Unit 4 Problem Set - Systems of Equations
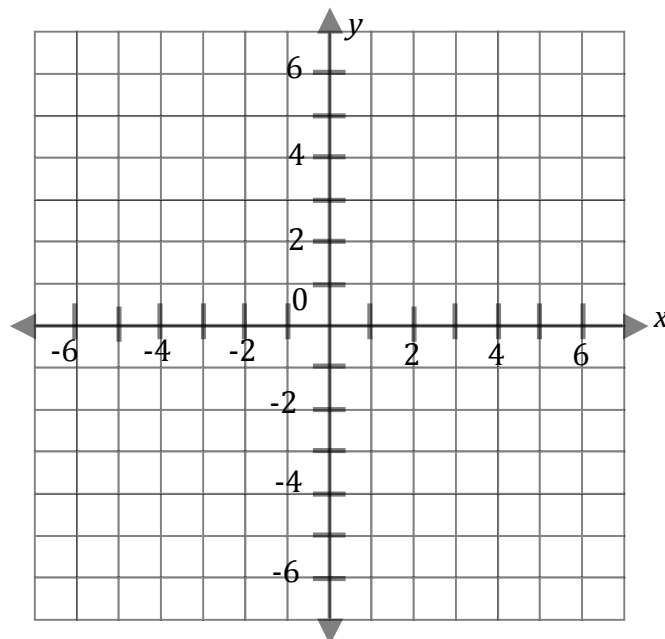
Name: _____ Class: _____

Solving Systems of Equations Graphically Problem Set

For 1 – 4, solve the following systems of equations graphically. Check the solutions.
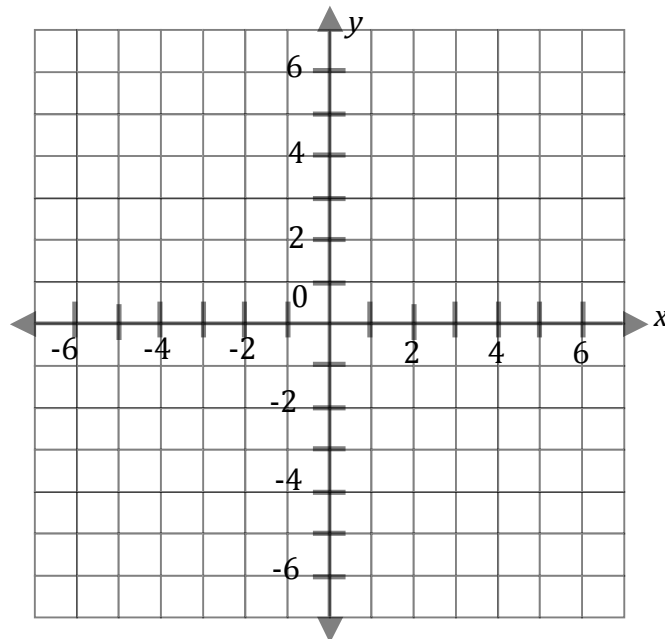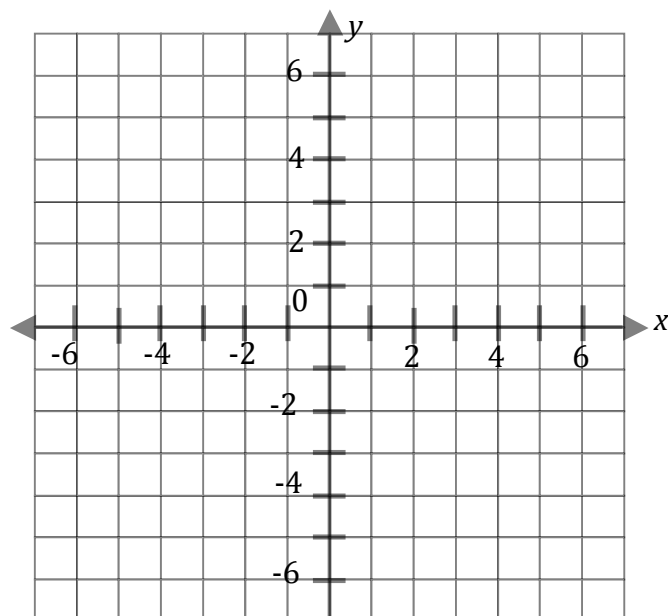
1.) $2y = 3x$

$2y + x = 8$
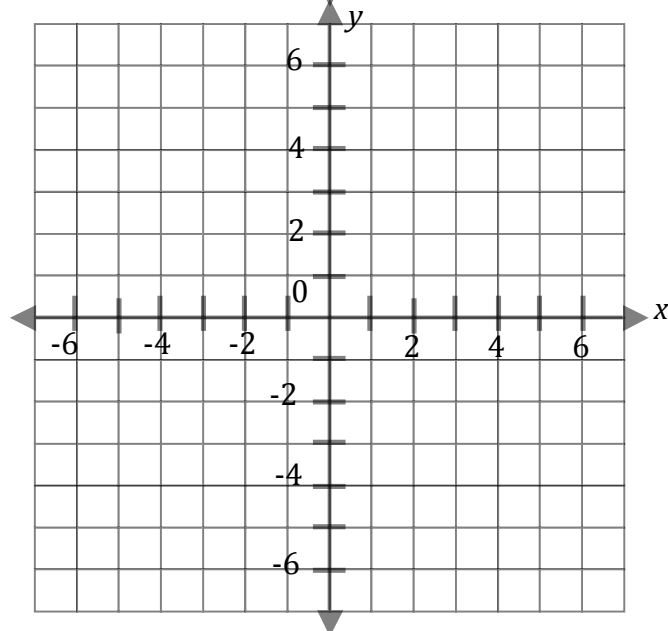
2.) $\dfrac{y}{2} = x - 3$

$y = 4$

3.) $y + x = 1$

      $3y - 9 = -x$

4.) $x = 2$

      $y = x - 3$

5.)   Ted and Jason are going to race their dirt bikes. Since Ted is younger, Jason is going to give

      him a 10 mile head start. Ted travels at 10 mph and Jason travels at 20 mph.

- Prepare a graph representing the boys' race.

- Put the time in hours on the x-axis and the distance in miles on the y-axis.

- At what time will Jason catch up with Ted? How far will they have traveled when they

  meet?

Use a sheet of graph paper.

6.) Dr. Snover is heating a beaker containing Liquid A and a beaker containing Liquid B. The temperature of liquid A is represented by $T = 2t + 140$ and the temperature of liquid B is represented by $T = t + 160$, where $T°$ F is the temperature of the liquid after t seconds.

a.) Solve the system of linear equations using the graphing calculator.

b.) When will the temperatures of the liquids be the same?

7.) A carpenter is hammering an iron nail and another carpenter is hammering a copper nail. The temperatures of the nails increase during the hammering. The temperature of the iron nail is represented by $T = 2s + 70$ and the temperature of the copper nail is represented by $T = 3s + 65$, where $T°$F is the temperature of the nail after s seconds.

a.) Solve the system of linear equations using the graphing calculator.

b.) When will the temperatures of the nails be the same?

8.) Cole wants to join a gym. At this gym, the monthly fee is $35, and he's not sure about the price of the joining fee. He knows that after 10 months, he will pay $425. Write an equation to model the relationship between the cost and number of months. Then, find the amount paid after 20 months.

9.) Find a function rule that satisfies the table given. (**Hint:** A function rule is in the format $y = mx + b$, so find the slope and the y-intercept.)

Price (x)	# of Days (y)
$18.00	2
$36.00	4
$54.00	6
$72.00	8
$90.00	10

Solving Systems of Equations by Substitution Problem Set

Check 10 – 11.

10.) $y = 3$

$3x + y = 5$

11.) $2x + y = 20$

$3x + 4y = 40$

12.) $y + x = -2$

$y + 2x = -1$

13.) $y = 3x - 8$

$y = 4 - x$

14.) $c - 5d = 2$

$2c + d = 26$

15.) $2h + 3k = 13$

$h + 4 = 2k$

16.) $4x + 12y = 20$

$2x + 3y = 4$

17.) $y = 3x - 7$

$y = 2x - 5$

18.) Tyler and Mitchell both joined the video game of the month club. There is a joining fee, plus an additional fee every time you play a new game. After you rent 7 games, the price is $55. After you rent 17 games, the price is $105. Find the joining fee and the amount you pay per new game.

Solving Systems of Equations by Elimination Problem Set

Check 19 - 20.

19.) $x + y = 8$
$x - y = 4$

20.) $x - 3y = 7$
$x + 2y = 2$

21.) $3r - 5s = -35$
$2r - 5s = -30$

22.) $4x - 3y = 12$
$x + 2y = 14$

23.) $6x - y = 20$
$20x + y = 32$

24.) $7x + 3y = -1$
$4x + y = 3$

25.) $3x - 8y = 13$
$4x - 5y = 6$

26.) $2x - y = 9$
$3x + 4y = -14$

27.) $2x + y = 45$
$3x - y = 5$

28.) $4x - 3y = 25$
$-3x + 8y = 10$

29.) A summer day camp charges a registration fee, plus a daily amount. Riley's fee for 9 days is $417 and Jon's fee for 3 days is $189. Write an equation to represent the cost for the camp program, c, based on the number of days attended, n. Then use your equation to find the cost of attending the camp for 15 days.

Applications of Systems of Equations Problem Set

30.) Joey and Ryan went to the store. Joey bought three shirts and two neckties for $69. Ryan

bought two shirts and three neckties for $61. What is the cost of one shirt?

What is the cost of one necktie?

31.) The eighth grade class at Spry raised $860 from the sale of tickets to a concert. Tickets sold

for $2.50 if purchased in advance and for $4.00 if purchased at the door. If a total of 275

tickets were sold, how many tickets were sold at the door?

32.) Five pens of the same type cost the same as two notebooks of the same type. If one pen
and two notebooks cost $4.20, what is the cost of one pen?
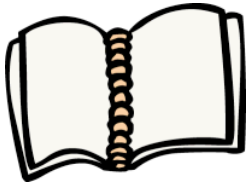
33.) A farmer has only chickens and cows in her barnyard. If the animals in her barnyard have a
total of 60 heads and 140 legs, how many chickens and how many cows are in the backyard?

34.) Sabrina is learning how to play some percussion instruments. One instrument she plays is in
the shape of an equilateral triangle shown below. The side lengths are in inches.
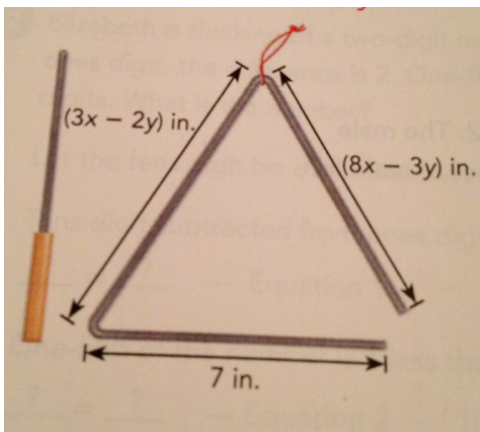
a.) What does equilateral mean?

$(3x - 2y)$ in.

$(8x - 3y)$ in.

b.)   Find x and y.

7 in.

35.) Eight years ago, Mr. Fontana was six times as old as his son. In twelve years' time, he will be twice as old as his son. How old are they now?

	Mr. Fontana's Age (yrs)	His Son's Age (yrs)
Eight Years Ago	$f - 8$	$s - 8$
In Twelve Years' Time	$f + 12$	$s + 12$

36.) A restaurant sells four combo meals. Jolly Meal, which cost $12.60, consists of 2 orders of French fries and 1 sandwich. The Special Meal, which is made up of 2 sandwiches and 1 order of French fries, costs $13.50. Calculate the cost of the following combo meals if the charge for sandwiches and orders of French fries are the same for all combo meals.

a.)   Children's Meal: 1 sandwich and 1 order of French fries

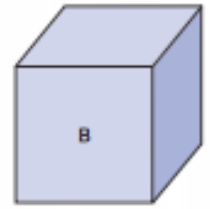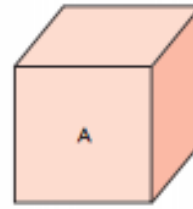b.)   Family Meal: 2 sandwiches and 3 orders of French fries

37.) Hailey's favorite activities are bike riding and dancing. She wants to try to do these activities for 6 hours each week. She would also like to try to burn off about 2,100 calories a week. She finds that biking uses about 425 calories each hour and dancing uses about 325 calories each hour. She wants to do bike riding for x hours and dancing for y hours each week. How much time should she spend doing each activity to accomplish her goal?

38.) Kassy has $110 and Anna has $600 in their bank accounts. Kassy's account balance increases by $30 every year and her account balance will be C dollars in x years. Anna's account balance reduces by $40 every year and her account balance will also be C dollars in x years.

a.) Write two equations of C in terms of x.

b.) Solve this system of linear equations to find the amount in the girls' account balances when they are equal.

39.) The diagram shows a 1-centimeter block of metals A and B. Five blocks of A and two blocks of B have a total mass of 44 grams. Three blocks of A and five blocks of B have a total mass of 34 grams. An alloy is made by melting and mixing two blocks of metal A and one block of metal B. Using the density formula, $Density = \dfrac{Mass}{Volume}$, find the density of the alloy.

40.) The table below shows Adelyn's phone usage and the total charges over three months.

Month	Local Voice Calls (min)	Out-of-State Voice Calls (min)	Total Charges ($)
January	60	30	45
February	80	20	46
March	40	20	34

Adelyn suspects that there are errors in the charges. Use systems of linear equations to check whether the charges are correct.

For 41 – 42, solve the following systems of equations using substitution.

41.) $3a - 2b = -4$
$3a + b = 2$

42.) $3x - y = 11$
$x + y = 5$

For 43 – 44, solve the following system of equations using elimination.

43.) $x - 2y = 5$
$3x - 5y = 8$

44.) $5m + 2n = -8$
$4m + 3n = 2$

For 45 – 46, solve the following systems of equations using any method you would like.

45.) $2m - n = 5$
$2m + n = 3$

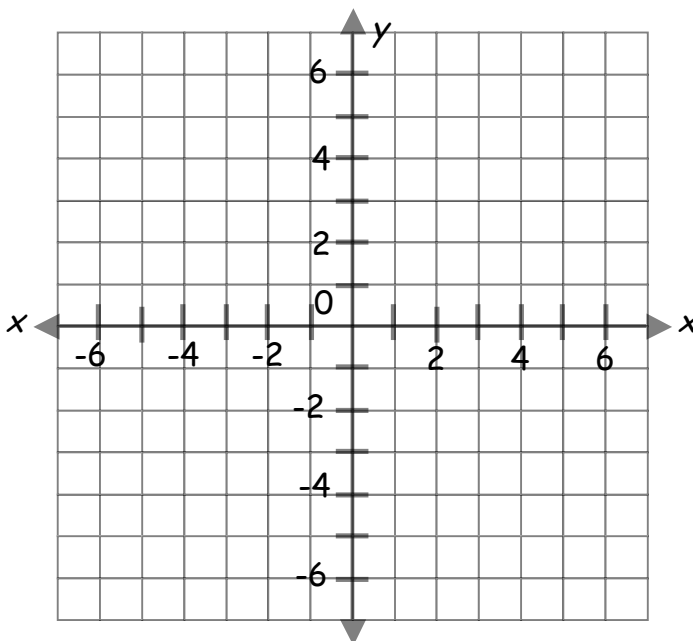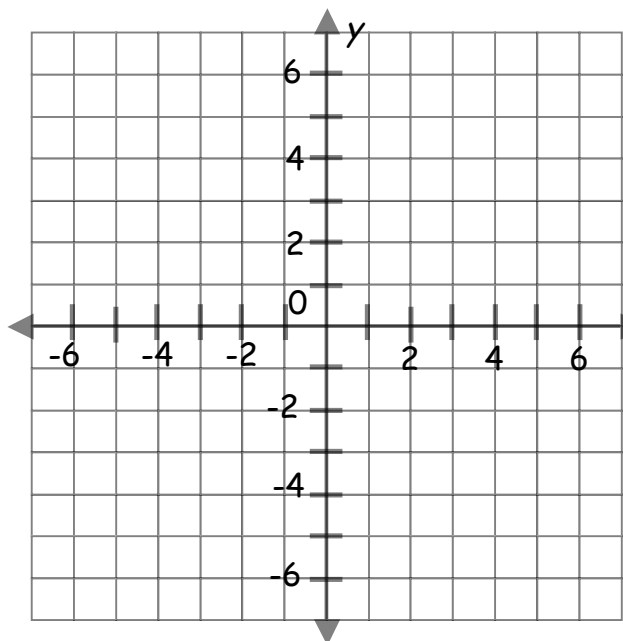46.) $5x - 2y = 23$
$5x + 2y = 17$

For 47 – 48, solve the following systems of equations graphically.

47.) $x + y = 6$
$x - y = 2$

48.) $y = 2x - 7$
$x + y = 5$

49.) The difference between the length and width of one face of a box is 4 inches. The face has a perimeter of 52 inches. Find the length and width.

Special Cases of Systems of Equations Problem Set

50.) $3x + y = 7$
$6x + 2y = 14$

51.) $x + y = 3$
$8x + 8y = 32$

How many solutions in question #50?

_____

Explain how you know.

How many solutions in question #51?

_____

Explain how you know.

52.) $6x + 2y = 12$
$3x + y = 21$

53.) $2x + y = 8$
$4x - 2y = 24$

How many solutions in question #52?

_____

Explain how you know.

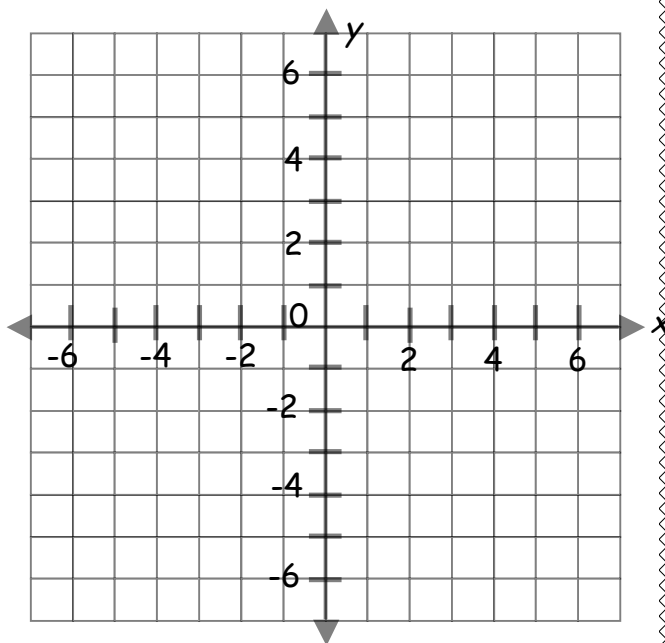How many solutions in question #53?

_____

Explain how you know.

54.) **Directions:** Solve the following system of equations using *all three methods*. Should you get the same answer?

$y - 3x = 6$
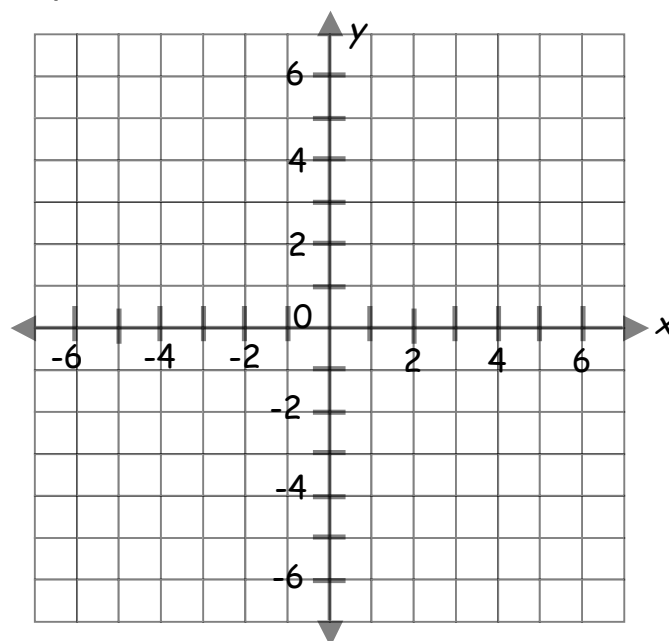
$2y + 4x = 2$

Graphically

Substitution

Elimination

55.) Solve the following system of equations graphically.

$$10x + 5y = 15$$
$$2x + y = 3$$

56.) Trey says he bought 9 apples and 6 apricots for $8.50 yesterday and bought 3 apples and 2 apricots for $7.40 today.

a.) Write a system of equations to find the cost of an apple and an apricot.

b.) State with reasons whether the system of equations has a unique solution, no solution, or has infinite solutions.

c.) What does this tell you about the cost of apples and apricots on those two days?

57.) Cameron gave a riddle: A string is 2 meters longer than a rod. Half of the rod is 1 meter shorter than half of the string. Is this true or false?

      a.) Write a system of equations to find the length of the string and the length of the rod.

      b.) State with reasons whether the system of equations has a unique solution, no solution, or has infinite solutions.

      c.) What does this tell you about Will's riddle?

Answers to Unit 4 Problem Set

1.) (2,3)

2.) (5,4)

3.) (-3,4)

4.) (2,-1)

5.) 1 hr. @ 20 mi.

6.) a.) (20,180)
   b.) 20 sec.

7.) a.) (5,80)
   b.) 5 sec.

8.) $y = 35x + 75$
   $775

9.) $y = \frac{1}{9}x$

10.) $\left(\frac{2}{3}, 3\right)$

11.) (8,4)

12.) (1,-3)

13.) (3,-1)

14.) 350 adult
   200 children

15.) (12,2)

16.) (2,3)

17.) large: 4 cups
   small: 2 cups

18.) pay $5/game
   pay $20 to join

19.) (6,2)

20.) (4,-1)

21.) (-5,4)

22.) (6,4)

23.) (2,-8)

24.) (2,-5)

25.) (-1,-2)

26.) (2,-5)

27.) (10,25)

28.) (10,5)

29.) length: 15 in
   width: 11 in

30.) bowl: 300 g
   cup: 200 g

31.) y = 38x + 75
   $645

32.) shirt: $17
   necktie: $9

33.) 115 door
   tickets
   160 advance
   tickets

34.) pen: $0.70
   notebook:
   $1.75

35.) 10 cows
   50 chickens

36.) (-1,-5)

37.) son: 13 yrs
   father: 38 yrs

38.) a.) $8.70
   b.) $21.30

39.) bike: 1.5 hrs
   dance: 4.5 hrs

40.) $320

41.) 6 g/cm^3

42.) Yes...March
   should be $30

43.) (0,2)

44.) (4,1)

45.) (-9,-7)

46.) (-4,6)

47.) (4,2)

48.) (4,1)

49.) (2,-1)

50.) (4,-1.5)

51.) infinite
   solutions

52.) no solution

53.) no solution

54.) one solution
   (5,-2)

55.) (-1,3)

56.) infinite
   solutions

57.) no solution;
   means the
   prices change

58.) infinite
   solutions;
   riddle is
   always true.