Name _____ Period_____ Date_____

Graphing/Classifying Systems of Linear Equations (page 1)

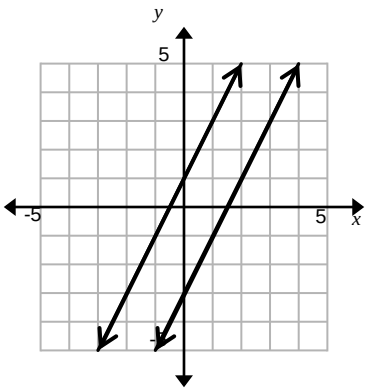
You know that the point of intersection of two intersecting lines is the solution for that system. There are two more scenarios:

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.

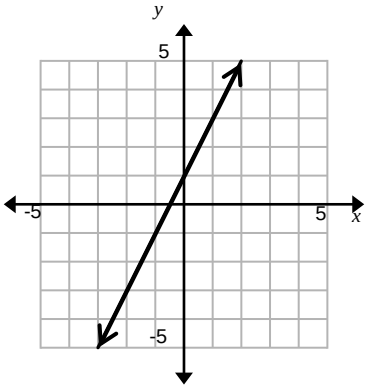
Check: Rewrite the equations in standard form.

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

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

***Example**:* Solve the system by graphing.

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



Rewrite $y - 1 = 2x$.

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

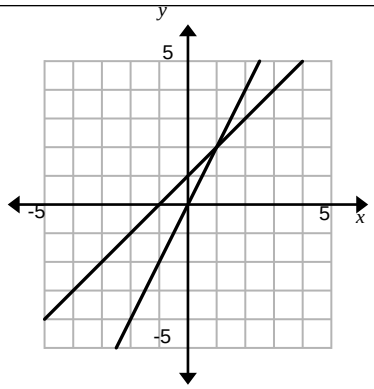
Note that both equations are the same. Graph the line.

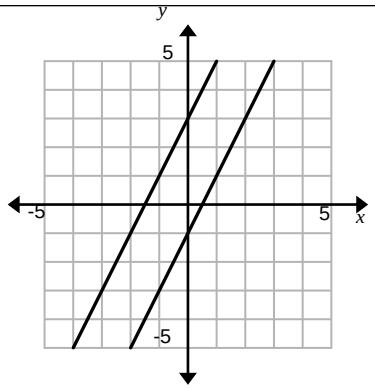
Any ordered pair on the graph will satisfy both equations; therefore, there an **infinite number of solutions of the system.**

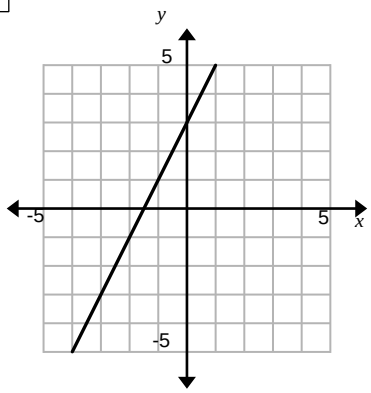
Graphing/Classifying Systems of Linear Equations (page 2)

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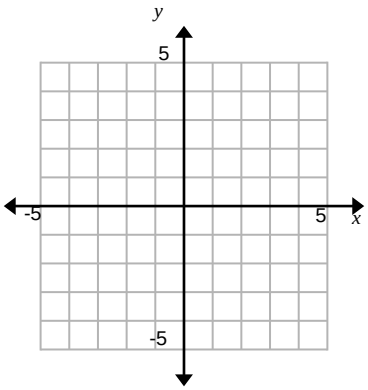
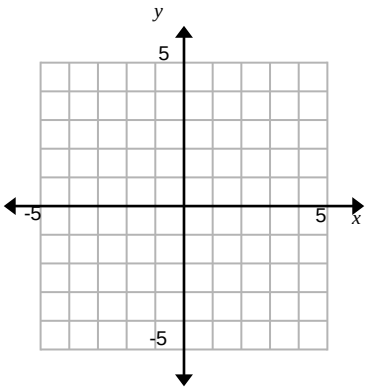
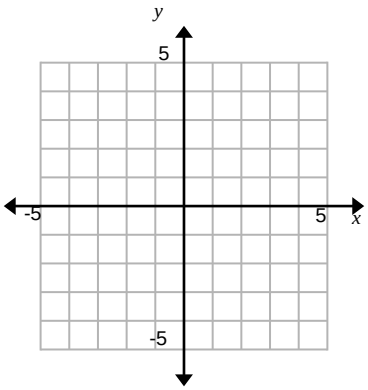
Solve each system of equations by graphing. If there is *no solution* or *infinitely many*, explain why.

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