



Graphing/Classifying Systems of Linear Equations (page 1)

You know that the point of intersection of two intersecting lines is the solution for that system. There are two more scenarios:

If the lines are **parallel**, there is **no solution**.

If the lines are the **same** (called **coincident** lines), there are an **infinite number** of solutions.

Example: Solve the system by graphing.

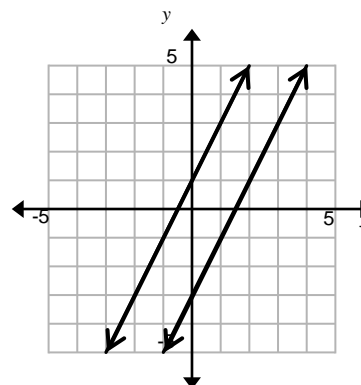
$$\begin{cases} y = 2x + 1 \\ y = 2x - 3 \end{cases}$$

Graphing each equation, the lines appear to be parallel. Since parallel lines do not intersect, there is no solution for this system.

Check: Rewrite the equations in standard form.

$$\begin{array}{ll} y = 2x + 1 & y = 2x - 3 \\ -2x = -2x & -2x = -2x \\ -2x + y = 1 & -2x + y = -3 \end{array}$$

Since $-2x + y$ cannot simultaneously be 1 and -3 ; therefore there is **no solution**.



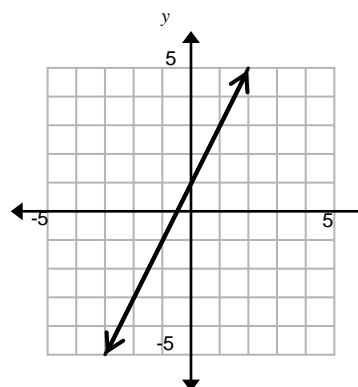
parallel.
solution

Example: Solve the system by graphing.

$$\begin{cases} y = 2x + 1 \\ y - 1 = 2x \end{cases}$$

Rewrite $y - 1 = 2x$.

$$\begin{array}{l} y - 1 = 2x \\ +1 = +1 \\ y = 2x + 1 \end{array}$$



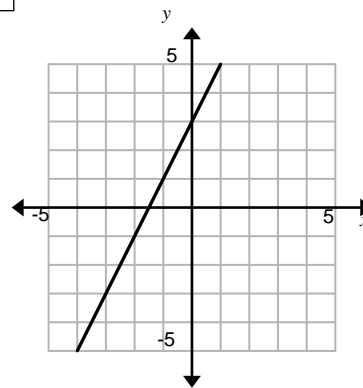
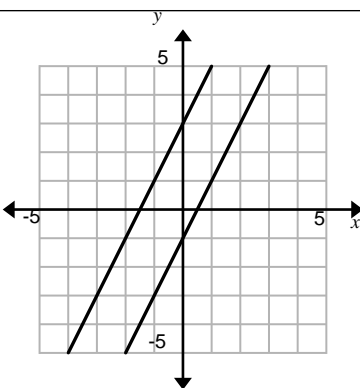
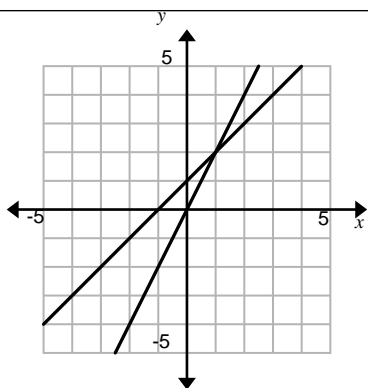
Note that both equations are the same. Graph the line.

Any ordered pair on the graph will satisfy both equations; therefore, there are an **infinite number of solutions of the system**.

Graphing/Classifying Systems of Linear Equations (page 2)

Solutions of Systems of Linear Equations

Circle the correct answer for the choices in the boxes under each graph.



- ✓ Slope is: different/same
- ✓ y-intercepts: different/same
- ✓ Lines are: parallel/intersecting/coincident
- ✓ Solution: one, none, infinite

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Solve each system of equations by graphing. If there is *no solution* or *infinitely many*, explain why.

1.
$$\begin{cases} y = 2x + 3 \\ y = \frac{1}{2}x \end{cases}$$

2.
$$\begin{cases} y = 2x + 4 \\ 2x - y = -4 \end{cases}$$

3.
$$\begin{cases} y + 2x = 3 \\ y = -2x - 3 \end{cases}$$

