

**Chapter 3 Review Worksheet #2 (Word Problems)** Name: Key

1.) You purchase a gym for \$115,000. The estimated monthly revenue is \$5,500 and expected monthly costs are \$3,200.

a.) Let  $R$  represent the revenue during the first  $t$  months of operation. Write a linear model for  $R$ .

$$R = 5,500t$$

$t$	0	55
$R$	0	302,500

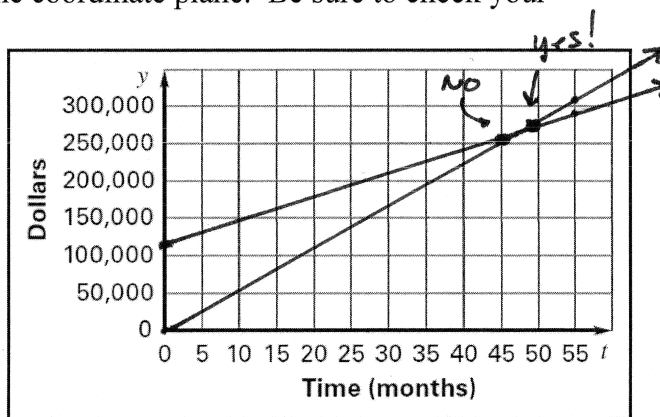
b.) Let  $C$  represent the costs during the first  $t$  months of operation, including the purchase price. Write a linear model for  $C$ .

$$C = 3,200t + 115,000$$

$t$	0	55
$C$	115,000	291,000

c.) Graph the revenue and lost linear models on the same coordinate plane. Be sure to check your solution.

$5,500(45) = 247,500$  *not*  
 $3,200(45) + 115,000 = 259,000$  *=*



d.) How many months will it take until revenue and costs are equal?

$$5,500(50) = 275,000$$

$$3,200(50) + 115,000 = 275,000$$

After 50 months, the revenue will equal the cost.

2.) A math test is to have 20 total questions. The test format uses multiple choice questions worth 4 points each, and problem solving questions that are worth 6 points each. The test is worth a total of 100 points.

a.) Write a system of equations to determine how many of each type of question is used. Be sure to define your variables.

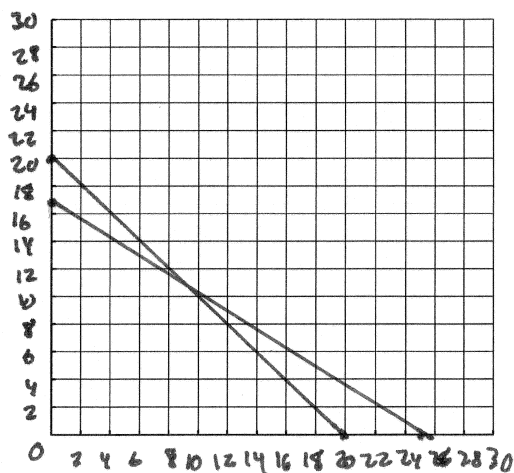
$x$ : # of M.C. problems  
 $y$ : # of P.S. questions  
 $x + y = 20$   
 $4x + 6y = 100$

b.) Solve your system by graphing. Set your  $x$ - and  $y$ -axis to go by two. Be sure to check your solution.

$10 + 10 = 20$  ✓  
 $40 + 60 = 100$   
 $100 = 100$  ✓

$x$  int (20, 0)  
 $y$  int (0, 20)

$x$  int (25, 0)  
 $y$  int (0, 16.67)



c.) How many of each type of question were on the test?

10 multiple choice  
 10 problem solving questions

- 3.) A hair salon receives a shipment of 84 bottles of hair conditioner to use and sell to customers. The two types of conditioners received are type A, which is used for regular hair, and type B, which is used for frizzy hair. Type A costs \$6.50 per bottle and type B costs \$8.25 per bottle. The hair salon's invoice for the conditioner is \$588.

Set up and solve a system of equations to find how many of each type of conditioner are in the shipment. Remember to define your variables.

$x$ : # of Type A bottles  
 $y$ : # of Type B bottles

$$\begin{aligned} x + y &= 84 & \xrightarrow{x-6.5} & -6.5x - 6.5y = -546 \\ 6.50x + 8.25y &= 588 & & \underline{6.5x + 8.25y = 588} \end{aligned}$$

$$1.75y = 42$$

$$y = 24$$

$$x + 24 = 84$$

$$x = 60$$

60 Type A bottles  
24 Type B bottles

- 4.) In order to connect your Blu-ray player to your TV set, you need a cable with a special adapter at both ends. An 8 foot cable costs \$24.50 and a 4 foot cable costs \$15.50. The total cost is the sum of the cost of the adapters and the cost of the cable itself.

Set up and solve a system of equations to find the per foot cost of the cable and the fixed cost of the special adapters. Remember to define your variables.

$x$ : cost per ft.  
 $y$ : cost for adapters

$$\begin{aligned} 24.50 &= 8x + y & \longrightarrow & 24.50 = 8x + y \\ 15.50 &= 4x + y & \xrightarrow{x-1} & \underline{-15.50 = -4x - y} \end{aligned}$$

$$9 = 4x$$

$$x = 2.25$$

$$15.50 = 4(2.25) + y$$

$$15.50 = 9 + y$$

$$6.50 = y$$

What would you expect to pay for a 6 foot cable?

$$C = 2.25l + 6.50$$

$$C = 2.25(6) + 6.50$$

Six A cable = \$20

- 5.) The cost of 11 gallons of regular gasoline and 16 gallons of premium gasoline is \$58.55. Premium costs \$0.20 more per gallon than regular. What is the cost of a gallon of regular and premium gasoline?

$x$ : cost of 1 gal. of regular  
 $y$ : cost of 1 gal. of premium

$$\begin{aligned} 11x + 16y &= 58.55 \\ y &= x + .20 \end{aligned}$$

$$11x + 16(x + .2) = 58.55$$

$$11x + 16x + 3.2 = 58.55$$

$$27x = 55.35$$

$$x = 2.05$$

$$y = 2.05 + .20$$

$$y = 2.25$$

\$2.05 for 1 gal. regular  
\$2.25 for 1 gal. premium

- 6.) You and a group of friends went to the Brewer's game. During the 3<sup>rd</sup> inning, you made a run to the concession stands to buy food for everybody. You bought 5 cheeseburgers and 3 hot dogs for \$29.25. When you get back to your seat you're trying to figure out what everybody owes, but cannot remember the price of a cheeseburger or hot dog. You do remember that the cheeseburger cost twice as much as the hot dog. What is the cost of a hamburger? a hot dog?

x: \$ of 1 hamburger  
y: \$ of 1 hot dog

$$5x + 3y = 29.25$$

$$x = 2y$$

$$x = 2(2.25)$$

$$x = 4.50$$

$$5(2y) + 3y = 29.25$$

$$10y + 3y = 29.25$$

$$13y = 29.25$$

$$y = 2.25$$

A burger costs \$4.50 and a hot dog costs \$2.25

- 7.) For an upcoming concert, a 2500 seat arena is selling tickets for \$25 and \$15. At least 1000 tickets must be priced at \$15 and total sales need to exceed \$10,000 to make a profit. Let x represent the number of tickets priced at \$25 and y represent the number of tickets priced at \$15. Write a system of inequalities that shows the possible combinations of ticket sales in order to make a profit.

x: # of \$25 tickets

y: # of \$15 tickets

$$x + y \leq 2500$$

$$25x + 15y > 10,000$$

$$y \geq 1000$$

$$x \geq 0$$

- 8.) The feed mill pays a farmer \$6930.00 for the 1st delivery, \$5475.00 for the 2nd delivery, and \$8879.50 for the 3rd delivery. The table shows the number of bushels included in each delivery. Use the table to write and solve a system of equations to find the price per bushel that the farmer received for each crop.

$$y = 3(3.2) - 6.1$$

$$y = 3.5$$

$$z = -2.5(3.2) - 1.5(3.5) + 19.25$$

$$z = 6$$

Delivery	Corn	Wheat	Soybeans
1st Delivery	900	540	360
2nd Delivery	1125	150	225
3rd Delivery	860	645	645

x: \$/bushel for corn

y: \$/bushel for wheat

z: \$/bushel for soybeans

$$900x + 540y + 360z = 6930$$

$$1125x + 150y + 225z = 5475$$

$$860x + 645y + 645z = 8879.50$$

$$360z = 900x - 540y + 6930$$

$$z = -2.5x - 1.5y + 19.25$$

\$3.20/bushel of corn, \$3.50/bushel of wheat, \$6/bushel of soybeans

$$1125x + 150y + 225(-2.5x - 1.5y + 19.25) = 5475$$

$$1125x + 150y - 562.5x - 337.5y + 4331.25 = 5475$$

$$562.5x - 187.5y = 1143.75$$

$$-187.5y = -562.5x + 1143.75$$

$$y = 3x - 6.1$$

$$-752.5x - 322.5(3x - 6.1) = -3536.75$$

$$-752.5x - 967.5x + 1967.25 = -3536.75$$

$$-1720x = -5504$$

$$x = 3.2$$

$$860x + 645y + 645(-2.5x - 1.5y + 19.25) = 8879.50$$

$$860x + 645y - 1612.5x - 967.5y + 12416.25 = 8879.50$$

- 9.) The movie theater charges different rates for attendees depending on their age; children 12 and under are \$4, adults are \$6 and senior citizens over 65 are \$5. A group of 14 people from a family decides to go to the movies one weekend. There are an equal number of senior citizens as children 12 and under. The total cost was \$66. Let  $x$  represent the number of children 12 and under. Let  $y$  represent the number of adults. Let  $z$  represent the number of senior citizens.

Write and solve a system of linear equations in three variables to find the number of people in each age category in the group.

$x$ : # of kids tickets  
 $y$ : # of adult tickets  
 $z$ : # of senior tickets

6 kid tickets  
 2 adult tickets  
 6 senior tickets

$$\begin{aligned} x + y + z &= 14 & \longrightarrow z + y + z &= 14 \\ 4x + 6y + 5z &= 66 & y + 2z &= 14 \\ x &= z \end{aligned}$$

$$4z + 6y + 5z = 66$$

$$6y + 9z = 66$$

$$y = -2z + 14$$

$$\begin{aligned} 6(-2z + 14) + 9z &= 66 \\ -12z + 84 + 9z &= 66 \end{aligned}$$

$$-3z = -18$$

$$z = 6$$

$$y = -2 + 14$$

$$y = -12 + 14$$

$$y = 2$$

$$x = 6$$

- 10.) A cashier has 25 coins consisting of nickels, dimes, and quarters with a value of \$4.90. If the number of dimes is 1 less than twice the number of nickels, how many of each type of coin does she have?

$x$ : # of nickels  
 $y$ : # of dimes  
 $z$ : # of quarters

$$x + y + z = 25$$

$$y = 2x - 1$$

$$(.05x + .10y + .25z = 4.90) \times 100$$

$$5x + 10y + 25z = 490$$

3 Nickels  
 5 Dimes  
 17 Quarters

$$x + 2x - 1 + z = 25$$

$$3x + z = 26$$

$$\begin{aligned} \times 25 \downarrow & -75x - 25z = -650 \\ & 25x + 25z = 500 \end{aligned}$$

$$-50x = -150$$

$$x = 3$$

$$5x + 10(2x - 1) + 25z = 490$$

$$5x + 20x - 10 + 25z = 490$$

$$25x + 25z = 500$$

$$y = 2(3) - 1$$

$$y = 5$$

$$3 + 5 + z = 25$$

$$z = 17$$