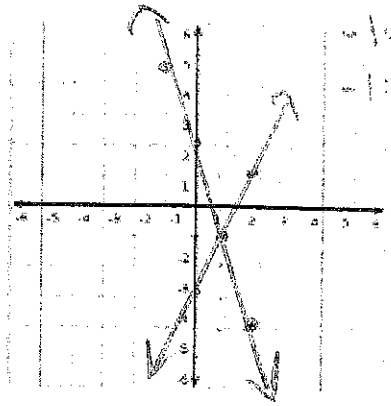
(3, 2)

2. $4x - 2y = -8$
   $y = 2x + 4$



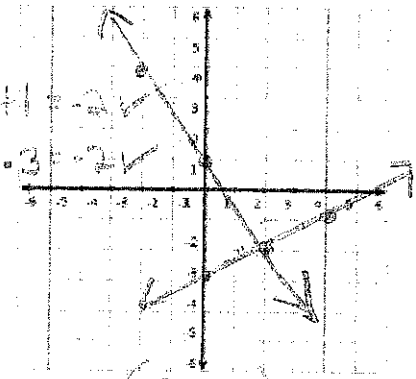
infinite solutions

3. $y = -3x + 2$
   $y = 2x - 3$



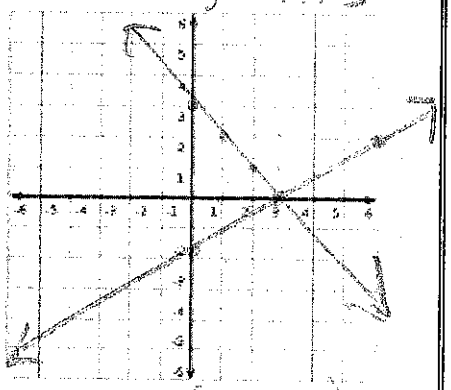
(1, -1)

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



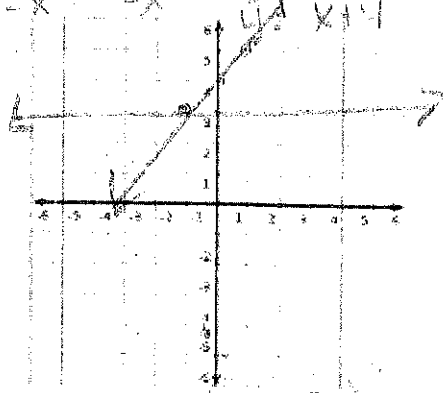
(2, -2)

5. $4x - 6y = 12$
   $2x + 2y = 6$



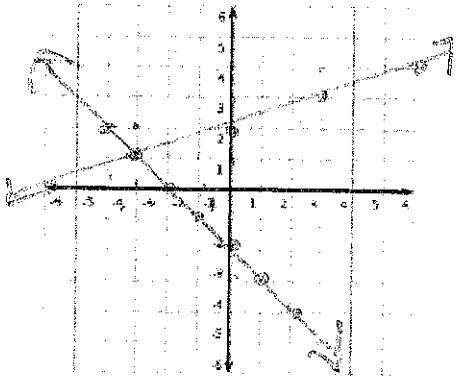
(3, 0)

6. $y = 3$
   $x - y = -4$

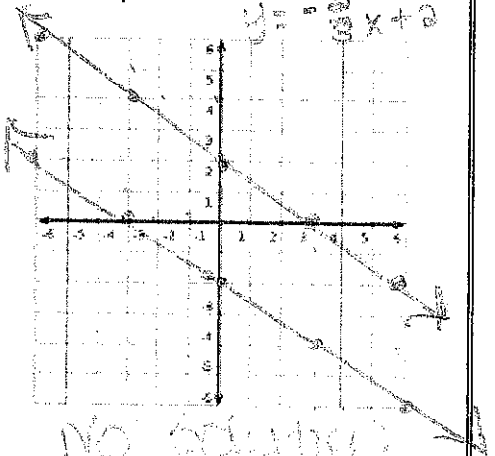


(-1, 3)

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

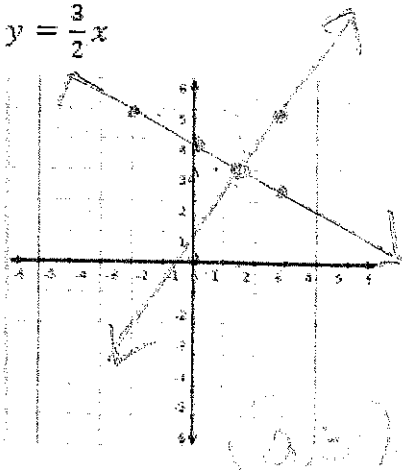


8. $4x + 6y = -12$
   $2x + 3y = 6$



no solution

9. $y = -\frac{1}{2}x + 4$
   $y = \frac{3}{2}x$



(3, 2)

#2.

$4x - 2y = -8$

$-4x \quad -4x$

$\frac{-2y}{-2} = \frac{-4x - 8}{-2}$

$y = 2x + 4$

#5

$4x - 6y = 12$

$-4x \quad -4x$

$\frac{-6y}{-6} = \frac{-4x + 12}{-6}$

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

$2x + 2y = 6$

$-2x \quad -2x$

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

$y = -x + 3$

#8 $4x + 6y = -12$

$-4x \quad -4x$

$\frac{6y}{6} = \frac{-4x - 12}{6}$

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

$6x + 3y = 6$

$-6x \quad -6x$

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