Solving Systems by Graphing

Two or more linear equations together form a **system of linear equations**. One way to solve a system of linear equations is by graphing each equation and looking to see if the lines have any point in common. Common points that make each equation true would be a **solution to the system of linear equations.**

Suppose you have $20 in your bank account and deposit $5 each week. Your friend has $5 in her account and deposits $10 each week. When will you and your friend have the same amount of money in your accounts?

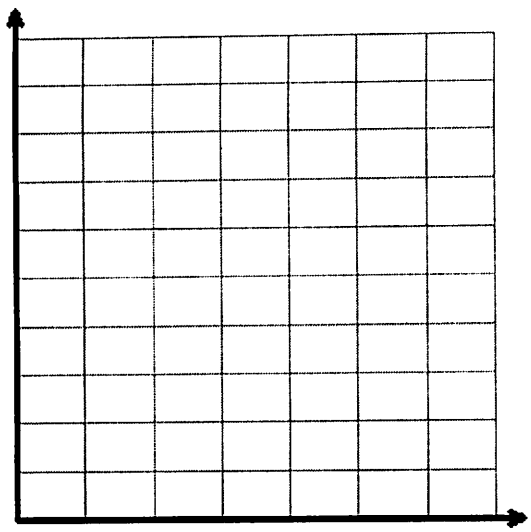
Linear Equations

You: _____

Friend: _____

Coordinate Where the Lines Cross: _____

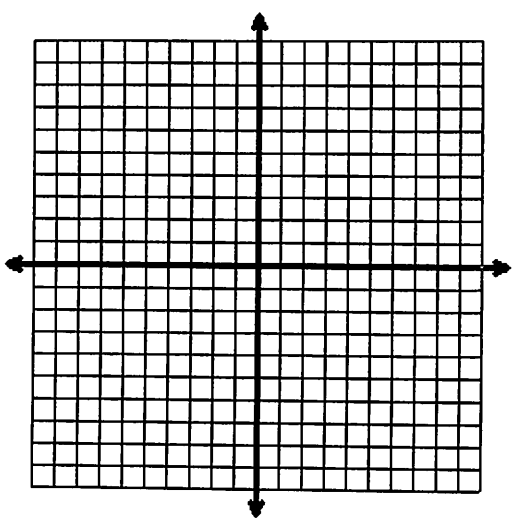
What does this mean?



Examples: Solve by Graphing

1. A: $y = 2x - 3$

   B: $y = x - 1$



Solution: _____

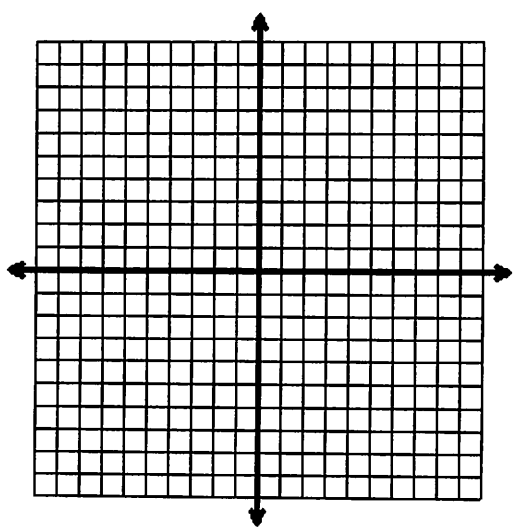
Check:

A:

B:

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

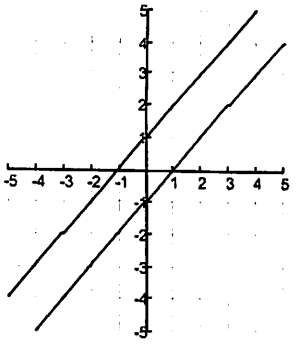
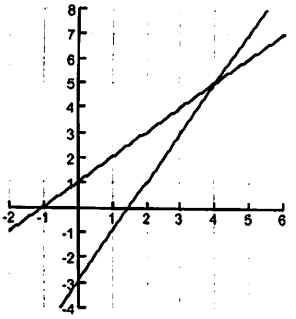
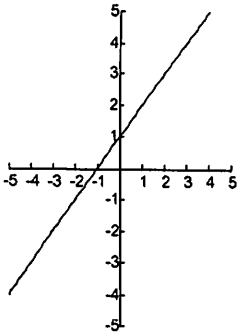
   B: $3y = -9x - 9$



Solution: _____

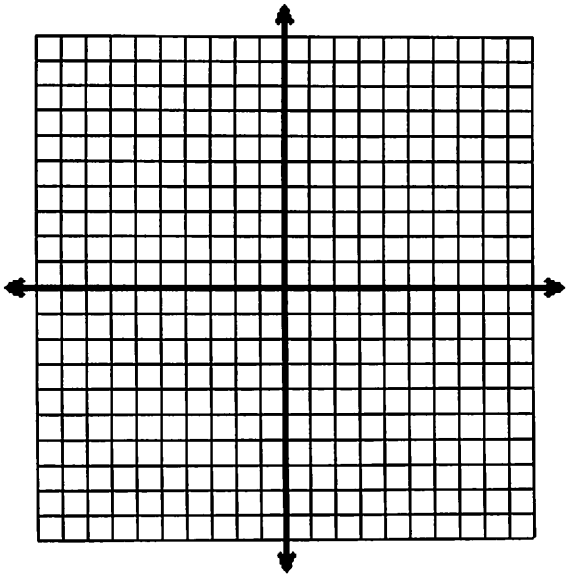
A:

B:

Parallel Lines	*Intersecting Lines*	*Same Line*
		
No Solution	*One Solution*	*Infinite Solutions*

Determine the Solutions to the System of Equations

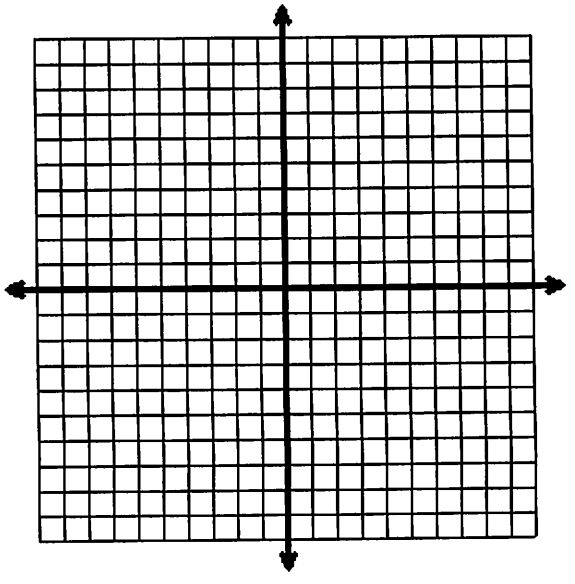
A: $y = -2x + 1$



Solution:

B: $2y = -4x - 8$

A: $2x + 4y = 8$



Solution:

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

Without Graphing, decide whether each system has *one solution, no solutions,* or *infinitely many solutions*

$y = 2x$ $y = 2x - 5$	$x + y = 10$ $2x + 2y = 8$	$y = -3x + 1$ $y = 3x + 7$	$2x - 5y = 20$ $y = \frac{3}{5}x + 4$

We can also check our answers on the calculator.

Find the intersection point for each of the following systems of linear equations by using the calculator.

Remember: After you have both lines in Y= ...  **CHOOSE 5: Intersect**

Get your cursor close to the intersection point and press  **3 TIMES**

1. $y = x + 2$ $y = -2x + 2$	2. $y = x + 4$ $y = 4x + 1$
3. $y = \frac{1}{2}x + 1$ $y = -3x + 8$	4. $y = -\frac{1}{3}x + 1$ $3y = x - 9$

Solving Systems by Graphing

Two or more linear equations together form a **system of linear equations**. One way to solve a system of linear equations is by graphing each equation and looking to see if the lines have any point in common. Common points that make each equation true would be a **solution to the system of linear equations.**

Suppose you have $20 in your bank account and deposit $5 each week. Your friend has $5 in her account and deposits $10 each week. When will you and your friend have the same amount of money in your accounts?

Linear Equations

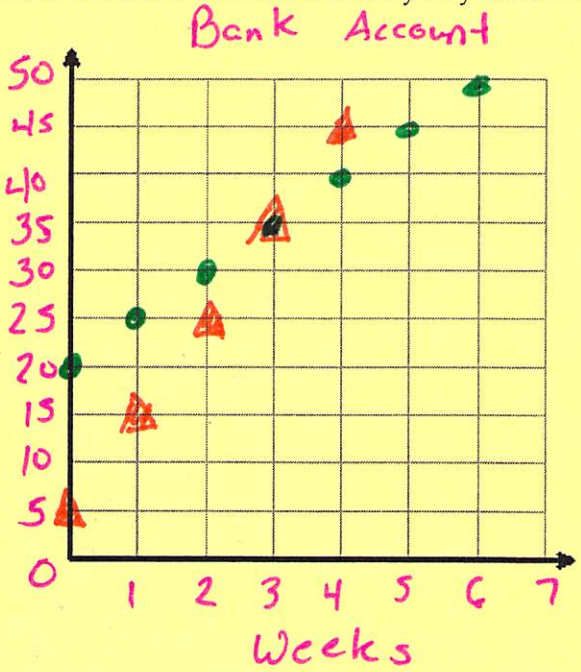
You: $y = 5x + 20$

Friend: $y = 10x + 5$

Coordinate Where the Lines Cross: (3, 35) $

What does this mean?

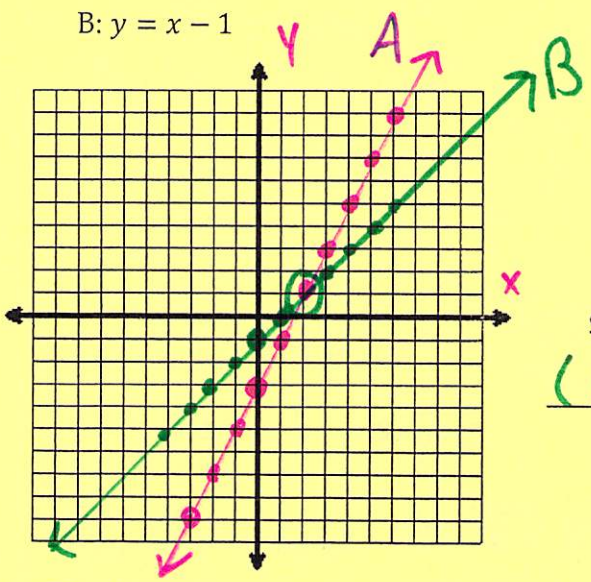
At week 3 each has $35.



Examples: Solve by Graphing

1. A: $y = 2x - 3$

B: $y = x - 1$



Solution: (2, 1)

Check:

A: $y = 2x - 3$

$1 = 2(2) - 3$

$1 = 1$ ✓

B: $y = x - 1$

$1 = 2 - 1$

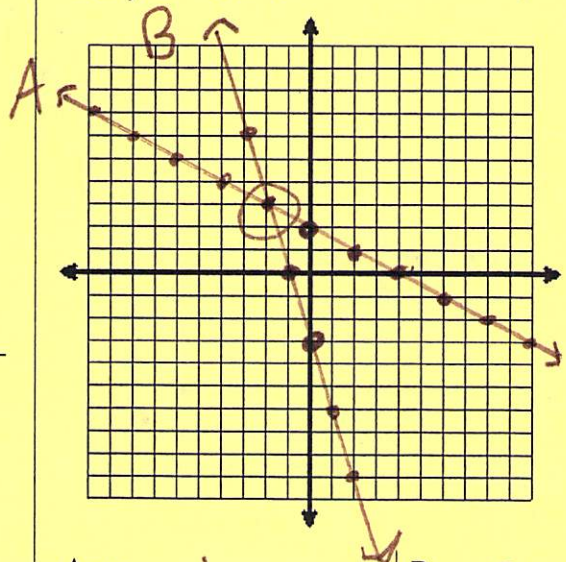
$1 = 1$ ✓

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

B: $3y = -9x - 9$

$\frac{3y}{3} = \frac{-9x}{3} - \frac{9}{3}$

$y = -3x - 3$



Solution: (-2, 3)

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

$3 = -\frac{1}{2}(-2) + 2$

$3 = 1 + 2$

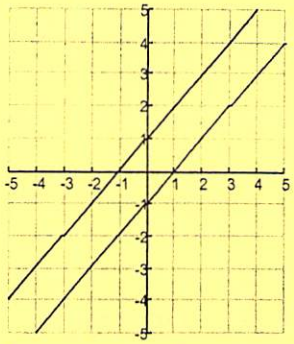
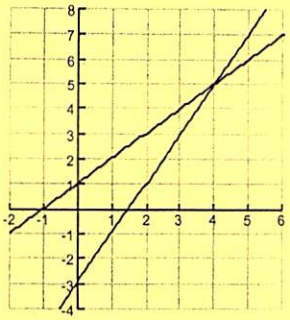
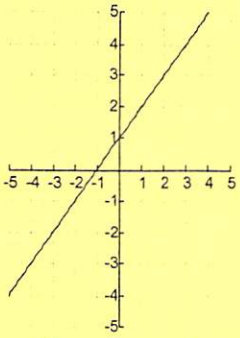
$3 = 3$

B: $3y = -9x - 9$

$3(3) = -9(-2) - 9$

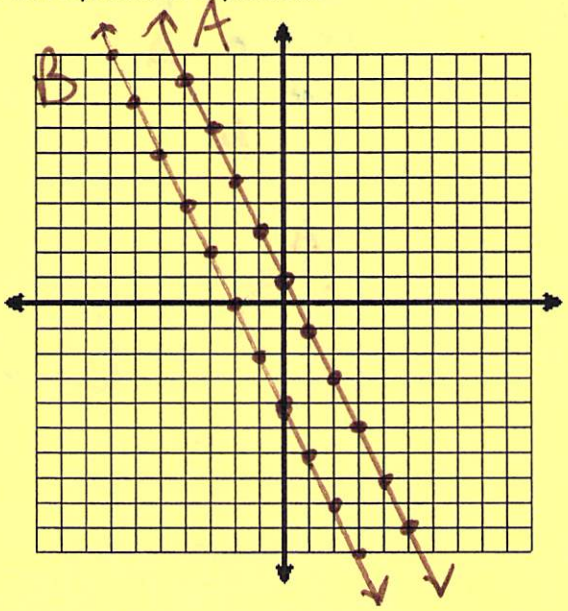
$9 = 18 - 9$

$9 = 9$ ✓

Parallel Lines	Intersecting Lines	Same Line
		
Same slope	Different Slope	Same Slope
No Solution	*One Solution*	*Infinite Solutions*
different y-intercept		Same y-intercept

Determine the Solutions to the System of Equations

A: $y = -2x + 1$



Solution:

11 Lines

NO solution

B: $\frac{2y}{2} = \frac{-4x}{2} - \frac{8}{2}$

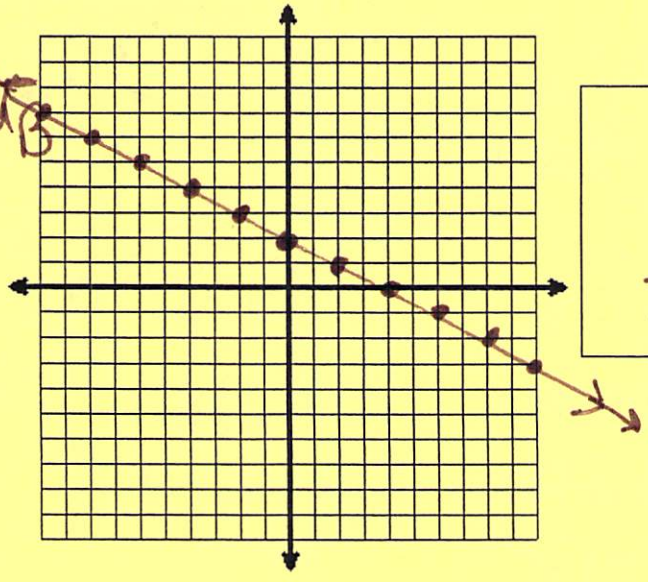
$y = -2x - 4$

A: $2x + 4y = 8$

$-2x \quad -2x$

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

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



Solution:

Same Line

Infinitely Many

Solutions

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

Without Graphing, decide whether each system has *one solution, no solutions,* or *infinitely many solutions*

$y = 2x$
$y = 2x - 5$

Same Slope
Different Y-intercept
II Lines

NO Solution

$x + y = 10$
$2x + 2y = 8$

$x + y = 10$ $\quad 2x + 2y = 8$
$-x \quad -x \quad -2x \quad -2x$
$y = -x + 10 \quad \frac{2y}{2} = \frac{-2x+8}{2}$
$y = -x + 4$

Same Slope
Different Y-intercept
~~II Lines~~

No Solution

$y = -3x + 1$
$y = 3x + 7$

Different Slopes

1 Solution

$2x - 5y = 20$
$y = \frac{3}{5}x + 4$

$2x - 5y = 20$
$-2x \quad -2x$
$\frac{-5y}{-5} = \frac{-2x+20}{-5} \quad \frac{}{-5}$
$y = \frac{2}{5}x - 4$

Different Slopes

1 Solution

We can also check our answers on the calculator.

Find the intersection point for each of the following systems of linear equations by using the calculator.

Remember: After you have both lines in Y= ... 2ND CALC TRACE **CHOOSE 5: Intersect**

Get your cursor close to the intersection point and press ENTRY SOLVE ENTER **3 TIMES**

1. $y = x + 2$ $y = -2x + 2$ (0, 2)	2. $y = x + 4$ $y = 4x + 1$ (1, 5)
3. $y = \frac{1}{2}x + 1$ $y = -3x + 8$ (2, 2)	4. $y = -\frac{1}{3}x + 1$ $3y = x - 9$ $\frac{3y}{3} = \frac{x-9}{3}$ $y = \frac{1}{3}x - 3$ (6, -1)