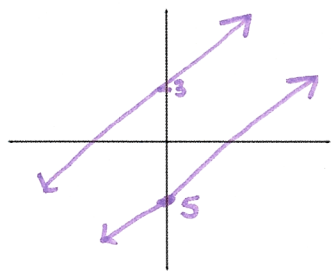
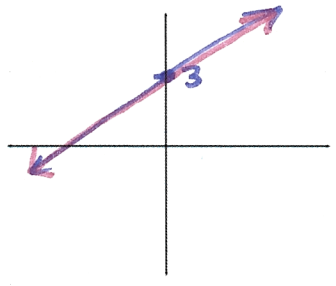
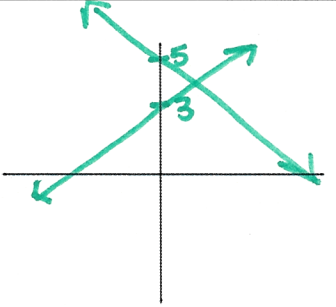


## System of Equations- Graphically Classwork



**Aim:** How can we determine solutions to simultaneous linear equations using the coordinate plane?

**Investigation:** Smartboard Activity

<p><i>Investigation 1:</i></p> $y = 2x + 3$ $y = 2x - 5$	<p>Sketch what you see on the board:</p> 	<p>I noticed...</p> <p>Answers will vary.</p> <p>→ slopes are the same</p> <p>→ parallel, don't intersect</p>
<p><i>Investigation 2:</i></p> $y = 2x + 3$ $\frac{2y}{2} = \frac{4x + 6}{2}$ $y = 2x + 3$		<p>I noticed...</p> <p>→ same slope</p> <p>→ same y-int.</p> <p>→ same equation</p> <p>→ on top of each other</p>
<p><i>Investigation 3:</i></p> $y = 2x + 3$ $y = -2x + 5$		<p>I noticed...</p> <p>→ different slopes</p> <p>→ they intersect at one point.</p>

**Conclusions:**

- ❖ Case 1: When the slopes's are the same, the lines are parallel; which means there is NO solution.
- ❖ Case 2: When the equations's are the same, there are INFINITE solutions
- ❖ Case 3: When the slopes are different, the lines intersect; which means there is one solution.

## Guided Practice- Solving a System of Equations (*Graphically*)

- A **system of equations** or **simultaneous equations** is graphing two or more equations on the same coordinate plane.
- **Solving** a system of equations means finding the **ordered pair** that is a solution for both equations. This solution is called **the point of intersection (P.O.I.)** \*\* Where the lines intersect\*\*

Example 1:

Step 1:  
Look at the equations!  
Are they both in  $y = mx + b$  form?

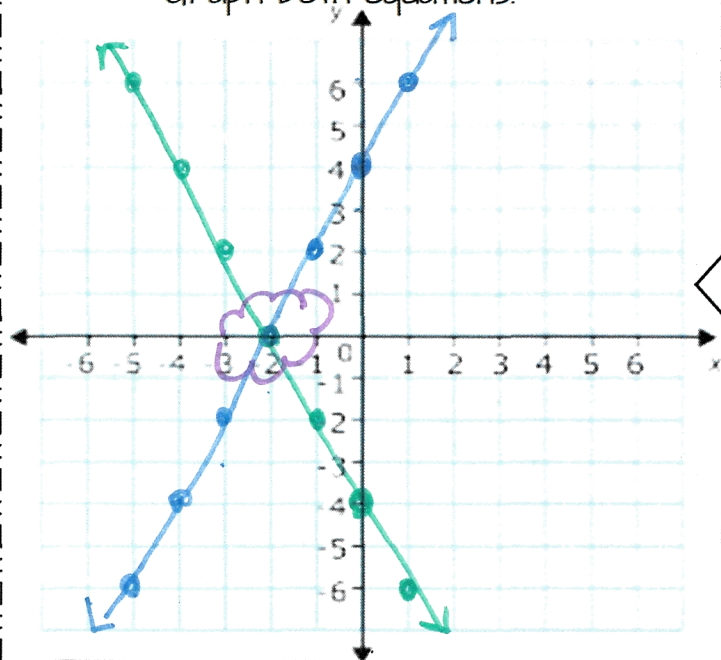
$$y = 2x + 4$$

$$2x + y = -4$$

YES

NO

Step 2:  
Graph both equations.



Rewrite equations in  
 $y = mx + b$

$$y = 2x + 4$$

$$m = 2$$

$$b = 4$$

$$\begin{array}{r} 2x + y = -4 \\ -2x \quad -2x \\ \hline y = -2x - 4 \\ m = -2 \\ b = -4 \end{array}$$

Step 3:  
Locate the point  
of intersection.

$(-2, 0)$

**SOLUTION**

Step 4:  
Check the solution!

$(-2, 0)$

$$y = 2x + 4$$

$$0 = 2(-2) + 4$$

$$0 = -4 + 4$$

$$0 = 0 \checkmark$$

$$2x + y = -4$$

$$2(-2) + 0 = -4$$

$$-4 + 0 = -4$$

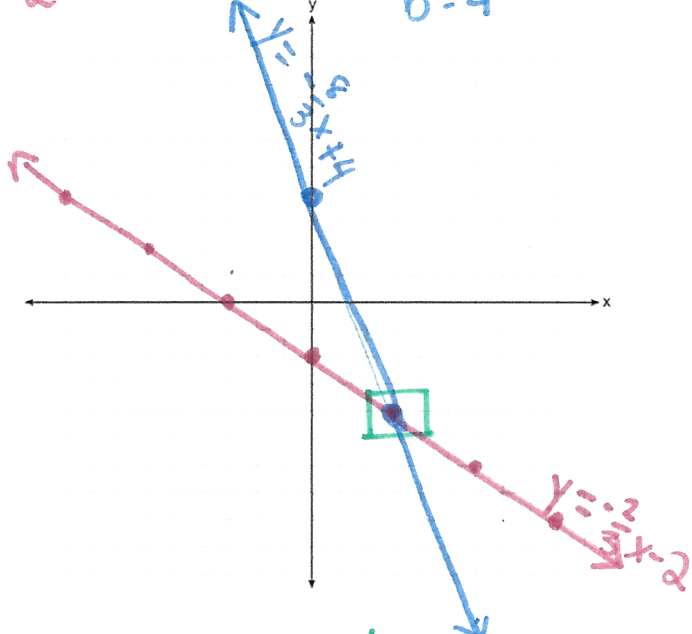
$$-4 = -4 \checkmark$$

**Problem Set:** For questions 1 & 2, solve the system of equations:

1.  $y = -\frac{2}{3}x - 2$   
 $y = -\frac{8}{3}x + 4$

$m = -\frac{2}{3}$   
 $b = -2$

$m = -\frac{8}{3}$   
 $b = 4$



The solution is:  $(3, -4)$

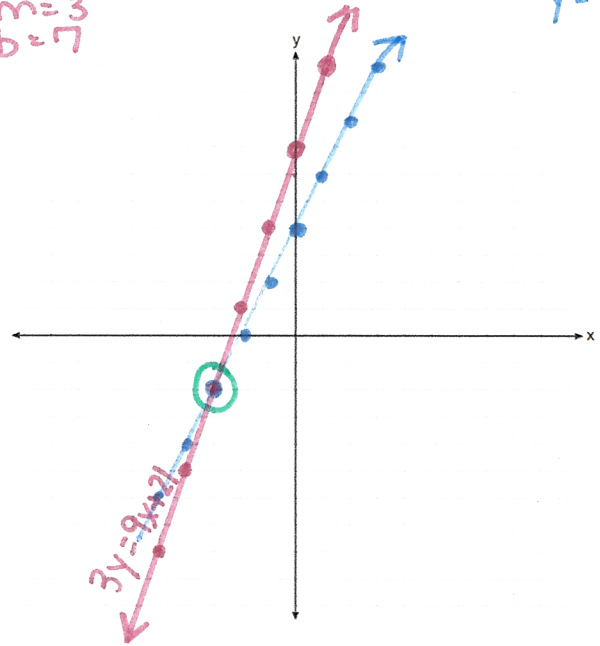
2.  $3y = 9x + 21$   
 $-2x + y = 4$

$\frac{3y}{3} = \frac{9x+21}{3}$   
 $y = 3x + 7$   
 $m = 3$   
 $b = 7$

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


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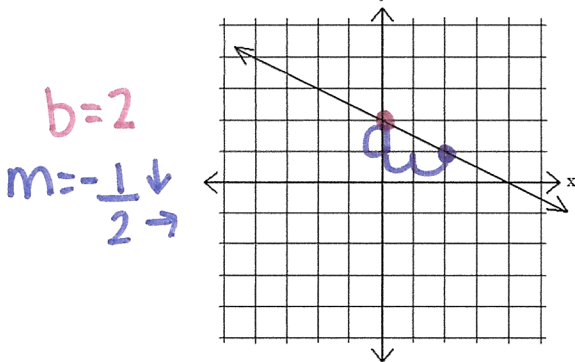
 $y = 2x + 4$   
 $m = 2$   
 $b = 4$



The solution is:  $(-3, -2)$

**Challenge:**

3. Given the following graph,



$b = 2$   
 $m = -\frac{1}{2}$

a) Write the equation of the line

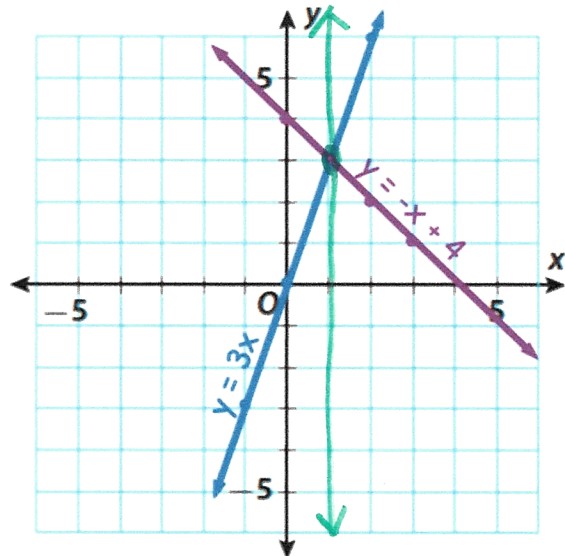
$y = -\frac{1}{2}x + 2$

b) Write an equation to form a system with no solutions (same slope)

c) Write an equation to form a system with infinite solutions (same equation)

$2y = -x + 4$   
 $3y = -\frac{3}{2}x + 6$  etc.

4. Create an equation using the graph to formulate a third line that shares this solution.



$x = 1$

