Understanding Math

Concept: Solving Linear Systems

Name:

COMPUTER COMPONENT

Instructions: Select the computer program *Understanding Equations* (Neufeld)
Follow the instructions to the Main Menu.
Select *Solving Linear Systems* from the Main Menu.

Work through all sections of this topic **in order**:

- *In This Topic*
- *The Meaning of a Linear System*
- *Solve a Linear System by Graphing*
- *Solve a Linear System by Substitution*
- *Solve a Linear System by Elimination*

Additional Required Materials: Pencil Crayons

Notice: You will not be finishing the entire topic before stopping to complete some **OFF COMPUTER EXERCES**.

As you work through the computer exercises, make your notes in the **NOTES** section of this page.

When you reach the end of the section *Solve a Linear System by Elimination* on the computer, move on to the **OFF COMPUTER EXERCISES** below**.**

NOTES:

Remember from Understanding Graphing, Linear Relations, What is a Linear Relation?

- A ____________________ can be represented by a ____________________ equation.
- A ____________________ equation is of the form _____ + ______ + ____ = _______

Where ____ , _____, and _____ represent _________ numbers.

- _____ = _____ + _____ is the equation of a ______________________ line.

- For an equation of a straight line we can graph it by two methods:

  Example: $y = 3x + 2$

  - Method 1:

    Pick ________ points on the ____________ by picking some

    values for __________ and finding the corresponding value for _____.

    Then:

    Graph the points.

  - Method 2:

    Determine

    - Slope (m) = ______
    - y-intercept (b) = _______

    - Then graph the y-intercept

    - Use the slop to find another point on the line with

      _________________ coordinates.

Summary:

_____ + _____ + _____ = ______ or _____ = ______ + ______

is a __________________ equation.

A _________ of _________________ equations, considered __________________, is a

_________________________ _______________________.

- When we ________________ a __________________ ________________ we find the point of ____________________________.

Solve a Linear System by Graphing

- We use the graphs of _______________ lines to _________________ the point of __________________________ for the _____________ lines.

Solve:

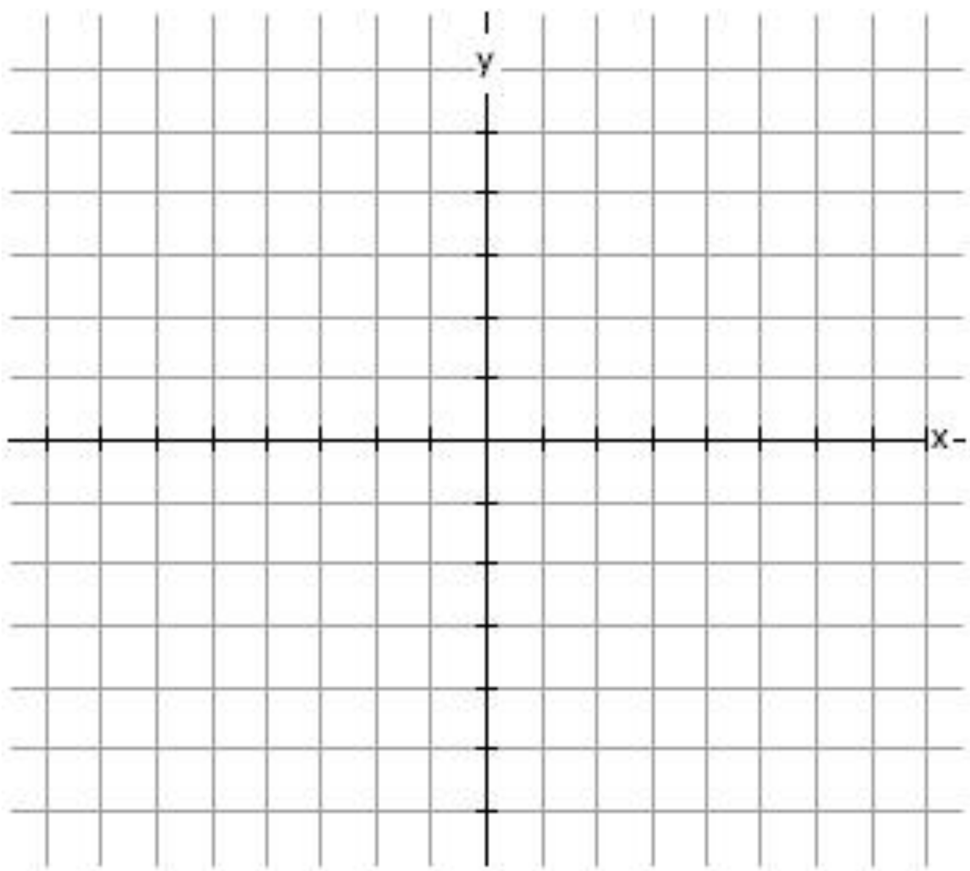
Equation	y-intercept	Slope	Another Integer Coordinate
y = 2 x + 3	(0, ______)		(_____, _____)
y = x - 1	(0, ______)		(_____, _____)

- Graph the coordinate points.
- Find the point where the ____ lines seem to ___________.
- x = _______

  y = _______

  (____, ____)

This point is called the _____________ of the system of linear equations.



After looking at Solving a Linear Systems by Graphing:

1. Equations having slopes that are negative.
2. Equations having slopes that include fractions (*rise over run*).
3. Equations having slopes that are the same (*parallel lines*).
4. Equations having slopes that are the same (*coincidental lines*).

Determine similarities and differences and explain why. (*Use examples to help clarify your ideas*.)

Solving a Linear System by Substitution

Solve:

$$\begin{aligned} 2x - y + 3 &= 0 \\ x - y - 1 &= 0 \end{aligned}$$

Step 1: Select ______________ of the _______________________ and _________________

the _____________________.

Step	Example
1. Select _______ of the __________________ and ____________________ the _____________________.	$2x - y + 3 = 0$ (1) $x - y - 1 = 0$ (2) Choose equation (1) $y =$ _____ + ______
2. ___________________ this expression into the other ______________________ (2)	$x - y - 1 = 0$ (2) $x - (\_\_\_\_ + \_\_\_\_) - 1 = 0$
3. Solve for the _______________ variable.	$x - (\_\_\_\_ + \_\_\_\_) - 1 = 0$ **x** = _______

4. ______________________ this value (x = ___) into the _________________________ equation to solve for _____.	$2x - y + 3 = 0$ (1) 2 (______) – y + 3 = 0 (1) **_____ = y** Common point is (_____, ______)

5.
 	
____________ the solution into each
 	
____________________ equation.
	$2x - y + 3 = 0$ (1)
	
	$x - y - 1 = 0$ (2)
	
	For (1)
	
	L.S. = 2 x – y + 3
	
	= 2 (___) - (____) + 3
	
	= ______
	
	R.S. = 0 ← Same, L.S. = R.S.
	
	For (2)
	
	L.S. = x – y - 1
	
	= (___) - (____) - 1
	
	= ______
	
	R.S. = 0 ← Same, L.S. = R.S.

After looking at Solving a Linear Systems by Substitution:

1. Intersecting Lines.
2. Intersecting Lines Involving Fractions
3. Parallel Lines
4. Coincidental Lines.

Determine similarities and differences and explain why. (*Use examples to help clarify your ideas*.)

Solving Linear Systems by Elimination

Step	Example
1. ____________________ the equations so that ________, ________, and _________________ terms are _______________ each other.	$2x - y + 3 = 0$ (1) $x - y - 1 = 0$ (2) $2x - y =$ ______ (1) $x - y =$ ______ (2)
2. If ____________________ _________________ each __________________ by a _____________ so that the _____________ or ____________ terms ____________ to ______.	$2x - y =$ ______ (2) × - 1 → $x +$ (____) $y =$ ______
3. _____________ the equations to solve for ____________ of the __________________.	$2x - y =$ ______ ____ $x +$ ____ $y =$ ______ ____ $x +$ ____ $y =$ ______
4. _______________________ for (______).	____ **x** = ______
5. ______________________ for the ____________ into __________ equation and ___________ for the ____________________.	$x - y - 1 = 0$ (_____) $- y - 1 = 0$ _____ $= y$ Common point is (_____, ______)

5.
 	
____________ the solution in each
 	
____________________ equation.
	$2x - y + 3 = 0$ (1)
	
	$x - y - 1 = 0$ (2)
	
	The common point is (______, ______)
	
	For (1)
	
	L.S. = 2 x – y + 3
	
	= 2 (___) - (____) + 3
	
	= ______
	
	R.S. = 0 ← Same, L.S. = R.S.
	
	For (2)
	
	L.S. = x – y - 1
	
	= (___) - (____) - 1
	
	= ______
	
	R.S. = 0 ← Same, L.S. = R.S.

Evaluate the methods used in Solving a Linear System by Elimination

1. Intersecting Lines.
2. Intersecting Lines Involving Fractions
3. Parallel Lines
4. Coincidental Lines.

Summaries the approaches used in each. Be as concise as you can.

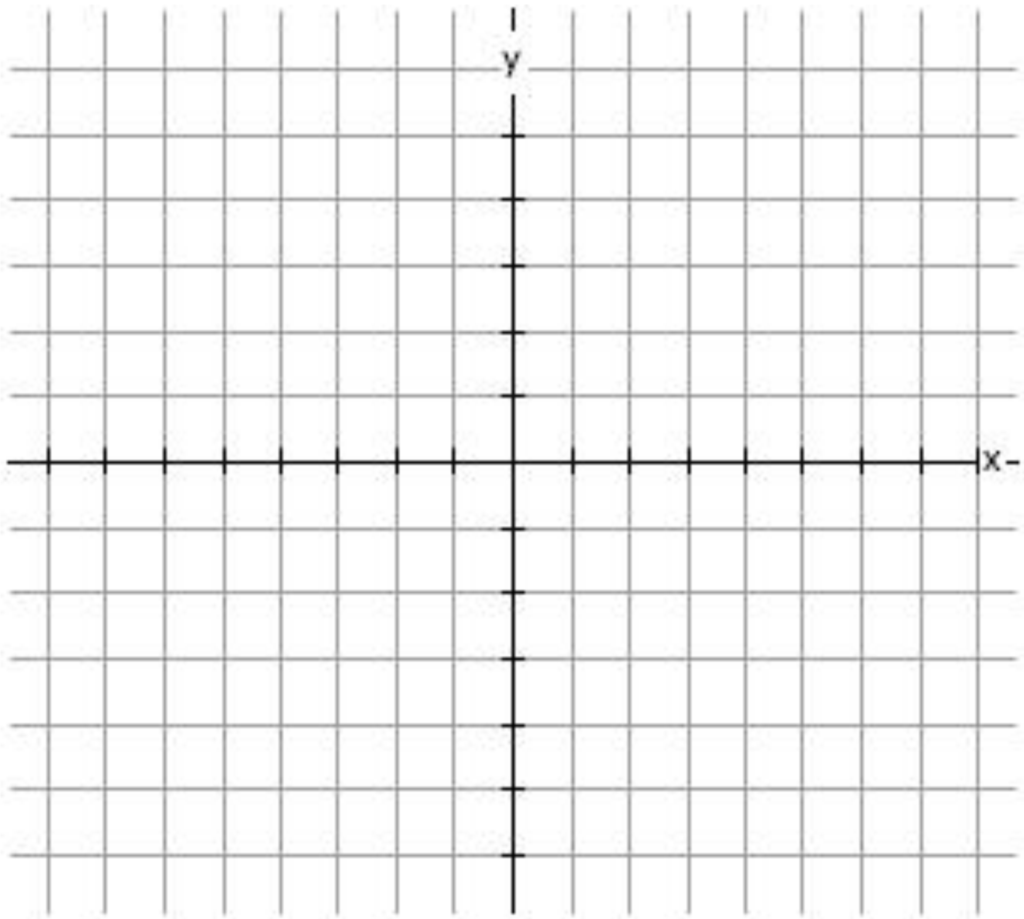
Hints:

- *Remember the patterns that were outlined for solving linear systems using substitution and graphing for each along with the model for elimination that we just did.*
- *Use examples to support your ideas*.)

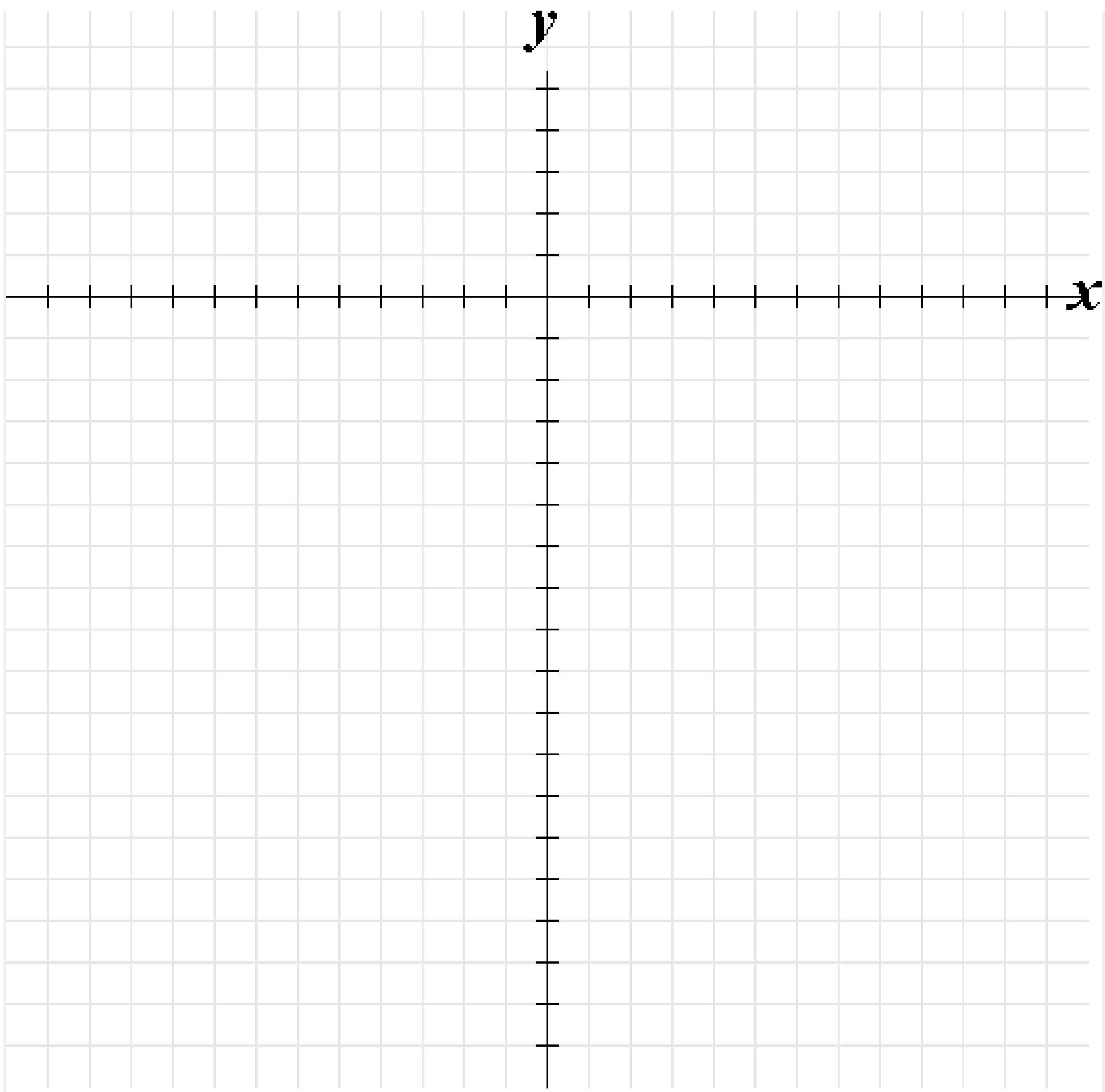
OFF COMPUTER EXERCISES

1. Find the solution to each system of linear equations by **graphing.**

(a) $y = -x + 4$
$y = 2x - 5$



(b) $y = 4x - 1$
$y = 2x - 9$



2. Solve the following linear systems by **substitution.** *(Show all your steps and make sure you check your solutions.)*

(a) $y = x + 1$

$2x + y + 5 = 0$

(b) $x + y + 6 = 0$

$4x - y + 9 = 0$

(c) $5x + 2y = 14$

$8x + 4y - 28 = 0$

(d) $x - y = 10$

$2x - y = 16$

3. Solve the following linear systems by **elimination.** *(Show all your steps and make sure you check your solutions.)*

(a) $x + 3y = 6$

$2x - 3y = 12$

(b) $3x - 5y = 32$

$2x + y = 4$

(c) $3x + 2y = 5$

$4x + 3y = 2$

(d) $x + y = 11$

$-2x + 6y = 2$