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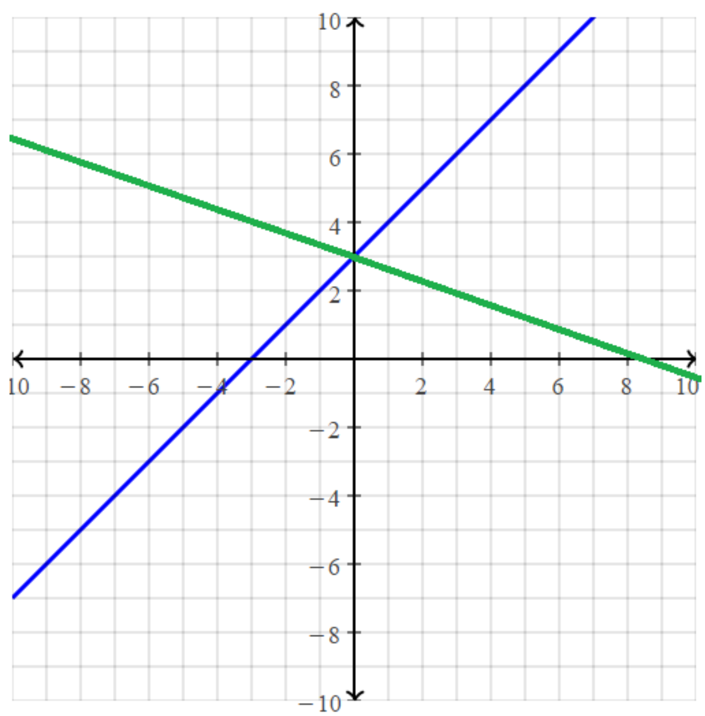
Systems of Linear Equations

Notes	Video Links & Practice Space
Welcome to **your** Toolbox	How to use the toolbox
Vocabulary **Linear Equation:** a polynomial equation that contains a __________ of __________ 1, but no term of higher degree **Parallel Lines**: lines on the same coordinate plane that are at __________ distance from each other and _________ intersect **Solution (of a system):** a point or set of points that _________ the equations of the system	**Vocabulary (0:56)**
Determining the Solution Type of a Linear System A linear system, as shown below, consists of two equations. $y = x + 3$ $y = -\frac{1}{3}x + 3$ Each equation will have an x-variable, a y-variable, and a constant (a number not attached to a variable). If there is no constant shown we can infer the constant is 0. **The solution to a graphed system is the point (or points) where the lines intersect. A system can have one solution, infinite solutions, or no solutions.**	

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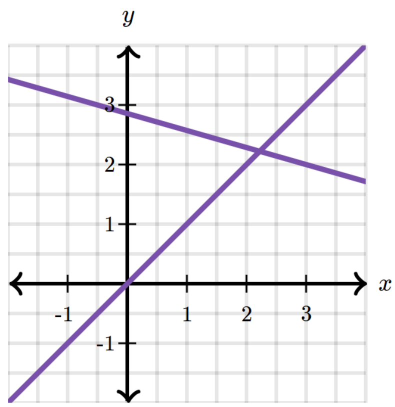
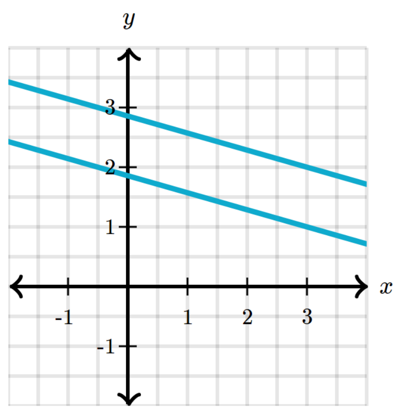
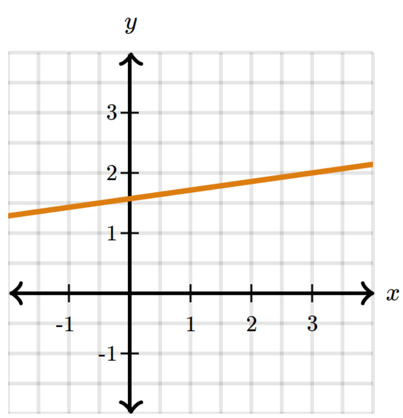
Types of Solutions	
	[One Solution](#) (1:07) ________________ Solution ________________ Slope ________________ y-intercepts
	[No Solution](#) (1:23) ________________ Solution ________________ Slope ________________ y-intercepts
	[Infinite Solutions](#) (1:22) ________________ Solutions ________________ Slope ________________ y-intercept

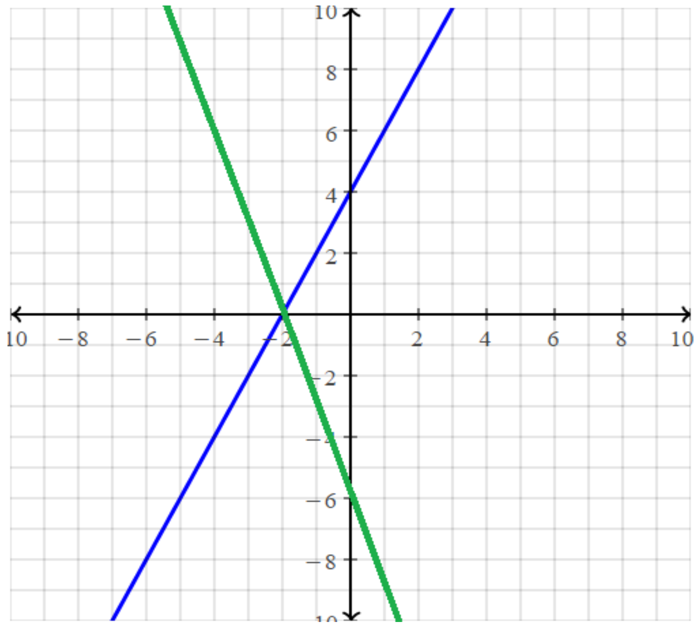
Verifying a Systems Solution Algebraically

Verifying Solutions (3:16)

If we graph the system below:

$y = 2x + 4$

$y = -3x - 6$



The point of intersection is (-2, 0)

How can we verify algebraically that this solution is, in fact, correct?

We can ________________ our solution into BOTH of the original equations.

If we obtain a ___________ statement the solution is correct.

What is a true statement?

Solving Systems by Graphing

Solving Systems by Graphing (5:32)

You've already learned how to graph linear equations in slope intercept form.

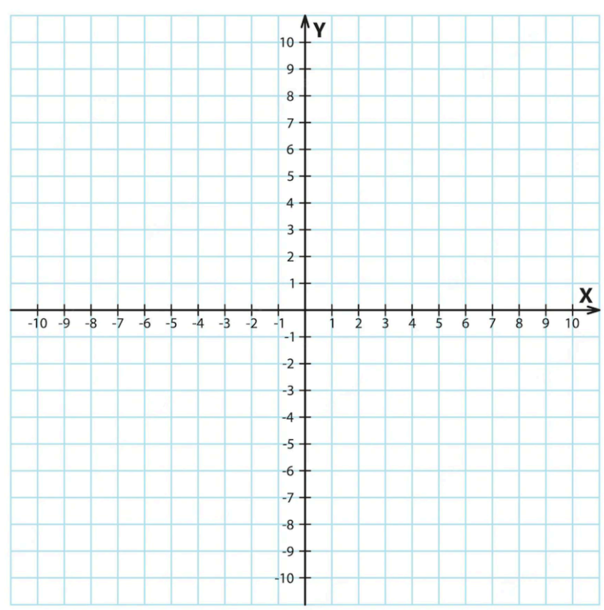
Graphing a linear system is no different except now we will be graphing two equations instead of one.

Once graphed we can identify the solution by looking for the point of intersection.

Let's graph the system below and identify the solution:

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

$4x = y + 6$



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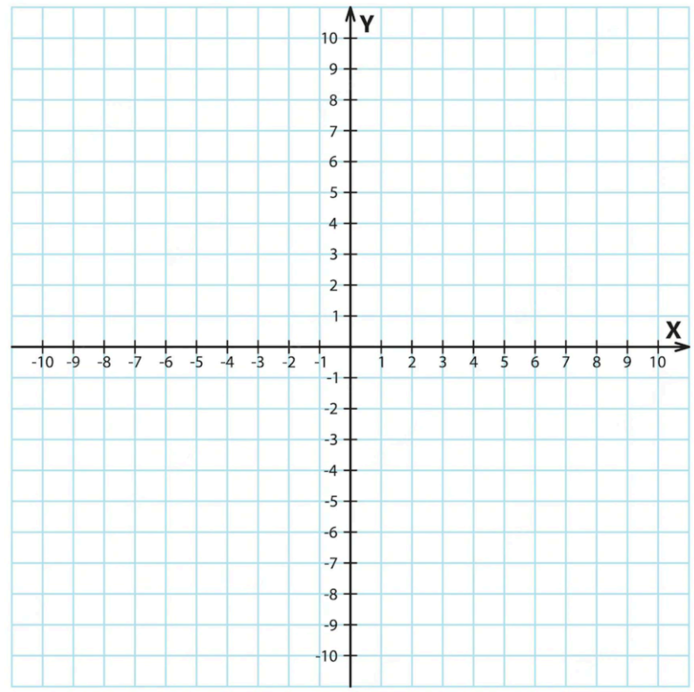
Practice

1. Solve this system of equations by graphing.

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

$6 = y + 3x$

Solving Systems by Graphing Practice (5:20)



Determining Solution Types Without a Graph

Determining Solution Types Without a Graph (1:42)

To determine the number of solutions a system has without graphing it the system must be written in slope intercept form, $y = mx + b$

For the system:

$y = 3x + 2 \quad y = 3x + 3$

The system is already written in slope intercept form.

We can now look at slope and y-intercept to determine the solution type.

For this system the equations have the ______________ slope and ________________ y-intercepts.

This means that there would be

____

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Practice	
2. What is the solution type for this system? $6x = 3y + 9$ $y = 2x + 3$	**Identifying Solutions 2 (3:20)**
3. What is the solution type for this system? $3x = 3y + 6$ $y = 1/2x + 3$	**Identifying Solutions 3 (3:38)**
4. What is the solution type for this system? $y = 4x + 2$ $2y = 8x + 4$	**Identifying Solutions 4 (2:08)**

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Solving A Real-World System of Two Equations by Graphing

You have learned about using linear equations to represent real-world problems and how their graphs can help to make predictions and better understand the situation.

Similarly, we can use systems of linear equations to help find a solution to real-world problems.

The next set of steps can be useful in finding and interpreting the solution to a real-world problem.

Step 1: Define and assign variables

Step 2: Write two equations to represent the information given in the problem

Step 3: Solve the system of linear equations by graphing, and check the solution

Step 4: Interpret the solution

A teacher can purchase packs of dry erase markers at a local store for $4 each. He can also buy them from an online retailer for $3 each and $5 shipping and handling.

How many packs of dry erase markers would the teacher need to purchase for the cost from the local store to be the same as the cost from the online retailer?

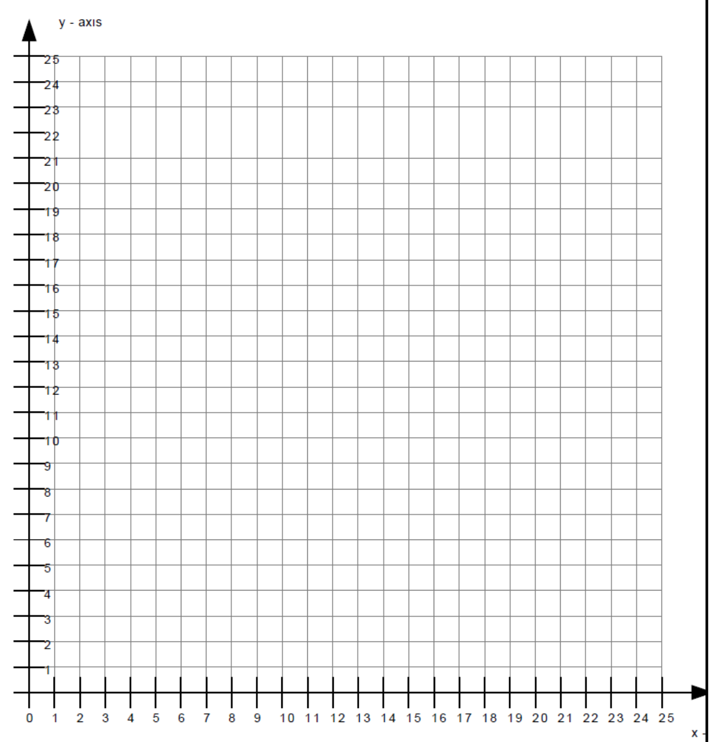
Solving A Real-World System of Equations by Graphing (4:40)

Let x = ______________________________

Let y = ______________________________

Equation for local store: ________________

Equation for online retailer: _____________



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Practice

5. Johnny's parents are planning a party for him at the local trampoline park. There are two types of party planner options.

   Option 1: They can pay $60 for the room and cake, and then $3 per guest.

   Option 2: Pay for an all-inclusive party package (room, cake and unlimited guests) for $120.

   If we have y represent the cost for the party and x represent the number of guests. Option 2 can be represented by y = 120.

   - What is the equation for option 1?

   - How many guests have to come to make it the same price for both options?

Systems Application 7:01