Name ANSWER KEY Date ANSWER KEY

Linear Equations, Functions, and Inequalities
Finding Solution Sets to Systems of Equations Using Substitution and Graphing
Independent Practice

1. Last Monday, two law students met up at *Café Literatura* after school to read the pages they were assigned in the Legal Methods class. Alejandro can read 1 page per minute, and he has read 28 pages so far. Carly, who has a reading speed of 2 pages per minute, has read 12 pages so far.

   Part A: Define the variables and write two equations to represent the number of pages that each student read.

   Variables:
   Let m= minutes of reading
   Let p= pages that each student has read
   Alejandro:

   $$p = m + 28$$

   Carly:

   $$p = 2m + 12$$

   Part B: Represent the two equations on the graph below.

Carly – blue graph Alejandro – red graph
The vertical scale for this graph is in increments of 4. The horizontal scale is in increments of 2.

Part C: What is the rate of change for each student?
Alejandro is 1
Carly is 2

Part D: What does the rate of change represent in this situation?

The rate of change represents the number of pages read per minute.

Part E: What is the y –intercept for Alejandro? What does it represent?

The y –intercept for Alejandro is 28 or $(0, 28)$ and it represents the number of pages she had already read.

Part F: What is the y-intercept for Carly? What does it represent?

The y –intercept for Carly is 12 or $(0, 12)$ and it represents the number of pages she had already read.

Part G: Give an example when Alejandro has read more pages than Carly. Justify your answer.

At 10 minutes, Alejandro will have read 38 pages and Carly will have read 32 pages.

Part H: Use the substitution method to determine when Alejandro and Carly have read the same amount of pages.

At 16 minutes

2. Parabola Skate Rental rents skate boards for $\$4.50$ per hour with a rental fee of $35. Arc of Hawk Skate Rental rents skate boards for $\$5.25$ per hour with a rental fee of $25.

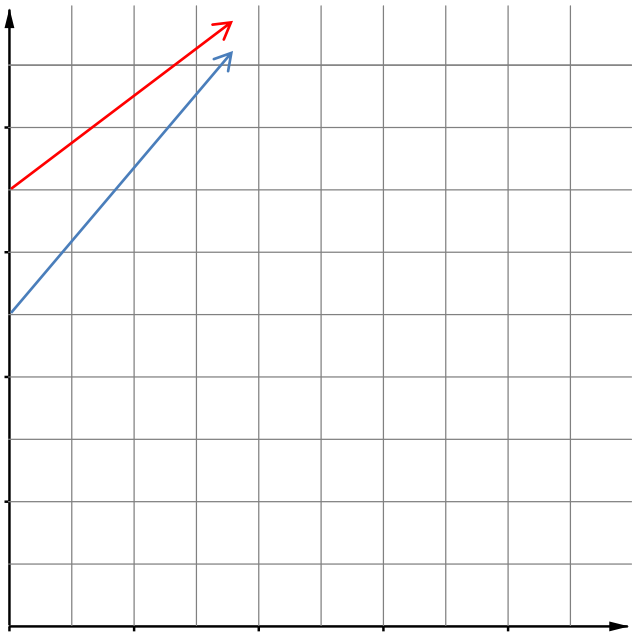
Part A: Define the variables and write two equations to represent each rental company.

Variables:
Let r = rental cost
Let h = hours

Parabola:
$\boldsymbol{r = 4.50h + 35}$

Arc of Hawk:
$\boldsymbol{r = 5.25h + 25}$

Part B: Represent the two equations on the graph below.



Arc of Hawk – blue line
Parabola – red line

Part C: What is the rate of change for each rental company?
Parabola:
$\boldsymbol{\$4.50}$ **per hour**
Arc of Hawk:

$\$5.25$ per hour

Part D: What does the rate of change represent in this situation?

Cost per hour to rent the skate board

Part E: What are the y –intercepts of each graph and what do they represent?

Parabola:

$(0, 35)$ represents the rental fee for the board

Arc of Hawk:

$(0, 25)$ represents the rental fee for the board

Part F: Give an example when renting from Parabola's would be a better deal than renting from Arc of Hawk's? Justify your answer.

14 hours
At 14 hours, the cost to rent from Parabola would be $\$98$ and the cost to rent from Arc of Hawk's would be $\$98.50$.

Part G: Use the substitution method to help the renter determine when the two skate board rentals will cost the same amount.

At $13\frac{1}{3}$ hours

3. In a basketball game, Tatiana made 23 baskets. Each of the baskets was worth either 2 or 3 points, and Tatiana scored a total of 53 points. Let x represent the number of two-point baskets she made and y represent the number of three-point baskets she made.

Part A: Write a system of equations to represent the situation.

$$x + y = 23$$

$$2x + 3y = 53$$

Part B: Would you use graphing or substitution to solve the system and determine the number of 2 –point and 3 –point baskets Tatiana made? Explain.

Substitution would be an easier method to use because you can get the exact intersection point numberically using algebra instead of having to look and estimate the intersection point.

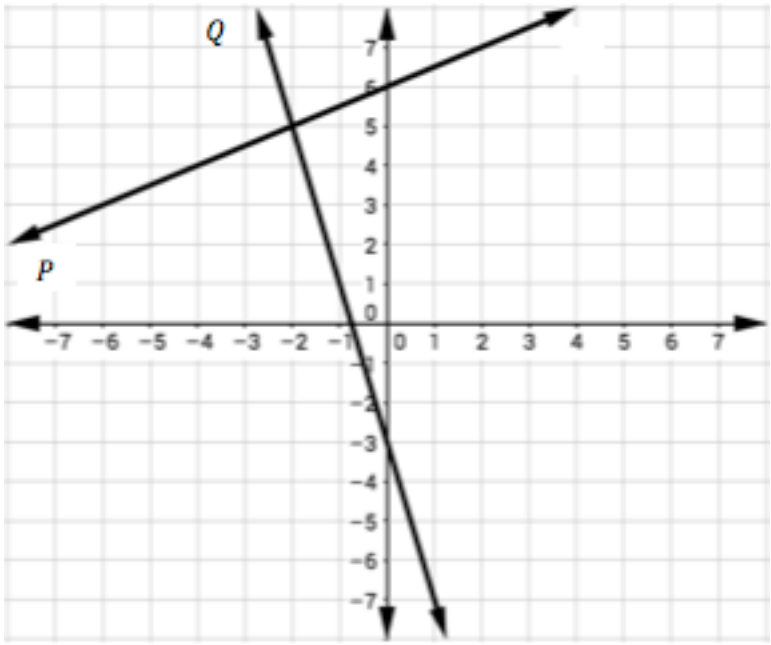
Part C: Use the method you chose in Part B to solve the system and find out how many 2-point and 3-point baskets Tatiana made.

Let $x = -y + 23$
Substitute.

$$2(-y + 23) + 3y = 53$$
$$-2y + 46 + 3y = 53$$
$$y + 46 = 53$$
$$y = 7$$

So, seven 3-point baskets and sixteen 2-point baskets.

4. The graph below shows a system of equations:



Part A: Write the equation of each line in slope-intercept form.

Line P: $y = \frac{1}{2}x + 6$

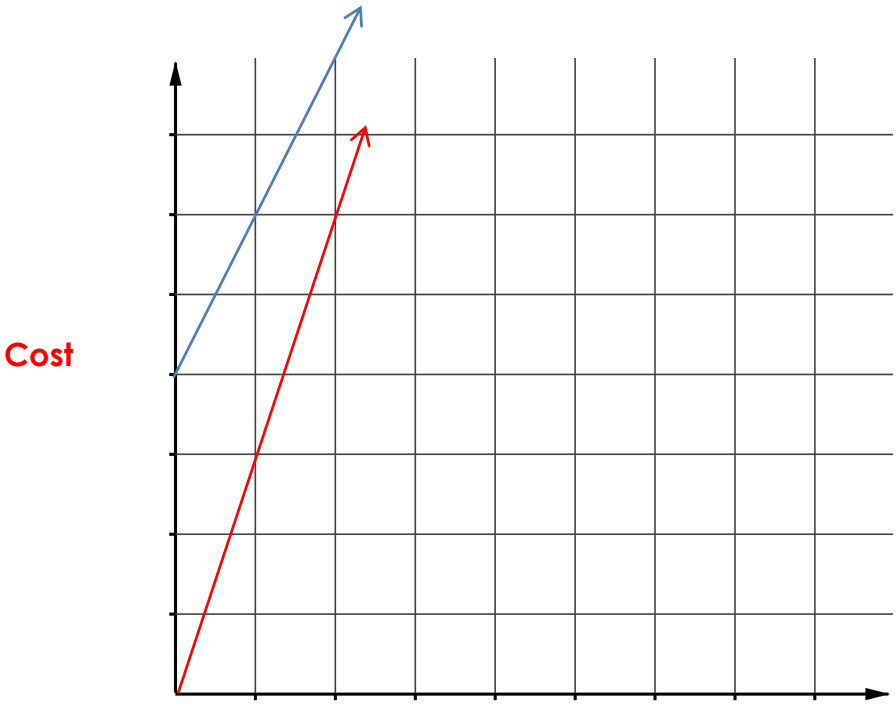
Line Q: $y = -4x - 3$

Part B: What is the solution to the system?
$(-2, 5)$

5. You are trying to decide which cell phone plan to purchase. Plan A charges $\$40$ for a new phone and $\$20$ a month for usage. Plan B provides the phone for free, but has a fee of $\$30$ a month for usage.

   Part A: Write an equation to represent each plan.
   Let c = cost and m=month
   Plan A:
   $c = 20m + 40$
   Plan B:
   $c = 30m$

   Part B: Represent the two plans on the graph below.



Vertcal axis is in increments of 10 and horizontal axis is in increments of 1.
Plan A = blue
Plan B = red

Part C: Use the substitution method to determine when the two plans will cost the same.

At 4 months

6. Monroe and Kalyani solved the following system:

$$\boldsymbol{y = 3x + 1}$$
$$\boldsymbol{y = -x + 5}$$

Monroe used substitution and found the solution set to be $(\mathbf{1}, \mathbf{4})$ while Kalyani graphed and found the solution set to be $(\mathbf{2}, \mathbf{7})$.

Part A: How would you determine who is correct?
To determine who is correct, you could use the substitution method and find the solution set or you could plug in the solution sets Monroe and Kalyani found to both equations to see who was correct.

Part B: Whose solution set is correct?
Monroe

7. Traci is running a trail in Hanna Park. She can run one mile in ten minutes. Yoni is running the same trail as Traci. Yoni can run a mile in five minutes but starts running 20 minutes after Traci started on the trail. If they start the trail from the same point, how long will it take Yoni to catch Traci?

4 miles

8. Mr. Gardner is contemplating which shuttle service to take to the airport. Fast Shuttle charges a $5 pick-up fee and $0.25 per mile. Steady Shuttle charges a $2 pick-up fee and $0.50 per mile.

   Part A: When will the two plans cost the same amount?

   At 12 miles

   Part B: If the airport is **20** miles away, which company should Mr. Gardner choose?

   Fast Shuttle

9. Maggie makes and sells scented body lotions. She initially spent $**108** to purchase supplies, and each kilogram of lotion cost $**16** to make. Maggie sells the lotion for $**25** per kilogram.

   How many kilograms of lotion will Maggie have to sell to break even?

   12 kilograms