Chapter 8, Lesson 9

Graphs of Linear Inequalities

A linear \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is very similar to a linear equation. It has two variables $(x, y)$, but instead of an equal sign, we will see $>, <$, $\geq , \leq . $

The solution to a linear inequality is any point that produces a true statement when substituted into the inequality.

Much like inequalities with one variable, there are many possible solutions to linear inequalities. We can show all possible solutions using a graph.

Example:

Graph$ y \leq x-1$.

* Step 1: Find the boundary line by replacing the inequality symbol with an equal sign.
	+ Graph this line.
		- Use a DASHED line for > or <.
		- Use a SOLID line for $\geq or\leq . $
	+ This line divides your coordinate plane into two half-planes.
* Step 2: Test a point from one of the half planes.
* Step 3: If the point is a solution, shade that half of the plane. If not, shade the other half of the plane.

Change:

$$y \leq x-1$$

to:

$$y=x-1$$

Check:

Practice:

1. $x+2y>6$



1. $y \leq -3x-2$
2. $x< -1$



1. $4x-2y \geq -8$

HW: 8.9 (page 463) #12-19, 20-30 even, 32

Chapter 8, Lesson 8

Systems of Linear Equations

(Day 1- Solve by Graphing)

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (or linear system) is made up of two or more linear equations that have the same variables. (Usually *x* and *y*)

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to a linear system is an ordered pair that is a solution to each equation.

 This means that the lines \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at that point.

Example 1:

$y=4x+3$ and $y= -x-2$

* Graph both lines on the coordinate plane below. (You can use any method that we have learned in this chapter.)
* Use the graph to find where the lines intersect.
* Check your work by substituting the point into each equation.



Solution: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Check:

Correct? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Practice. Solve the linear system by graphing.

1. $y=-\frac{5}{3}x+3$ and $y= \frac{1}{3}x-3$



1. $-3x+y= -4$ and $x+2y= 6$
* You may want to put these

in slope-intercept form.

1. $4x+2y= 4$ and $-2x-y=2$
* These lines are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which means they will never intersect. (Notice- the slopes are the same.)



* Therefore, there is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
1. $3x- y=-6$ and $-6x+2y=12$
* Notice that these lines have the same \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the same \_\_\_\_\_\_\_\_\_\_\_\_.
* This means they are the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ solutions.

HW: 8.8 (page 457) #7-12 all, 13-21 odd \*Need graph paper

Chapter 8, Lesson 8

Systems of Linear Equations

(Day 2: Solve Algebraically- The Substitution Method)

Sometimes the solution to a linear system is a fraction or decimal, which can make it difficult to solve graphically. Sometimes it is just easier to solve algebraically because it is less work (to not graph).

Example 1:

$2x-y=1$ and $2x+y=8$



Let’s graph this system like we did yesterday.

As you can see, the solution does not have whole numbers, which makes it difficult to interpret from the graph.

To solve this system, we must first solve one of the equations for either *x* or *y*.

Pick an equation and solve: Now substitute into the other equation:

Now you have found one of the variables. Substitute into either equation to get the other value.

Practice:

1. $x+y=4$ and $ 3x-2y=4$

2. $x-2y=10$ and$ 2x+y=5$

3. $y=2x$ and $3y=6x$

* In this set of equations, we can use the substitution method.
* Substitute $y=2x$ into the second equation. What do you notice?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* We can also easily solve the second equation for *y*. What do you notice?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* What does this mean? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* This method is called solving by inspection.

$4. 2y-4x= -1$ and $2y-4x=6$

* We can solve this system by inspection.
* What do you notice about these two equations?
	+ Similarities:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + Differences: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* What does that mean? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
1. $y=x-1$ and $2y=2x-2$
2. $y=3 $ and $x= -4$
3. $x+2y= -4$ and $ 3x+2y=4$
4. $-3x+3y=4$ and $-x+y=3$
5. $-7x-2y= -13$ and $x-2y=11$
6. $-9x+3y=12$ and $-12x+4y=16$

HW: pg. 458B #1-5 odd, 7-18

Chapter 8, Lesson 8

Systems of Linear Equations

(Day 3: Solve Algebraically- The Elimination Method)

Another way to solve a system of linear equations is to cancel one variable. We can do that by adding the two equations together.

Example 1:

$$3x+y= -14$$

$$-2x-y=9$$

* In this system, we can see that we have a positive and negative *y*.
* If we add the two equations together, it will cancel the *y*-values, leaving only *x* to solve for.
* Now that we have the *x*-value, we can substitute that into either equation to find the *y*-value.
* The solution is: \_\_\_\_\_\_\_\_\_\_\_\_\_

Practice:

1. $-x+9y= -5$

$x-5y=1$

1. $4x+9y= -19$

$-4x-7y=13$

1. $2x+3y=12$

$-x-3y=18$

Sometimes the variables do not match up perfectly to make zero. When this happens we must multiply an equation by a value so that we can cancel.

Example 2:

$$3x+y= -21$$

$$x+y= -5$$

In this equation:

* We can cancel the x-values by multiplying the second equation by \_\_\_\_\_\_\_\_\_.
* OR we can cancel the y-values by multiplying either equation by \_\_\_\_\_\_\_\_\_.
* REMEMBER: You must multiply EVERY TERM in the equation.
1. $x+4y= -3$

$$x+7y= -12$$

1. $4x-7y=5$

$9x-7y= -15$

1. $3x-y= -13$

$4x+2y=5$

1. $-2x+y=10$

$4x-y= -14$

1. $6x+5y=14$

$2x+7y=2$

HW: Day 1: Kuta Worksheet- Evens; Day 2: Odds

Word Problems using Systems of Equations

Word problems using systems of equations are solved similarly to what we have done in the past. This time, however, you will have an x and a y. Remember to define your variables. Make sure you answer the question asked. The answer should be a real life answer, not an ordered pair.

I have two integers. The sum of the integers is 83 and the difference is 15. What are the numbers?

Let x = the larger number

Let y = the smaller number

Now reread the problem and make the math sentences. It will take two this time.

x + y = 83

x – y = 15 Now solve using either elimination or substitution.

1. I have two numbers. The sum of them is 106 and the difference is 28. What are the numbers?

Sometimes they aren’t quite so simple.

*Mark sold 20 tickets to the play. Some were adult tickets and some were student tickets. Adult tickets cost $10 each while student tickets cost $5 each. If he sold $180 worth of tickets, how many of each kind did he sell?*

Ask yourself – what should my variables be?

x = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and y = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Now, reread the problem and find two different equations using these variables.

Now you need to solve the system using either elimination or substitution.

Remember – this answer is not an ordered pair but instead real life answers

2. Chelsea is running the bake sale. She is selling bags of brownies and bags of cookies. During 7th grade lunch, she sold $35 worth, selling 10 brownie bags and 5 cookie bags. During 8th grade lunch, she sold $60 worth, selling 15 brownie bags and 10 cookie bags. How much does a bag of brownies cost? How much does a bag of cookies cost?

HW: Day 1: Kuta--Systems of Equations Word problems – Alg I version

Day 2: Kuta: System of Equations Word Problems – Alg 2 version

Pre-Alg Word Problems

1. Read the word problem

2. Figure out what the problem wants you to solve for. That is usually the “x.”

Write x = a word description. You need to show what x is.

3. Reread it now that you know what the “x” is and write down a math sentence from the problem.

4. Solve the math sentence.

5. See if your answer makes sense (can’t have 1.5 people, can’t have negative books, can’t drive 300 miles per hour)

6. Reread the problem to make sure you answered EVERYTHING that the problem is asking for.

Mary has 4 more dollars than twice as much money as her twin brother Jerry. If Mary has $24, how much money does Jerry have?

Bob and Tina have I-pods. Bob has 20 less than three times as many songs on his than Tina. If Bob has 193 songs, how many does Tina have?

Alex, Brittany, and Charlie are siblings. They want to pool their money to buy a present for their dad for father’s day. Charlie has twice as much as Alex. Brittany has 20 dollars less than Alex. If the siblings have $84 total, how much does each person have?

Edward’s test scores are 84, 87, 80, and 71. He has one test left. He would like his test average to be an 83. What grade does he need to get on the last test?

Freida has scored a 97, 85, 91, 88, and 93 on her previous tests. What does she need to score on her last one to get a 93 in the class?

A map scale says that 1 inch = 2.5 miles. The route measured on the map is 2.7 inches. How many miles will this be?

One costume for the play took ¾ a yard of fabric. How many yards of fabric will be needed for all 25 members of the cast?

HW: Day 1: Word Problems Worksheet Day 2: More Word Problems Worksheet

Pre-Alg Word Problem Worksheet

1. Gertrude’s mom just got a Facebook ®. Gertrude has 39 more than 8 times the number of friends that her mom has. How many friends does her mom have if Gertrude has 455 friends?

2. Hildegard and her friend Isabelle compare how many contacts they have in their cell phones. Hildegard has 90 less than twice as many as Isabelle. If Hildegard has 224, how many contacts does Isabelle have?

3. Jack wants to compare songs on i-tunes with her friend Kirk. Kirk has 463 songs, which is 500 less than three times the amount that Jack has. How many does Jack have?

4. Lori, Mark, and Nora combine their money to buy their friend Olivia a gift. Nora has 5 dollars less than Mark. Lori has 8 dollars less than twice as much as Mark. If they have $47 total, how much do each of them have?

5. Parth, Quentin, and Robyn are comparing the amount of money that they have. Parth has $20 more than Quentin. Robyn has twice the amount the Parth has. All three friends have $128 total. How much money do each of them have?

6. Sonya had some money but just got $15 allowance. Now she has $21 less than twice as much as before she got her allowance. How much money did she have before she got her allowance? How much money does she have now?

7. Tom wants to get a 90% for his test average. He test grades so far are: 95, 82, 90, and 93. What does he need on the last test to achieve his goal?

8. Ursula wants to get an 87% in her class. Her grades so far are 92, 78, 85, 82,and 87. What grade does she need to accomplish this?

9. Victor is struggling in math. His grades so far are 70, 65, 78, 68, 59, and 62. He would like to get a 70. What grade would he need?

10. A map says that ¾ of an inch is equal to 20 miles. How far would the map show if two cities are 160 miles apart?

11. I am having a party and 88 people are coming. The recipe serves 20 people and calls for 4 bottles of Sprite ®. How many bottles of Sprite ® will I need? (round to the proper answer for purchasing food)

More Pre-Alg Word Problem Worksheet

1. Will has been collecting soda tabs for his classroom and has 320. Yvonne has also been collecting them. If Will has 100 more than twice as much as Yvonne, how many soda tabs does Yvonne have?

2. Alfred decides to take his son Brad to the Cirque de Soliel show. Student tickets and adult tickets cost different amounts. The student ticket was $40. The adult ticket was $45 less than three times the student ticket. How much was the adult ticket? How much were both tickets together?

3. Charlie, Danny, and Eddie are selling candy for their ball team. Charlie sold 2 more than twice as much as Danny. Eddie sold 20 more than Danny. The boys sold 150 candy bars total. How many did each boy sell?

4. Fred, Gary, Harry, and Ingrid decide to split the cost of a $75 present for their friend. Fred has $10. Harry has $6 more than Gary. Ingrid has $16 less than Gary. How much does each friend contribute?

5. Jerry wants to have $120 to take on vacation. He already has $32 saved. If there are 8 weeks left, how many dollars does he need to save per week to meet his goal? (Note do this algebraically.)

6. Katie’s grades in social studies are 80, 73, 50, and 79. She would like to make a 75 in the class. She has TWO tests left. If she gets the same grade on both tests, what does she need to get on those tests?

7. Lonnie has 249 songs on his Ipod. Lonnie has 60 more than half has many as his friend Max. How many songs does Max have on his iPod?

8. A recipe calls for 3 ½ cups of flour to make 50 cookies. I need to make 180 cookies. How much flour do I need?

9. I need to buy punch for a party. The recipe calls for a 2-liter bottle of Sprite and a ½ gallon of rainbow sherbet. This recipe is enough for 25 people. I am having 135 people. How much Sprite and sherbet do I need to buy?

10. Nate and Orlando decide to put their money together to buy a new video game. Orlando has $10 less than four times as much Nate. The game costs $65 and they have $5 more than they need. How much do they each have?

11. Peter is going on a trip. The map says that ¼ inch = 6 miles. According to the map, the distance is 4 ¼ inches. How many miles is that?

12. Rosie wants to buy peaches. They are on sale 3 for $1. She has $3.80. How many peaches can she buy?