

## CHAPTER 6-3

### SOLVING LINEAR SYSTEMS

- 060007a, P.I. A.A.10  
Which ordered pair is the solution of the following system of equations?  
$$3x + 2y = 4$$
$$-2x + 2y = 24$$

[A] (2,-1)                      [B] (2,-5)  
[C] (-4,8)                      [D] (-4,-8)
- 080429a, P.I. A.A.10  
What point is the intersection of the graphs of the lines  $2x - y = 3$  and  $x + y = 3$ ?  
[A] (2, 1)                      [B] (1, 2)  
[C] (3, 0)                      [D] (3, 3)
- 060716a, P.I. A.A.10  
Which ordered pair satisfies the system of equations below?  
$$3x - y = 8$$
$$x + y = 2$$

[A] (2.5, 0.5)                      [B] (2.5, -0.5)  
[C] (5, -3)                      [D] (3, -1)
- 080013a, P.I. A.A.10  
What is the value of  $y$  in the following system of equations?  
$$2x + 3y = 6$$
$$2x + y = -2$$

[A] 2                      [B] 4                      [C] 1                      [D] -3
- 080706a, P.I. A.A.10  
If  $a + 3b = 13$  and  $a + b = 5$ , the value of  $b$  is  
[A] 4.5                      [B] 7                      [C] 1                      [D] 4

- fall0708ia, P.I. A.A.7  
The equations  $5x + 2y = 48$  and  $3x + 2y = 32$  represent the money collected from school concert ticket sales during two class periods. If  $x$  represents the cost for each adult ticket and  $y$  represents the cost for each student ticket, what is the cost for each adult ticket?  
[A] \$10    [B] \$20    [C] \$4    [D] \$8
- 080529a, P.I. G.G.63  
When solved graphically, which system of equations will have exactly one point of intersection?  
[A]  $y = -x - 20$                       [B]  $y = \frac{3}{5}x + 12$   
 $y = x + 17$                                        $y = 0.6x - 19$   
[C]  $y = 0.5x + 30$                       [D]  $y = -x + 15$   
 $y = 0.5x - 30$                                        $y = -x + 25$

## CHAPTER 6-4

### WRITING LINEAR SYSTEMS

- 080233a, P.I. A.A.7  
Tanisha and Rachel had lunch at the mall. Tanisha ordered three slices of pizza and two colas. Rachel ordered two slices of pizza and three colas. Tanisha's bill was \$6.00, and Rachel's bill was \$5.25. What was the price of one slice of pizza? What was the price of one cola?
- 010232a, P.I. A.A.7  
When Tony received his weekly allowance, he decided to purchase candy bars for all his friends. Tony bought three Milk Chocolate bars and four Creamy Nougat bars, which cost a total of \$4.25 without tax. Then he realized this candy would not be enough for all his friends, so he returned to the store and bought an additional six Milk Chocolate bars and four Creamy Nougat bars, which cost a total of \$6.50 without tax. How much did *each* type of candy bar cost?

10. 010332a, P.I. A.A.7  
Alexandra purchases two doughnuts and three cookies at a doughnut shop and is charged \$3.30. Briana purchases five doughnuts and two cookies at the same shop for \$4.95. All the doughnuts have the same price and all the cookies have the same price. Find the cost of one doughnut and find the cost of one cookie.
11. 060133a, P.I. A.A.7  
Ramón rented a sprayer and a generator. On his first job, he used each piece of equipment for 6 hours at a total cost of \$90. On his second job, he used the sprayer for 4 hours and the generator for 8 hours at a total cost of \$100. What was the hourly cost of *each* piece of equipment?
12. 010104a, P.I. A.A.7  
Three times as many robins as cardinals visited a bird feeder. If a total of 20 robins and cardinals visited the feeder, how many were robins?  
[A] 5      [B] 20      [C] 15      [D] 10
13. 080606a, P.I. A.A.7  
Sal keeps quarters, nickels, and dimes in his change jar. He has a total of 52 coins. He has three more quarters than dimes and five fewer nickels than dimes. How many dimes does Sal have?  
[A] 20      [B] 18      [C] 21      [D] 13
14. 089916a, P.I. A.A.7  
At a concert, \$720 was collected for hot dogs, hamburgers, and soft drinks. All three items sold for \$1.00 each. Twice as many hot dogs were sold as hamburgers. Three times as many soft drinks were sold as hamburgers. The number of soft drinks sold was  
[A] 480      [B] 120      [C] 360      [D] 240
15. 060326a, P.I. A.A.7  
Seth has one less than twice the number of compact discs (CDs) that Jason has. Raoul has 53 more CDs than Jason has. If Seth gives Jason 25 CDs, Seth and Jason will have the same number of CDs. How many CDs did *each* of the three boys have to begin with?
16. 010033a, P.I. A.A.7  
A group of 148 people is spending five days at a summer camp. The cook ordered 12 pounds of food for each adult and 9 pounds of food for each child. A total of 1,410 pounds of food was ordered.  
*a* Write an equation or a system of equations that describes the above situation and define your variables.  
*b* Using your work from part *a*, find:  
(1) the total number of adults in the group  
(2) the total number of children in the group
17. 010327a, P.I. A.A.7  
Arielle has a collection of grasshoppers and crickets. She has 561 insects in all. The number of grasshoppers is twice the number of crickets. Find the number of *each* type of insect that she has.
18. 010022a, P.I. A.A.7  
Mary and Amy had a total of 20 yards of material from which to make costumes. Mary used three times more material to make her costume than Amy used, and 2 yards of material was not used. How many yards of materials did Amy use for her costume?
19. 060123a, P.I. A.A.7  
Ben had twice as many nickels as dimes. Altogether, Ben had \$4.20. How many nickels *and* how many dimes did Ben have?

20. 010436a, P.I. A.A.7  
Using only 32-cent and 20-cent stamps, Charlie put \$3.36 postage on a package he sent to his sister. He used twice as many 32-cent stamps as 20-cent stamps. Determine how many of *each* type of stamp he used.
21. 060031a, P.I. A.A.7  
The owner of a movie theater was counting the money from 1 day's ticket sales. He knew that a total of 150 tickets were sold. Adult tickets cost \$7.50 each and children's tickets cost \$4.75 each. If the total receipts for the day were \$891.25, how many of *each* kind of ticket were sold?
22. 010134a, P.I. A.A.7  
There were 100 more balcony tickets than main-floor tickets sold for a concert. The balcony tickets sold for \$4 and the main-floor tickets sold for \$12. The total amount of sales for both types of tickets was \$3,056.  
*a* Write an equation or a system of equations that describes the given situation. Define the variables.  
*b* Find the number of balcony tickets that were sold.
23. 080132a, P.I. A.A.7  
The ninth graders at a high school are raising money by selling T-shirts and baseball caps. The number of T-shirts sold was three times the number of caps. The profit they received for each T-shirt sold was \$5.00, and the profit on each cap was \$2.50. If the students made a total profit of \$210, how many T-shirts *and* how many caps were sold?
24. 010539a, P.I. A.A.7  
The tickets for a dance recital cost \$5.00 for adults and \$2.00 for children. If the total number of tickets sold was 295 and the total amount collected was \$1,220, how many adult tickets were sold? [Only an algebraic solution can receive full credit.]
25. 060531a, P.I. A.A.7  
A ribbon 56 centimeters long is cut into two pieces. One of the pieces is three times longer than the other. Find the lengths, in centimeters, of both pieces of ribbon.
26. 060638a, P.I. A.A.7  
Sharu has \$2.35 in nickels and dimes. If he has a total of thirty-two coins, how many of *each* coin does he have?
27. 080412a, P.I. A.A.7  
The ratio of Tariq's telephone bill to Pria's telephone bill was 7:5. Tariq's bill was \$14 more than Pria's bill. What was Tariq's bill?  
[A] \$21 [B] \$49 [C] \$35 [D] \$28
28. 060004a, P.I. A.A.7  
Two numbers are in the ratio 2:5. If 6 is subtracted from their sum, the result is 50. What is the larger number?  
[A] 35 [B] 55 [C] 45 [D] 40
29. 060201a, P.I. A.A.7  
Jamie is 5 years older than her sister Amy. If the sum of their ages is 19, how old is Jamie?  
[A] 12 [B] 7 [C] 14 [D] 5
30. 010228a, P.I. A.A.7  
A total of 600 tickets were sold for a concert. Twice as many tickets were sold in advance than were sold at the door. If the tickets sold in advance cost \$25 each and the tickets sold at the door cost \$32 each, how much money was collected for the concert?
31. 010228b, P.I. A.A.7  
At the local video rental store, José rents two movies and three games for a total of \$15.50. At the same time, Meg rents three movies and one game for a total of \$12.05. How much money is needed to rent a combination of one game and one movie?

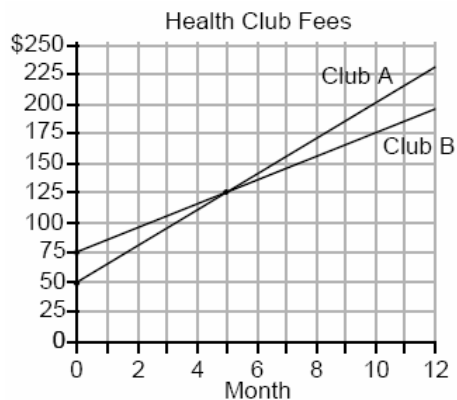
32. 060123b, P.I. A.A.7

The cost of a long-distance telephone call is determined by a flat fee for the first 5 minutes and a fixed amount for each additional minute. If a 15-minute telephone call costs \$3.25 and a 23-minute call costs \$5.17, find the cost of a 30-minute call.

### **BREAK EVEN**

33. 089935a, P.I. A.A.7

Two health clubs offer different membership plans. The graph below represents the total cost of belonging to Club A and Club B for one year.

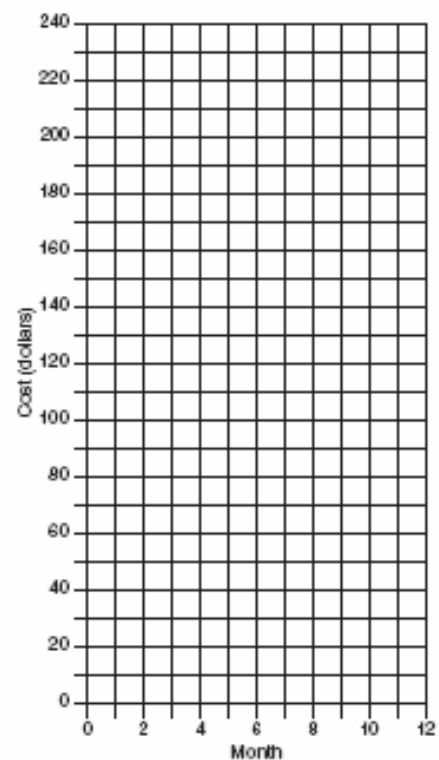


- a* If the yearly cost includes a membership fee plus a monthly charge, what is the membership fee for Club A?
- b* (1) What is the number of the month when the total cost is the same for both clubs?
- (2) What is the total cost for Club A when both plans are the same?
- c* What is the monthly charge for Club B?

34. 060232a, P.I. A.A.7

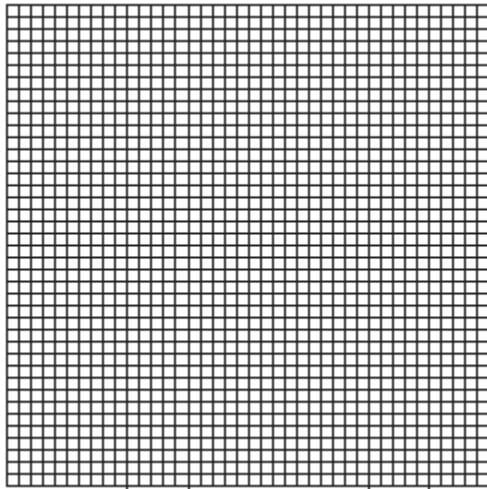
At Ron's Rental, a person can rent a big-screen television for \$10 a month plus a one-time "wear-and-tear" fee of \$100. At Josie's Rental, the charge is \$20 a month and an additional charge of \$20 for delivery with no "wear-and-tear" fee.

- a* If  $c$  equals the cost, write one equation representing the cost of the rental for  $m$  months at Ron's Rental and one equation representing the cost of the rental for  $m$  months at Josie's Rental.
- b* On the accompanying grid, graph and label each equation.
- c* From your graph, determine in which month Josie's cost will equal Ron's cost.



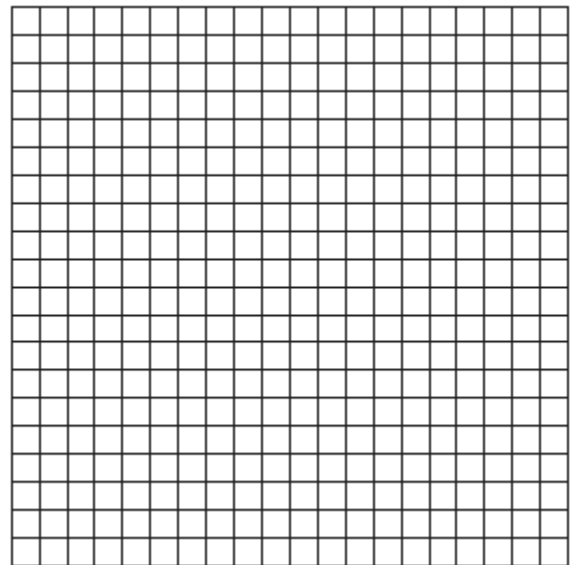
35. 060335a, P.I. A.A.7

The senior class is sponsoring a dance. The cost of a student disk jockey is \$40, and tickets sell for \$2 each. Write a linear equation and, on the accompanying grid, graph the equation to represent the relationship between the number of tickets sold and the profit from the dance. Then find how many tickets must be sold to break even.



36. 010329a, P.I. A.A.7

Currently, Tyrone has \$60 and his sister has \$135. Both get an allowance of \$5 each week. Tyrone decides to save his entire allowance, but his sister spends all of hers each week plus an additional \$10 each week. After how many weeks will they each have the same amount of money? [The use of the grid is optional.]



37. 010130a, P.I. A.A.7

Juan has a cellular phone that costs \$12.95 per month plus 25¢ per minute for each call. Tiffany has a cellular phone that costs \$14.95 per month plus 15¢ per minute for each call. For what number of minutes do the two plans cost the same?

38. 060117a, P.I. A.A.7

A hotel charges \$20 for the use of its dining room and \$2.50 a plate for each dinner. An association gives a dinner and charges \$3 a plate but invites four nonpaying guests. If each person has one plate, how many paying persons must attend for the association to collect the exact amount needed to pay the hotel?

[A] 60      [B] 20      [C] 44      [D] 40

39. 010035a, P.I. A.A.7

The Excel Cable Company has a monthly fee of \$32.00 and an additional charge of \$8.00 for each premium channel. The Best Cable Company has a monthly fee of \$26.00 and additional charge of \$10.00 for each premium channel. The Horton family is deciding which of these two cable companies to subscribe to.

*a* For what number of premium channels will the total monthly subscription fee for the Excel and Best Cable companies be the same?

*b* The Horton family decides to subscribe to 2 premium channels for a period of one year.

(1) Which cable company should they subscribe to in order to spend less money?

(2) How much money will the Hortons save in one year by using the less expensive company?

40. 080114b, P.I. A.A.7

A cellular telephone company has two plans. Plan A charges \$11 a month and \$0.21 per minute. Plan B charges \$20 a month and \$0.10 per minute. After how much time, to the *nearest minute*, will the cost of plan A be equal to the cost of plan B?

[A] 81 hr 8 min

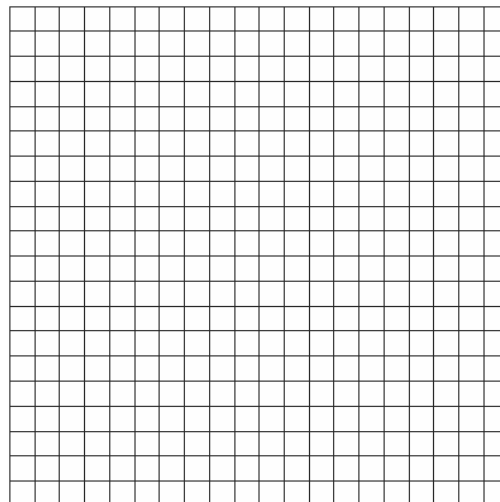
[B] 81 hr 48 min

[C] 1 hr 36 min

[D] 1 hr 22 m

41. 060226b, P.I. A.A.7

Island Rent-a-Car charges a car rental fee of \$40 plus \$5 per hour or fraction of an hour. Wayne's Wheels charges a car rental fee of \$25 plus \$7.50 per hour or fraction of an hour. Under what conditions does it cost *less* to rent from Island Rent-a-Car? [The use of the accompanying grid is optional.]



## CHAPTER 6-5

### LINEAR INEQUALITIES

42. fall0715ia, P.I. A.A.4

An electronics store sells DVD players and cordless telephones. The store makes a \$75 profit on the sale of each DVD player ( $d$ ) and a \$30 profit on the sale of each cordless telephone ( $c$ ). The store wants to make a profit of at least \$255.00 from its sales of DVD players and cordless phones. Which inequality describes this situation?

[A]  $75d + 30c \leq 255$  [B]  $75d + 30c > 255$

[C]  $75d + 30c \geq 255$  [D]  $75d + 30c < 255$

43. 080513a, P.I. A.A.21

Which ordered pair is not in the solution set of  $y > 2x + 1$ ?

[A] (1,6) [B] (3,8) [C] (1,4) [D] (2,5)

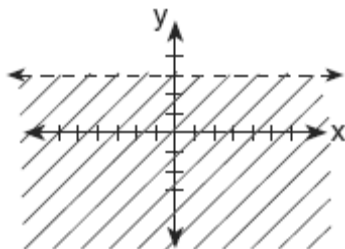
44. 080220a

In the graph of  $y \leq -x$ , which quadrant is completely shaded?

- [A] IV [B] I [C] II [D] III

45. 010629a, P.I. A.G.6

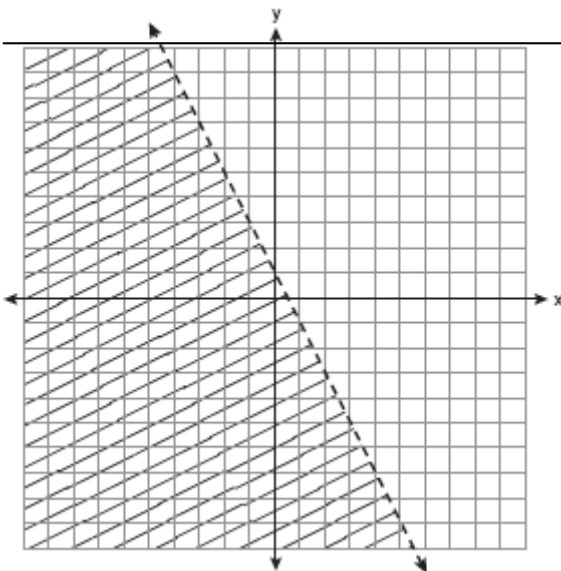
Which inequality is represented by the accompanying graph?



- [A]  $y \geq 3$  [B]  $y < 3$   
[C]  $y > 3$  [D]  $y \leq 3$

46. fall0720ia, P.I. A.G.6

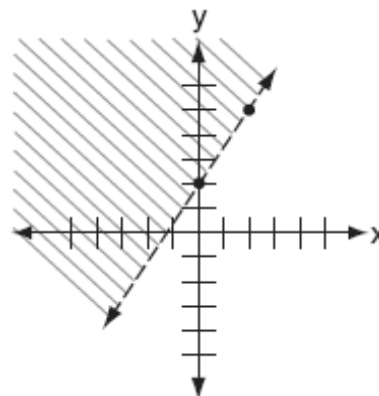
Which inequality is represented by the graph below?



- [A]  $y < 2x + 1$  [B]  $y < -\frac{1}{2}x + 1$   
[C]  $y < -2x + 1$  [D]  $y < \frac{1}{2}x + 1$

47. 010828a, P.I. A.G.6

Which inequality is shown in the accompanying diagram?



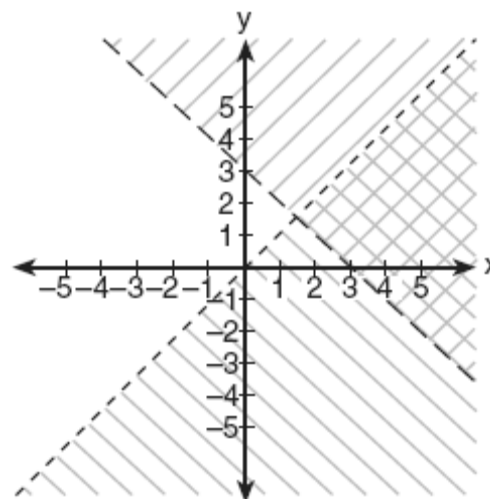
- [A]  $y \geq \frac{3}{2}x + 2$  [B]  $y < \frac{3}{2}x + 2$   
[C]  $y > \frac{3}{2}x + 2$  [D]  $y \leq \frac{3}{2}x + 2$

## CHAPTER 6-6

### SYSTEMS OF LINEAR INEQUALITIES

48. 080615a, P.I. A.A.40

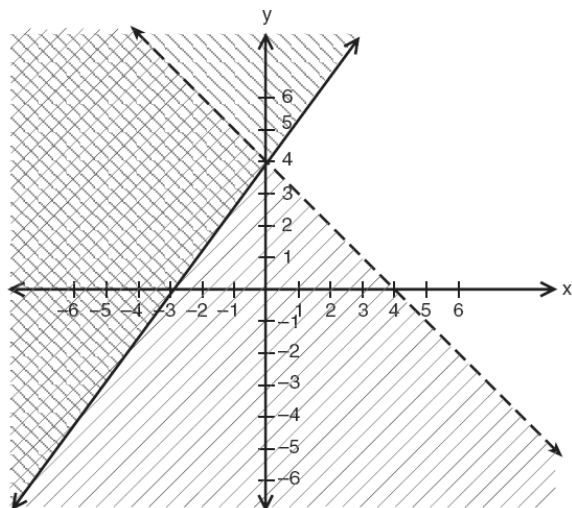
Which ordered pair is in the solution set of the system of inequalities shown in the accompanying graph?



- [A] (0,0) [B] (3,2) [C] (1,5) [D] (0,1)

49. 010528a, P.I. A.A.40

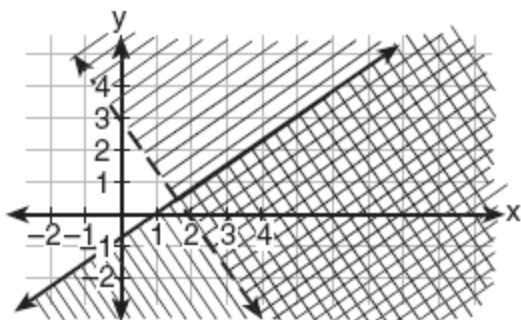
Which point is in the solution set of the system of inequalities shown in the accompanying graph?



- [A]  $(-4, 1)$                       [B]  $(4, -1)$   
[C]  $(0, 4)$                         [D]  $(2, 4)$

50. 060620a, P.I. A.A.40

Which coordinate point is in the solution set for the system of inequalities shown in the accompanying graph?



- [A]  $(0, 1)$                             [B]  $(2, 2)$   
[C]  $(1, -1)$                         [D]  $(3, 1)$

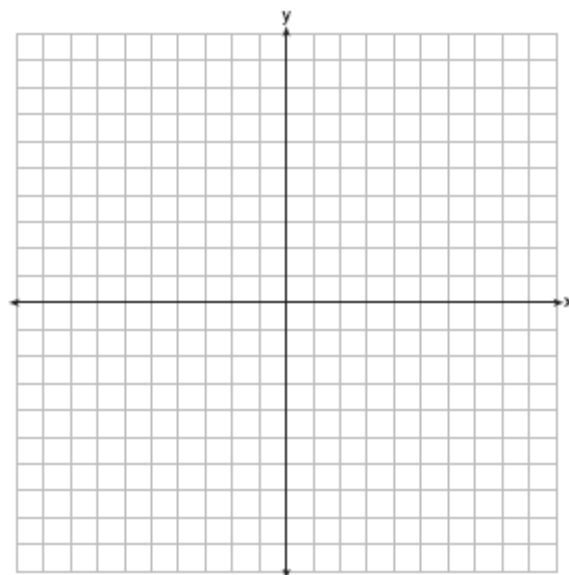
51. 010738a, P.I. A.G.7

Graph the following systems of inequalities on the accompanying set of axes and label the solution set  $S$ :

$$y > x - 4$$

$$y + x \geq 2$$

[Only a graphic solution can receive full credit.]



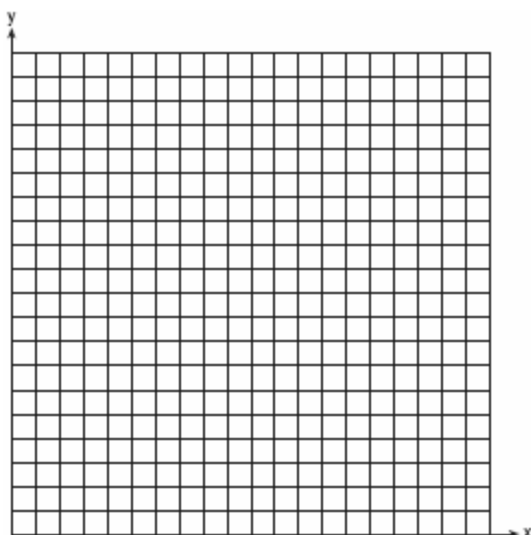


## CHAPTER 6-7

### LINEAR PROGRAMMING

52. 010234a, P.I. A.G.7

A company manufactures bicycles and skateboards. The company's daily production of bicycles cannot exceed 10, and its daily production of skateboards must be less than or equal to 12. The combined number of bicycles and skateboards cannot be more than 16. If  $x$  is the number of bicycles and  $y$  is the number of skateboards, graph on the accompanying set of axes the region that contains the number of bicycles and skateboards the company can manufacture daily.

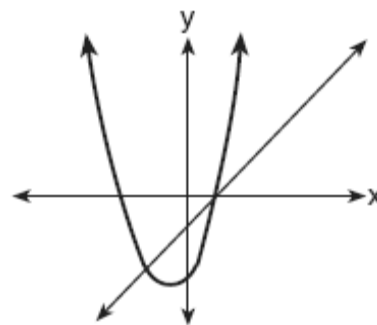


## CHAPTER 6-8

### SOLVING NONLINEAR SYSTEMS

53. 060507a

The accompanying diagram shows the graphs of a linear equation and a quadratic equation.



How many solutions are there to this system of equations?

- [A] 0      [B] 3      [C] 2      [D] 1

54. 060018a, P.I. A.A.11

The graphs of the equations  $y = x^2 + 4x - 1$  and  $y + 3 = x$  are drawn on the same set of axes. At which point do the graphs intersect?

- [A] (1, 4)      [B] (-2, 1)  
[C] (1, -2)      [D] (-2, -5)

55. 080135a, P.I. A.A.11

Solve the following system of equations algebraically:

$$y = x^2 + 4x - 2$$

$$y = 2x + 1$$

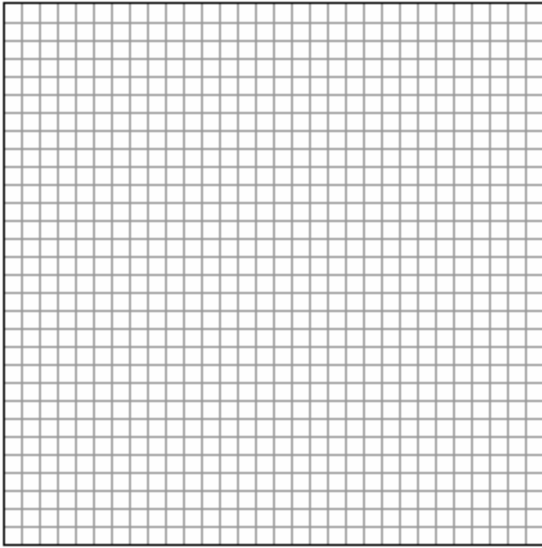
56. 080538a, P.I. A.A.11

Solve the following system of equations:

$$y = x^2 + 4x + 1$$

$$y = 5x + 3$$

[The use of the grid is optional.]

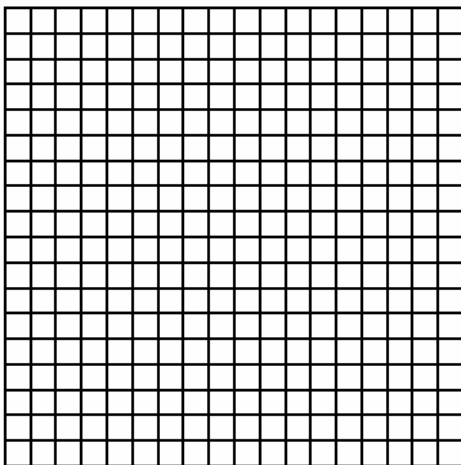


57. 069935a, P.I. A.A.11

Solve the following system of equations algebraically or graphically for  $x$  and  $y$ :

$$y = x^2 + 2x - 1$$

$$y = 3x + 5$$

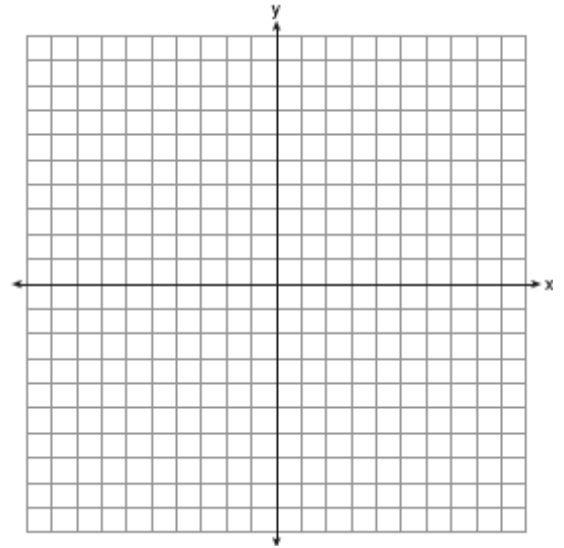


58. fall0738ia, P.I. A.G.9

Solve the following systems of equations graphically, on the set of axes below, and state the coordinates of the point(s) in the solution set.

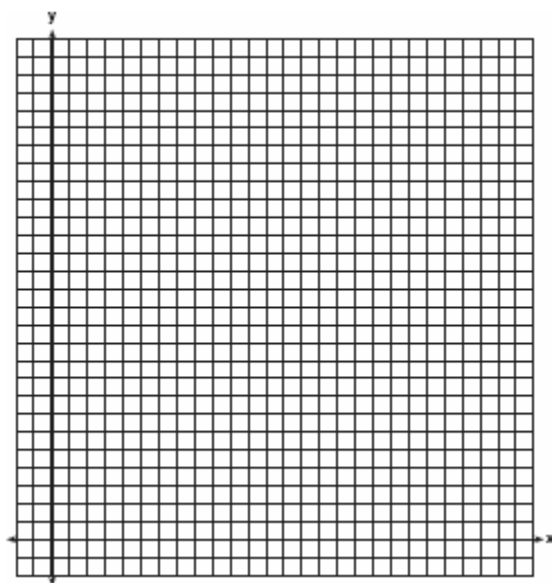
$$y = x^2 - 6x + 5$$

$$2x + y = 5$$



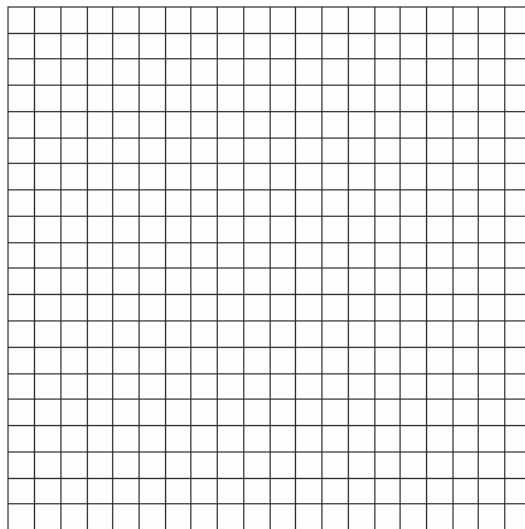
59. 060235a, P.I. A.G.9

A rocket is launched from the ground and follows a parabolic path represented by the equation  $y = -x^2 + 10x$ . At the same time, a flare is launched from a height of 10 feet and follows a straight path represented by the equation  $y = -x + 10$ . Using the accompanying set of axes, graph the equations that represent the paths of the rocket and the flare, and find the coordinates of the point or points where the paths intersect.



60. 060228b, P.I. A.A.11

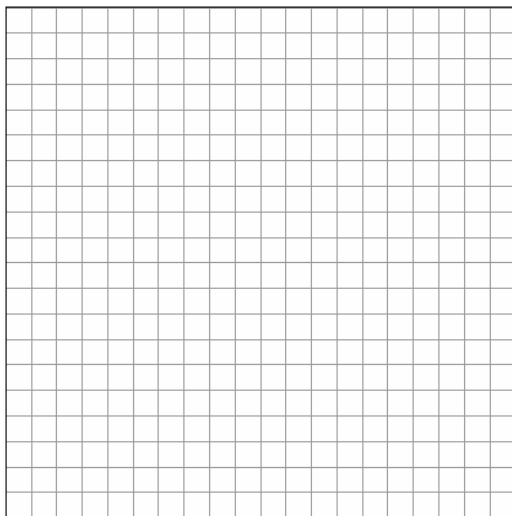
A pelican flying in the air over water drops a crab from a height of 30 feet. The distance the crab is from the water as it falls can be represented by the function  $h(t) = -16t^2 + 30$ , where  $t$  is time, in seconds. To catch the crab as it falls, a gull flies along a path represented by the function  $g(t) = -8t + 15$ . Can the gull catch the crab before the crab hits the water? Justify your answer. [The use of the accompanying grid is optional.]



61. 060328b, P.I. G.G.70

The price of a stock,  $A(x)$ , over a 12-month period decreased and then increased according to the equation

$A(x) = 0.75x^2 - 6x + 20$ , where  $x$  equals the number of months. The price of another stock,  $B(x)$ , increased according to the equation  $B(x) = 2.75x + 1.50$  over the same 12-month period. Graph and label both equations on the accompanying grid. State all prices, to the *nearest dollar*, when both stock values were the same.



62. 080611b

What is the total number of points of intersection for the graphs of the equations  $y = x^2$  and  $y = -x^2$ ?

- [A] 2      [B] 3      [C] 1      [D] 0

63. 060706b

What is one solution of the accompanying system of equations?

$$\begin{aligned} y &= -x^2 + 5 \\ y &= -0.5x^2 + 3 \end{aligned}$$

- [A] (-2,1)      [B] (0,3)  
[C] (0,5)      [D] (3,5)

[1] C

[2] A

[3] B

[4] B

[5] D

[6] D

[7] A

[4] \$1.50 for one slice of pizza and \$0.75 for one cola, and appropriate work is shown, such as  $3x + 2y = \$6$  and  $2x + 3y = \$5.25$ .

[3] Appropriate work is shown, but one computational error is made.

or [3] Appropriate work is shown, but only the price of one slice of pizza or the price of one cola is found correctly.

[2] Appropriate work is shown, but more than one computational error is made.

or [2] An incorrect system of equations of equal difficulty is solved appropriately to calculate the cost of one slice of pizza and one cola.

[1] \$1.50 for one slice of pizza and \$0.75 for one cola, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[8] incorrect procedure.

[4] Milk Chocolate bar = \$0.75 and Creamy Nougat bar = \$0.50, and appropriate work is shown, such as equations, a trial-and-error method with at least two trials and appropriate checks, or an algebraic or graphic solution.

[3] Appropriate work is shown, but one computational error is made.

[2] The cost of one candy bar is determined correctly with appropriate work shown, but no attempt is made to find the cost of the other candy bar.

or [2] Appropriate work is shown, but more than one computational error is made.

[1] Appropriate work is shown, but no answer is found.

or [1] Milk Chocolate bar = \$0.75 and Creamy Nougat bar = \$0.50, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[9] incorrect procedure.

[4] One doughnut is \$0.75 and one cookie is \$0.60, and appropriate work is shown, such as a system of equations, trial and error with at least three trials and appropriate checks, or a table.

[3] Appropriate work is shown, but one computational error is made.

or [3] Appropriate work is shown, but only one correct answer is found, or two correct answers are found, but they are not identified clearly as doughnuts or cookies, or the doughnuts and cookies are labeled incorrectly.

[2] Appropriate work is shown, but more than one computational error is made.

or [2] Two equations are written, one correct and one incorrect, but two appropriate answers are found.

or [2] The trial-and-error method is used to find a correct solution, but only two trials and appropriate checks are shown.

[1] Two correct equations are written, but no further correct work is shown.

or [1] One doughnut is \$0.75 and one cookie is \$0.60, but no work or only one trial with an appropriate check is shown.

[0] One correct equation is shown, and no answer or only one appropriate answer is found.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[10] obviously incorrect procedure.

[4] \$5 for the sprayer and \$10 for the generator, and appropriate work is shown, such as  $x$  = hourly cost of sprayer and  $y$  = hourly cost of generator, and an appropriate system of equations is solved or a trial-and-error method is used, showing at least two trials with appropriate checks.

[3] Both correct equations are shown or an appropriate chart or trial-and-error method is used, but one computational error is made.

or [3] Both correct equations are shown, and they are solved for one value, but no further work is shown.

[2] Only one of the two equations is correct, but they are solved appropriately for both values.

or [2] Both correct equations are shown, but more than one computational error is made.

or [2] \$5 for the sprayer and \$10 for the generator, but only one trial is shown with appropriate checks.

[1] Both equations are incorrect, but they are solved appropriately for both values.

or [1] Both correct equations are shown, but they are not solved.

or [1] \$5 for the sprayer and \$10 for the generator, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[11] incorrect procedure.

[12] C

[13] B

[14] C

[3] Seth had 101, Jason had 51, and Raoul had 104, and appropriate work is shown, such as  $x + 25 = (2x - 1) - 25$  or trial and error with at least three trials and appropriate checks.

[2] Appropriate work is shown, but one computational error is made.

or [2] 101, 51, and 104, and appropriate work is shown, but the solutions are not labeled or are labeled incorrectly.

or [2] A correct equation is solved, but the number of CDs for only one boy is found.

or [2] The trial-and-error method is used to find a correct solution, but only two trials and appropriate checks are shown.

[1] Appropriate work is shown, but more than one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made, but an appropriate number of CDs is found for each boy.

or [1] A correct equation is written, but no further correct work is shown.

or [1] Seth had 101, Jason had 51, and Raoul had 104, but no work or only one trial with an appropriate check is shown.

[0] Seth had 101 or Jason had 51 or Raoul had 104, but no work is shown.

or [0] 101, 51, and 104, but no work is shown and the solutions are not labeled or are labeled incorrectly.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[15] obviously incorrect procedure.

a [2] An appropriate equation or system is shown, such as  $x + y = 148$  and  $12x + 9y = 1410$  or one equation such as  $12(148 - x) + 9x = 1410$  with variables identified.

[1] The student shows appropriate equation(s), but variables are not defined.

or [1] One mistake in equation(s) is made, or only one equation with two variables is shown, but variables are defined.

b(1) [1] 26 and an appropriate method is shown, such as solving the equation or making a table.

or [1] An appropriate answer is found based on incorrect equation(s) obtained in part a.

b(2) [1] 122 and an appropriate method is shown, such as  $148 - 26$ .

or [1] An appropriate answer is found based on incorrect equation(s) obtained in part a.

b (1) and b (2) [1] 26 and 122 and no work is shown.

a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[16] obviously incorrect procedure.

[3] 374 grasshoppers and 187 crickets, and appropriate work is shown.

[2] An appropriate equation is solved or appropriate work is shown, but only one correct answer is found, or two correct answers are found but they are not identified clearly as grasshoppers or crickets, or the grasshoppers and crickets are labeled incorrectly.

or [2] Appropriate work is shown, but one computational error is made.

[1] Appropriate work is shown, but more than one computational error is made.

or [1] An incorrect equation of equal difficulty is solved appropriately.

or [1] 374 grasshoppers and 187 crickets, but no work is shown.

[0] 374 and 187, but no work is shown, and the answers are not identified clearly as grasshoppers or crickets.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[17] obviously incorrect procedure.

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[2] 4.5 and an appropriate method is shown, such as the equation  $3x + x + 2 = 20$  or some trial and error or arithmetic process.

[1] An appropriate method is shown, but the correct answer is not found.

or [1] 4.5 and no work is shown.

or [1] The student solves the equation  $x + 3x - 2 = 20$  and answers 5.5.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[18] incorrect procedure.

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[2] 42 nickels and 21 dimes, and appropriate work is shown, such as  $0.1x + (0.05)2x = 4.20$  or a guess and a check with a minimum of two trials and appropriate checks or another appropriate method.

[1] 42 nickels or 21 dimes, but appropriate work is shown.

or [1] Appropriate work is shown, but no answer or an incorrect answer is found.

or [1] 42 nickels and 21 dimes, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[19] incorrect procedure.

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[3] Four 20-cent and eight 32-cent stamps, and appropriate work is shown, such as a system of equations, or a linear equation such as  $2x(.32) + .20x = 3.36$ , or trial and error with at least three trials and appropriate checks.

[2] Appropriate work is shown, but one computational error is made, but appropriate quantities are found for each stamp.

or [2] Appropriate work is shown, but the quantity for only one of the stamps is found.

or [2] Appropriate work is shown, but the solutions are not labeled or the labels are reversed.

or [2] The trial-and-error method is used to find correct solutions, but only two trials and appropriate checks are shown.

[1] Appropriate work is shown, but two or more computational errors are made, but appropriate quantities are found for each stamp.

or [1] The trial-and-error method is attempted, and at least six systematic trials and appropriate checks are shown, but no solution is found.

or [1] An incorrect equation or system of equations of equal difficulty is solved appropriately for both solutions.

or [1] A correct equation or system of equations is written, but no further correct work is shown.

or [1] Four 20-cent and eight 32-cent stamps, but no work or only one trial with an appropriate check is shown.

[0] Four and eight, but no work is shown, and the solutions are not labeled.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[20] obviously incorrect procedure.

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[4] 65 adult tickets and 85 student tickets and an appropriate equation is shown, such as  $7.50x + 4.75(150 - x) = 891.25$ , or any other acceptable method is used.

[3] Either 65 or 85 and appropriate work is shown.

or [3] Appropriate work is shown, but one computational error is made that leads to two appropriate answers.

[2] An incorrect equation is shown, but it is solved appropriately for two answers.

or [2] The correct equation is shown, but two computational errors are made.

[1] Appropriate work is shown, but no answer is found.

or [1] 65 and 85 but no work is shown.

[0] Either 65 or 85 and no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[21] obviously incorrect procedure.

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a [2] The student writes an appropriate system of equations, such as  $b = f + 100$  and  $4b + 12f = 3,056$ , and defines the variables.

or [2] The student writes an appropriate equation, such as  $4(100 + x) + 12x = 3,056$ , and defines the variable.

[1] A correct equation or correct equations are shown, but the variables are not defined.

or [1] One error is made in the setup, such as  $b + f = 100$ .

[0] The student only defines the variables.

b [2] 266, and appropriate work is shown, using an algebraic solution or a correct trial-and-error method.

or [2] Appropriate work is shown for an incorrect part a equation or system of equations.

[1] Work is shown, but the answer is inappropriate, such as \$1,064.

or [1] 266, but no work is shown.

a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[22] obviously incorrect procedure.

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- [4] 36 T-shirts and 12 caps, and appropriate work is shown, such as an appropriate system of equations or a correct trial-and-error method with at least two trials and appropriate checks.
- [3] Appropriate work is shown, but only the correct number of T-shirts or the correct number of caps is determined.
- or [3] One error is made, resulting in an incorrect number of T-shirts or caps, but the corresponding number of the other item is determined appropriately.
- [2] An appropriate method is shown, but no answer is found.
- or [2] The variables are represented correctly, and a correct equation or system of equations is written, but the process is not completed.
- or [2] 36 T-shirts and 12 caps, but only one trial and appropriate checks are shown.
- or [2] The variables are represented correctly, but an incorrect equation is written, but the solution is completed appropriately.
- [1] 36 T-shirts and 12 caps, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- 

- [4] 210, and appropriate work is shown, such as a system of equations or the linear equation  $5x + 2(295 - x) = 1,220$ .
- [3] Appropriate work is shown, but one computational error is made.
- or [3] Appropriate work is shown, but the number of children's tickets is found as the answer.
- [2] Appropriate work is shown, but two or more computational errors are made.
- or [2] Appropriate work is shown, but one conceptual error is made.
- or [2] An incorrect equation of equal difficulty is solved appropriately.
- or [2] 210, but a method other than an algebraic solution is used.
- [1] Appropriate work is shown, but one conceptual error and one computational error are made.
- or [1] The correct system of equations or linear equation is written, but no further correct work is shown.
- or [1] 210, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- 
- [2] 14 and 42, and appropriate work is shown, such as  $x + 3x = 56$ , a table, or trial and error with at least three trials and appropriate checks.
- [1] Appropriate work is shown, but one computational error is made.
- or [1] Appropriate work is shown, but only one of the two lengths is found.
- or [1] A correct equation is written and solved, but the lengths are not stated.
- or [1] An incorrect equation of equal difficulty is solved appropriately.
- or [1] 14 and 42, but no work or fewer than three trials with appropriate checks are shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-

[4] 17 nickels and 15 dimes, and appropriate work is shown, such as the equation  $0.05x + 0.10(32 - x) = 2.35$  or trial and error with at least three trials and appropriate checks.  
 [3] Appropriate work is shown, but one computational error is made.  
 or [3] Appropriate work is shown, and the correct answers are found, but they are not labeled or are labeled incorrectly.  
 or [3] Appropriate work is shown, but only the correct number of nickels or the correct number of dimes is found and labeled.  
 [2] Appropriate work is shown, but two or more computational errors are made.  
 or [2] Appropriate work is shown, but one conceptual error is made.  
 or [2] The trial-and-error method is used to find the correct solution, but only two trials and appropriate checks are shown.  
 or [2] The trial-and-error method is attempted and at least six systematic trials and appropriate checks are shown, but no solution is found.  
 or [2] An incorrect system of equations of equal difficulty is solved appropriately for both the number of nickels and dimes.  
 or [2] A correct equation is solved for  $x$ , but no further correct work is shown.  
 [1] Appropriate work is shown, but one conceptual error and one computational error are made.  
 or [1] A correct equation is written, but no further correct work is shown.  
 or [1] 17 nickels and 15 dimes, but no work or only one trial with an appropriate check is shown.  
 [0] 17 nickels or 15 dimes, but no work or only one trial with an appropriate check is shown.  
 or [0] 17 and 15, but no work is shown, and the answers are not labeled or are labeled incorrectly.  
 or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[26] obviously incorrect procedure.

[27] B

[28] D

[29] A

[3] \$16,400, and appropriate work is shown, such as

200 tickets sold at the door     $\$32 = \$6,400$

400 tickets sold in advance     $\$25 = \$10,000$

$\$16,400$

[2] The correct number of tickets is shown, but one computational error is made in computing the total amount of money collected.

or [2] \$6,400 and \$10,000 are calculated correctly, but they are not added to obtain the total.

[1] The numbers of tickets, 200 and 400, are calculated correctly.

or [1] An appropriate solution is found, but it is based on incorrect numbers of tickets.

or [1] \$16,400, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[30]

[4] \$6.15, and appropriate work is shown, such as solving simultaneous equations or using a trial-and-error method.

[3] \$2.95 (movie) and \$3.20 (game) are found, but they are not added.

or [3] Appropriate work is shown, but one computational error is made.

[2] The system of equations is set up correctly, but one conceptual error leads to an appropriate solution.

or [2] \$2.95 (movie) or \$3.20 (game), and appropriate work is shown.

[1] \$6.15, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[31] incorrect procedure.

- [2] \$6.85, and appropriate work is shown.  
[1] The correct rate for the first 5 minutes and the correct rate for each additional minute is shown, but the cost of a 30-minute call is not found.  
or [1] Appropriate work is shown, but one computational error is made.  
or [1] \$6.85, but no work is shown.  
[0] The student calculates either the rate for the first 5 minutes or the rate for each additional minute, but no further work is shown.  
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- 
- [32] a [1] \$50  
b (1) [1] 5  
(2) [1] \$125  
c [1] \$10  
a, b, and c [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- 
- [33] a [1]  $c = 10m + 100$  for Ron's Rental and  $c = 20m + 20$  for Josie's Rental.  
b [2] Two lines, rays, or segments are graphed and labeled correctly, using values arrived at by using a table or by using the slope and y-intercept.  
[1] Two lines, rays, or segments are graphed correctly, but they are not labeled.  
or [1] One line, ray, or segment is graphed and labeled correctly, using values arrived at by using a table or by using the slope and y-intercept.  
c [1] 8  
or [1] An appropriate number of months is found, based on an incorrect graph in part b.  
a, b, and c [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- 
- [34]

- [4]  $y = 2x - 40$ , a correctly drawn graph with a slope of 2 and a y-intercept of -40, and 20, and appropriate work is shown.  
[3] Appropriate work is shown, but one computational or graphing error is made.  
or [3] The equation and graph are correct, but the breakeven point is missing or is incorrect.  
[2] Appropriate work is shown, but more than one computational or graphing error is made.  
or [2] An incorrect equation is written, but an appropriate graph is drawn, and an appropriate breakeven point is identified.  
[1] An incorrect equation is written, but an appropriate graph is drawn, but the breakeven point is missing or is incorrect.  
or [1] A correct equation is written, but the graph is incorrect, and the breakeven point is not identified.  
or [1]  $y = 2x - 40$  and 20, but no work is shown and no graph is drawn.  
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- 
- [35] [3] 5, and appropriate work is shown, such as the equation  $60 + 5x = 135 - 10x$ , or trial and error with at least three trials and appropriate checks, or a graph.  
[2] Appropriate work is shown, but one computational or graphing error is made.  
or [2] The trial-and-error method is used to find a correct solution, but only two trials and appropriate checks are shown.  
[1] Appropriate work is shown, but more than one computational or graphing error is made.  
or [1] 5, but no work or only one trial with an appropriate check is shown.  
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- 
- [36]

[3] 20, and appropriate work is shown, such as an equation, trial and error, or a graph.

[2] Appropriate work is shown, such as  $12.95 + 0.25x = 14.95 + 0.15x$ , but one computational error is made.

or [2] Appropriate work is shown, but an answer of \$17.95 is found.

or [2] 20, and only a check is shown.

[1] The student starts appropriate work to find when the prices are equal but does not complete it, such as starting to solve the correct equation, showing one incorrect trial, or drawing an incomplete graph.

or [1] 20, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[37] incorrect procedure.

[38] A \_\_\_\_\_

a [2] 3 and an appropriate method is shown, such as trial and error or the equation  $32 + 8x = 26 + 10x$ .

[1] 3 and no work is shown.

or [1] An appropriate method is shown, but an incorrect answer is found.

b (1) [1] Best Cable Company and an appropriate explanation is given.

b (2) [1] \$24 and an appropriate explanation is given.

b (1) and b (2) [1] Best Cable Company and \$24 and no work is shown.

a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[39] obviously incorrect procedure.

[40] D \_\_\_\_\_

[2] More than 6 hours, and appropriate work is shown, using a graphic or algebraic solution.

[1] Appropriate work is shown, but one computational error or an error in analyzing the results is made.

or [1] More than 6 hours, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[41] incorrect procedure.

[42] C \_\_\_\_\_

[43] D \_\_\_\_\_

[44] D \_\_\_\_\_

[45] B \_\_\_\_\_

[46] C \_\_\_\_\_

[47] C \_\_\_\_\_

[48] B \_\_\_\_\_

[49] A \_\_\_\_\_

[50] D \_\_\_\_\_

[4] Both inequalities are graphed correctly and at least one is labeled, and the solution set is labeled  $S$ .

[3] Appropriate work is shown, but one graphing error is made, such as drawing a solid line for  $y > x - 4$  or shading incorrectly, but the solution set is labeled  $S$ .

or [3] Both inequalities are graphed correctly and at least one is labeled, but the solution set is not labeled or is labeled incorrectly.

or [3] Both inequalities are graphed correctly, the solution set is labeled, but neither inequality is labeled.

[2] Appropriate work is shown, but two or more graphing errors are made, but an appropriate solution set is labeled.

or [2] Appropriate work is shown, but one conceptual error is made, such as graphing the lines  $y = -x + 2$  and  $y = x - 4$  and labeling the point of intersection  $S$ .

[1] One inequality is graphed and shaded correctly, but no further correct work is shown.

or [1] The lines  $y = -x + 2$  and  $y = x - 4$  are graphed correctly, but no solution is indicated.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[51] incorrect procedure.

[4] The inequalities  $x \leq 10$ ,  $y \leq 12$ , and  $x + y \leq 16$  are graphed and shaded correctly on the given set of axes.

[3] All inequalities are graphed and shaded correctly, but one incorrect type of line (dashed or broken) is used.

or [3] All three inequalities are graphed correctly, but one inequality is not shaded or is shaded incorrectly.

or [3] The inequality  $x + y \leq 16$  is graphed correctly, but an error is made in graphing either the horizontal or vertical line, but they are shaded appropriately.

or [3] Only two of the three inequalities are graphed correctly, but all three are shaded appropriately.

[2] All three inequalities are graphed correctly, but two are shaded incorrectly.

or [2] Only two of the three inequalities are graphed and shaded correctly.

[1] Only one of the three inequalities is graphed and shaded correctly.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[52] incorrect procedure.

[53] C

[54] D

- [4]  $(-3,-5)$  and  $(1,3)$ , and appropriate algebraic work is shown.
- [3] Appropriate algebraic work is shown, but  $x = -3$  and  $x = 1$  are given as the solution.
- or [3] Appropriate algebraic work is shown, but only one correct solution is given, such as  $(1,3)$ .
- [2]  $(-3,-5)$  and  $(1,3)$ , but a graphic solution is shown.
- or [2] Correct substitution and an algebraic equation set equal to zero are shown, but the result is not factored, such as  $x^2 + 2x - 3 = 0$ .
- [1] Any correct substitution is shown, such as  $2x + 1 = x^2 + 3x - 2$ .
- or [1]  $(-3,-5)$  and  $(1,3)$ , but no algebraic work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- 

- [4]  $(-1,-2)$  and  $(2,13)$ , and appropriate work is shown, such as an algebraic or graphic solution or trial and error with at least three trials and appropriate checks.
- [3] Appropriate work is shown, but one computational or graphing error is made.
- or [3] Appropriate work is shown, but only one solution is found or only the  $x$ - or the  $y$ -values are found.
- [2] Appropriate work is shown, but two or more computational or graphing errors are made.
- or [2] Appropriate work is shown, but one conceptual error is made.
- or [2] The trial-and-error method is used to find the correct solutions, but only two trials and appropriate checks are shown.
- or [2] The trial-and-error method is attempted and at least six systematic trials and appropriate checks are shown, but no solution is found.
- or [2] Both equations are graphed correctly, but neither ordered pair is identified.
- or [2] Only one equation is graphed correctly, but an appropriate solution is found.
- or [2] An incorrect quadratic equation of equal difficulty is solved appropriately, and appropriate solutions are found.
- [1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.
- or [1] One equation is graphed correctly, but no further correct work is shown.
- or [1] An incorrect equation of a lesser degree of difficulty, such as a linear equation, is solved appropriately.
- or [1] A correct substitution is made and the system of equations is simplified to a single quadratic equation set equal to zero, but no further correct work is shown.
- or [1]  $(-1,-2)$  and  $(2,13)$ , but no work or only one trial with an appropriate check is shown.
- [0]  $(-1,-2)$  or  $(2,13)$ , but no work or only one trial with an appropriate check is shown.
- or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-

- [4] (3,14) and  $(-2,-1)$  and either an algebraic or a graphic solution is shown.  
[3] An appropriate method is shown, but only one correct ordered pair is identified.  
or [3] An appropriate method is shown, but one computational mistake is made.  
or [3] An appropriate method is shown, but values are given only for  $x$ .  
[2] The substitution is correct, but the quadratic produced is not factored correctly.  
or [2] Both equations are graphed correctly, but neither ordered pair is identified.  
[1] Only one equation is graphed correctly.  
or [1] The substitution is incorrect, but it produces a linear equation that is solved correctly.  
or [1] Only the substitution is correct.  
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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- [4] Correct graphs are drawn, and  $(0,5)$  and  $(4,-3)$  are stated.  
[3] Both equations are graphed, but one graphing error is made, but appropriate solutions are stated.  
or [3] Both graphs are drawn correctly, but only one solution is stated.  
[2] Both graphs are drawn correctly, but no solutions are stated.  
or [2] Both equations are graphed, but two or more graphing errors are made, but appropriate solutions are stated.  
or [2] Appropriate work is shown to find  $(0,5)$  and  $(4,-3)$ , but a method other than graphing is used.  
or [2] Both equations are graphed, but one conceptual error is made.  
[1] Both equations are graphed, but one conceptual error and one graphing error are made.  
or [1]  $(0,5)$  and  $(4,-3)$  are stated, but no work is shown.  
[0]  $(0,5)$  or  $(4,-3)$  is stated, but no work is shown.  
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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[4] (10,0) and (1,9), and both graphs are drawn correctly.

[3] Both graphs are drawn correctly, but only one solution is stated correctly.

or [3] One graph of equal difficulty is drawn incorrectly, but the solutions are appropriate, based on the graphs.

[2] (10,0) and (1,9), but the problem is solved algebraically instead of graphically.

or [2] One graph of equal difficulty is drawn incorrectly, and only one solution is appropriate, based on the graphs.

[1] Both the parabola and the line are graphed incorrectly, but the solutions are appropriate, based on the graphs.

or [1] Incorrect solutions result from an algebraic method.

or [1] (10,0) and (1,9), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[59] incorrect procedure.

[4] Yes, and appropriate work is shown, and an appropriate justification is given.

[3] Appropriate work is shown, and an appropriate justification is given, but one computational error is made, or the negative value of  $t$  is not rejected.

[2] An appropriate graph or equation is shown, such as  $16t^2 - 8t - 15 = 0$ .

[1] An incorrect graph or equation of equal difficulty is used, but an appropriate solution is found.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[60] incorrect procedure.

[4] 9 and 26, and appropriate work is shown, such as graphing and labeling the equations and identifying the points of intersection.

[3] Both functions are graphed correctly, and the points of intersection are indicated, but the prices are not stated.

or [3] The parabola is graphed correctly, but the line is graphed incorrectly, but appropriate prices are stated.

[2] The line and the parabola are graphed and labeled, but a conceptual error is made, such as only one price is found because the graph of the parabola is incomplete.

or [2] The line is graphed correctly, but the parabola is graphed incorrectly, but appropriate prices are stated.

or [2] 9 and 26, but only an algebraic solution is shown.

[1] Both the line and the parabola are graphed incorrectly, but appropriate prices are stated.

or [1] 9 and 26, but no work is shown.

[0] 9 or 26, but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[61] obviously incorrect procedure.

[62] C

[63] A