

Solving Systems of Linear Equations by Graphing

Your Notes

To ease graphing, write each equation in slope intercept form.

$$\begin{array}{r}
 3x + y = 9 \\
 -3x \quad -3x \\
 \hline
 y = -3x + 9
 \end{array}$$

↑ slope ↑ y-int.

$$\begin{array}{r}
 x - y = 1 \\
 -x \quad -x \\
 \hline
 -y = -x + 1 \\
 \frac{-y}{-1} = \frac{-x}{-1} + \frac{1}{-1} \\
 \hline
 y = x - 1
 \end{array}$$

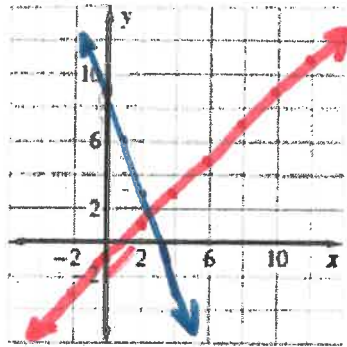
↑ slope of '1' ↑ y-int

Example 1 Use the graph-and-check method

Solve the linear system: $3x + y = 9$ Equation 1
 $x - y = 1$ Equation 2

Solution

1. Graph both equations.



2. Estimate the point of intersection. The two lines appear to intersect at $(2.5, 1.5)$.

3. Check whether $(2.5, 1.5)$ is a solution by substituting 2.5 for x and 1.5 for y in each of the original equations.

Equation 1

$$3x + y = 9$$

$$3(2.5) + 1.5 \stackrel{?}{=} 9$$

$$9 = 9 \checkmark$$

Equation 2

$$x - y = 1$$

$$2.5 - 1.5 \stackrel{?}{=} 1$$

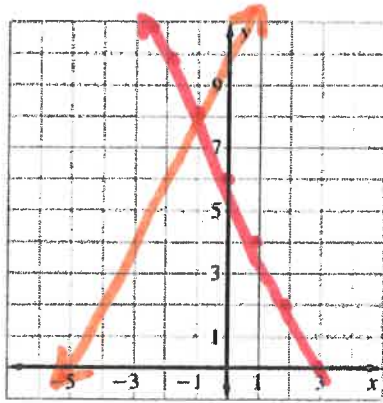
$$1 = 1 \checkmark$$

Cross out negative. Sorry about that!

Because $(2.5, 1.5)$ is a solution of each equation in the linear system, it is a solution to the system

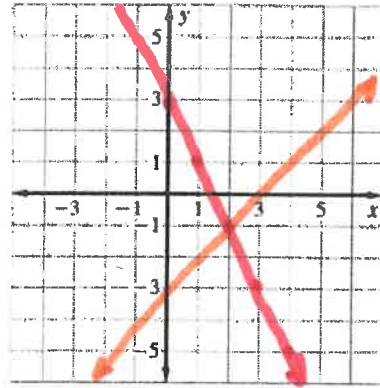
✔ **Checkpoint** Solve the linear system by graphing.

1. $2y + 4x = 12$
 $2x - y = -10$



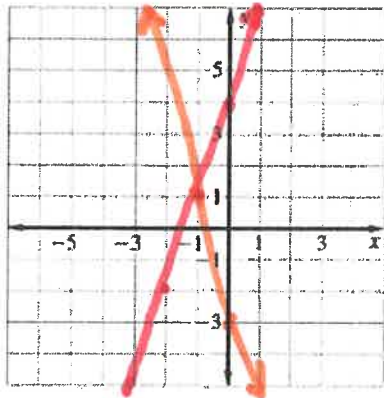
Solution
 $(-1, 8)$

2. $4x + 2y = 6$
 $3x - 3y = 9$



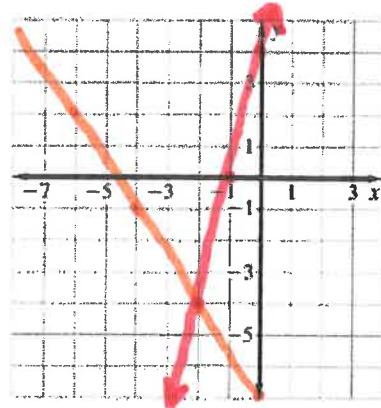
Solution
 $(2, -1)$

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



Solution
 $(-1, 1)$

4. $y = 4x + 4$ ✓
 $2y = -3x - 14$



Solution
 $(-2, -4)$

$2y + 4x = 12$
 $-4x - 4x$

$2y = -4x + 12$
 $2 \quad 2 \quad 2$

$y = -2x + 6$

$2x - y = -10$
 $-2x - 2x$

$-y = -10 - 2x$
 $-1 \quad -1 \quad -1$

$y = 10 + 2x$

$2y = 6x + 8$
 $2 \quad 2 \quad 2$

$y = 3x + 4$

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

$y = -4x - 3$

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

$2y = -4x + 6$
 $2 \quad 2 \quad 2$

$y = -2x + 3$

$3x - 3y = 9$
 $-3x - 3x$

$-3y = -3x + 9$
 $-3 \quad -3 \quad -3$

$y = x - 3$

$2y = -3x - 14$
 $2 \quad 2 \quad 2$

$y = -1.5x - 7$

also a slope of $-3/2$

$-3 \downarrow$
 $2 \downarrow$

Check these by plugging them back into the equations!

Practice

Tell whether the ordered pair is a solution of the linear system.

1. $(0, -4);$
 $x + y = -4$
 $x - 5y = 20$

2. $(3, 3);$
 $x + 2y = 9$
 $4x - y = 15$

3. $(1, -2);$
 $2x - 3y = 8$
 $3x + 2y = -1$

0 + -4 = -4 ✓
0 - 5(-4) = 20 ✓

This is a solution!

3 + 2(3) = 9 ✓
4(3) - 3 = 9 ✗

This is not a solution!

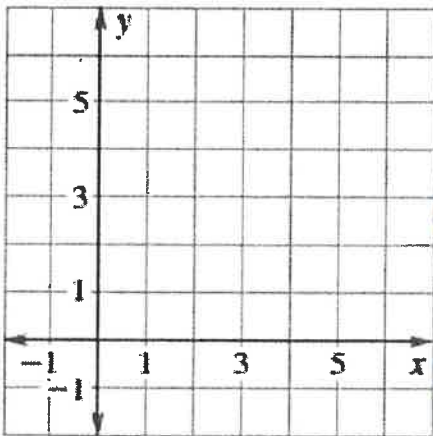
2(1) - 3(-2) = 8 ✓
3(1) + 2(-2) = -1 ✓

This is a solution

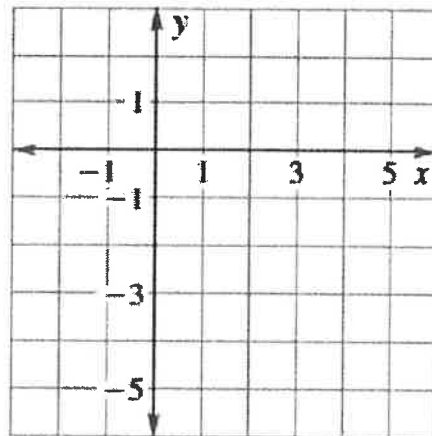
Solve the linear system by graphing. Check your solution.

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

5. $y = -2x + 1$
 $y = x - 5$



Use a Desmos to check your solutions!



6. $y = x$
 $y = 4x - 9$

Solutions!

7. $y = -2x + 2$
 $y = x + 5$

