PS5: Systems of equations

5.1 Checking a solution
5.1 Solving by Graphing

Agenda

- Vocabulary
- Checking solutions to a system of equations
- Graphing and solving systems of equations
- Homework

Vocabulary

- **System of linear equations:** Two or more linear equations in the same variables form a system of linear equations, or simply a *linear system*.
- **Solution of a system of linear equations:** A solution of a system of linear equations in two variables *x* and *y* is an ordered pair (*x*, *y*) that satisfies each equation in the system.

Checking for a solution

- When we get a solution to a system of equations, it will be an (x,y) point. That point will solve both equations, therefore it's a solution.
- (0,3) is the solution.
- $y = x + 3, \qquad 3 = 0 + 3, \qquad 3 = 3$
- $2y = \frac{1}{2}x + 6 \qquad 2(3) = \frac{1}{2}(0) + 6, \qquad 6 = 6$
- This means that it is a solution.

Is it a solution?

I recommend rewrite and solve in columns.

- Checking a solution:
- Check to see if $(-3,1)$ is a solution to the system:
- $x + y = -2$
- $2x - 3y = -9$

- If it is a solution, then that means the lines cross at that point.

We now need to find the solutions to 2 equations. Here is how…

What is a solution? This is the point where the two line (system) cross on a graph. There are 3 ways to find this location. Today we will cover the first way:

<u>Method 1) Graphing</u>

If we can visually see where the two lines cross, we can figure out it's point of intersection, thus, the solution.

How do we do it? Here is how!

Solving a linear system using Graph-and-Check method.

To use the graph-and-check method to solve a system of linear equations in two variables, use the following steps.

- **Step 1:** Write each equation in a form that is easy to graph .
  That is $y = mx + b$
- **Step 2:** Graph both equations in the same coordinate plane .
  Graph the y-intercept, then use the slope.
- **Step 3:** Estimate the coordinates of the point of intersection.
  Where do the lines cross? Added points on the line to figure it out!
- **Step 4:** Check the coordinates algebraically by substituting into each equation of the original linear system.
  Plug the x and y values into each equations. Do they work? Yes? Then it's a solution.

Example #1

- Solve the linear system graphically. Check the solution algebraically.
- $x + y = -2$
- $-x + y = -4$

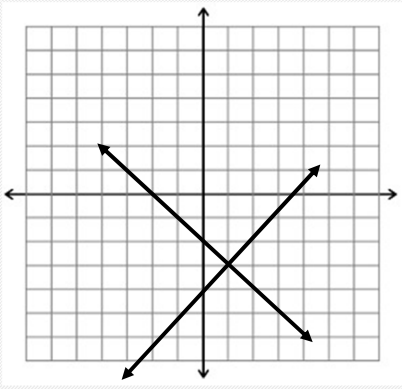
Step 1) Put in $y = mx + b$ form

$$y = -x - 2$$
$$y = x - 4$$

Step 2) Graph them both

Step 3) Find where they cross (__,__)

Step 4) Check to see if they work.

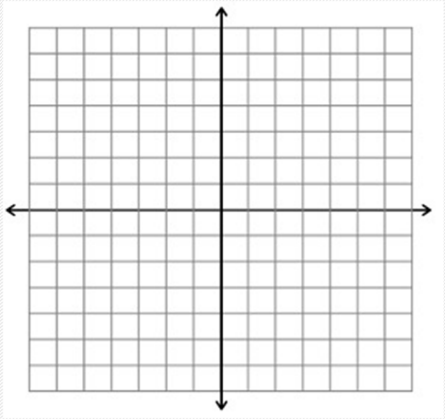


Again: Example 2 Using the Graph-and-Check Method

- Solve the linear system graphically. Check the solution algebraically.
- $5x + 4y = -12$
- $3x - 4y = -20$
- **Step 1:** Write each equation in a form that is easy to graph .

Example 2: Using the Graph-and-Check Method

- **Step 2:** Graph both equations in the same coordinate plane .
- $y = \frac{3}{4}x + 5$
- $y = -\frac{5}{4}x - 3$
- **Step 3:** Estimate the coordinates of the point of intersection .

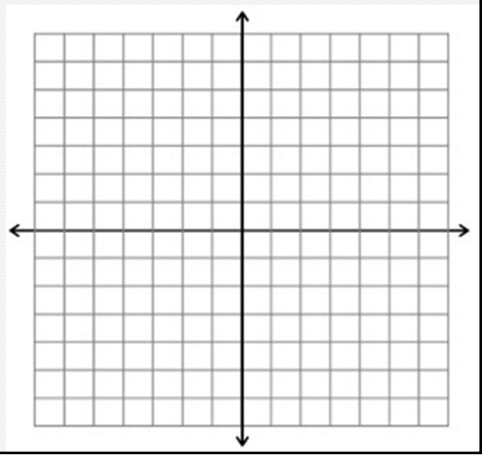


Example 2: Using the Graph-and-Check Method

- **Step 4:** Check the coordinates algebraically by substituting into each equation of the original linear system (or SI form).
- $(-4,2)$. Plug into both equations for x and y.
- $5x + 4y = -12$ $3x - 4y = -20$

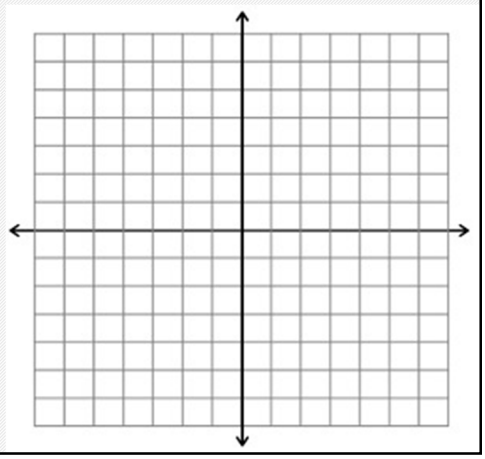
Example 3: Graph and check to solve the linear system.

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



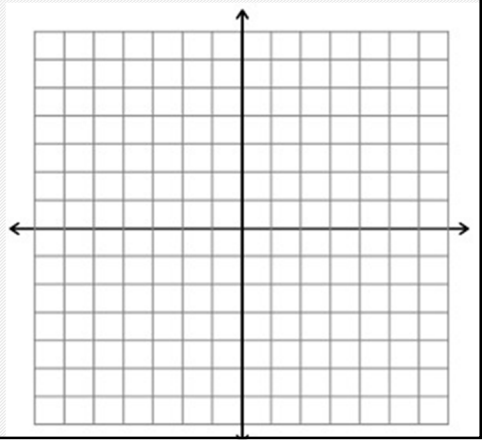
OYO: You try!

- $y = \frac{1}{2}x + 5$
- $y = 3x$



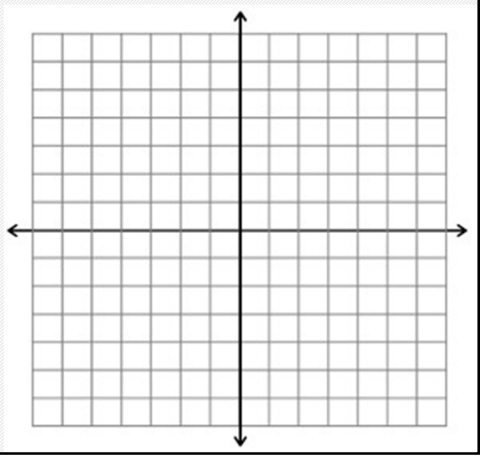
OYO: You try!

- $y = -2x - 3$
- $2x + 5y = 25$



IF Time: You try!

- $y = 3x + 4$
- $7x - 3y = -6$



IF Time: You try!

- $5x + 2y = 4$
- $9x + 2y = 12$