

Assignment #3 – Systems of Equations
MATH CST 404

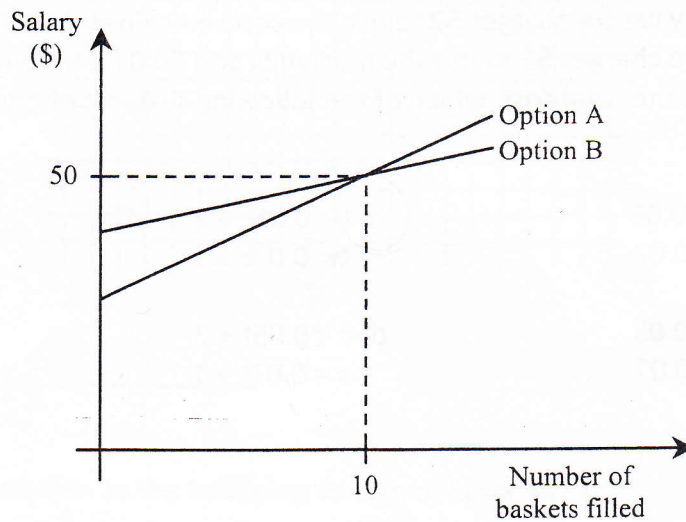
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Due: _____

Name: Key

A – Multiple Choice – select only one answer, 4 points each

1. The salary that a farmer pays his strawberry pickers can be determined according to two different options. The following graph shows the relationship between the salary paid and the number of baskets of strawberries filled.



According to this graph, which one of the following statements is TRUE?

- A) The base salary under option A is higher than the base salary under option B.
- B) The amount paid for each basket filled is greater under option B than under option A.
- C) If they fill between 8 and 15 baskets, workers get a better deal under option B.
- D) Workers get a better deal under option A if they fill more than 10 baskets of strawberries.

2. What is the solution to the following system of equations?

$$\begin{aligned} y &= x - 3 \\ y &= -2x + 6 \end{aligned}$$

$$\begin{aligned} x - 3 &= -2x + 6 \\ 3x &= 9 \\ x &= 3 \\ y &= 3 - 3 \\ y &= 0 \end{aligned}$$

a) (1, -2)

b) (3, 0)

c) (-3, -6)

d) (9, 6)

3. The system of linear relations below represents the cost of lessons C_1 and C_2 charged by two different dance schools based on the number of hours (h) of dance classes.

$$C_1 = 5h + 30$$

$$C_2 = 6h + 20$$

How many hours of classes will cost the same at both schools?

- A) 80 hours C) 10 hours
 B) 50 hours D) 4.5 hours

4. A photocopy centre charges \$2 to use the copy machines and \$0.05 per copy. Another centre charges \$1 to use the machines and \$0.07 per copy. If c is the number of copies and t is the total cost, which of the following systems of equations represents this situation?

a) $t = 2c + 0.05$
 $t = 1c + 0.07$

b) $t = 0.05c + 2$
 $t = 0.07c + 1$

c) $c = 2t + 0.05$
 $c = 1t + 0.07$

d) $c = 0.05t + 2$
 $c = 0.07t + 1$

B - Short Answer - write your answer in the space provided, 4 points each

1. Jane purchased a certain number of \$0.50 stamps and a certain number of \$0.30 stamps for a total of \$7.60. If she bought 20 stamps altogether, how many of each type did she buy?

Jane bought 8 \$0.50 stamps and 12 \$0.30 stamps.

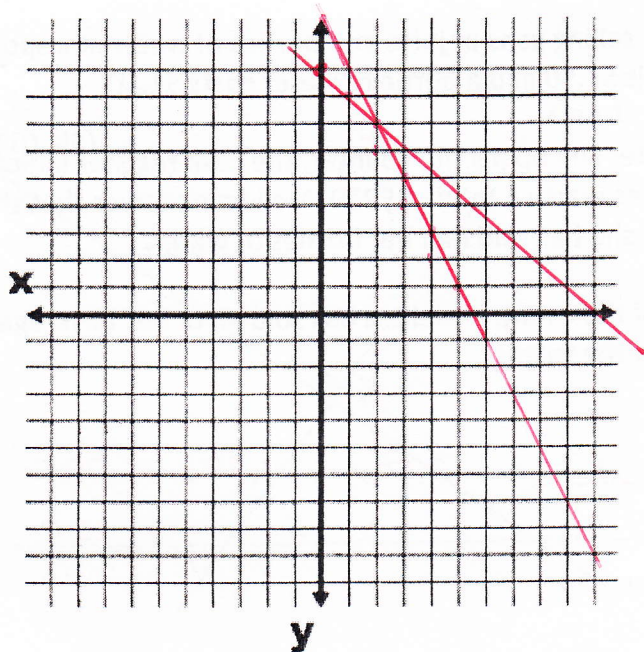
$x = \#0.50$
 $y = \#0.30$

$$\begin{array}{r} 0.50x + 0.30y = 7.60 \rightarrow \\ 0.50(1x + y = 20) \rightarrow \\ \hline 0.50x + 0.30y = 7.60 \\ -0.50x + 0.50y = 10 \\ \hline -0.20y = 2.4 \\ y = 12 \\ x = 8 \end{array}$$

2. Solve the following system of equations by graphing in the Cartesian plane below:

$$x + y = 9 \rightarrow y = -x + 9$$

$$y = -2x + 11$$



Solution: (2, 7)

3. What is the solution to the following system of equations?

$$\begin{array}{r} 3x - 4y = -15 \\ 3x - y = 12 \\ \hline -3y = -27 \\ y = 9 \end{array}$$

$$\begin{array}{r} 3x - 36 = -15 \\ 3x = 21 \\ x = 7 \end{array}$$

Solution: (7, 9)

4. Three customers are at the check-out counter of a grocery store. The first pays \$4 for 2L of milk and 3 muffins. The second pays \$6.15 for 5L of milk and 2 muffins. The third has 1L of milk and 4 muffins. How much does the third customer pay?

$x = \text{milk}$
 $y = \text{muffin}$

$$\begin{array}{r} 2(2x + 3y = 4) \rightarrow 4x + 6y = 8 \\ 2(5x + 2y = 6.15) \rightarrow 10x + 4y = 12.30 \\ \hline -6y = -4.30 \\ 6y = 4.30 \\ y = 0.716\bar{6} \end{array}$$

$$\begin{array}{r} 10x + 15y = 20 \\ 10x + 4y = 12.30 \\ \hline 11y = 7.70 \\ y = 0.70 \end{array}$$

$$\begin{array}{r} 2x + 2(0.70) = 4 \\ 2x + 1.40 = 4 \\ 2x = 2.60 \\ x = 1.30 \end{array}$$

The third customer paid: \$ 3.75

$$\text{total: } 0.95 + 4(0.70) = 3.75$$

3. The system of linear relations below represents the cost of lessons C_1 and C_2 charged by two different dance schools based on the number of hours (h) of dance classes.

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Jane bought 8 \$0.50 stamps and 12 \$0.30 stamps.

$x = \#0.50$
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$$\begin{array}{r} 0.50x + 0.30y = 7.60 \rightarrow \\ 0.50(1x + y = 20) \rightarrow - \\ \hline 0.50x + 0.50y = 10 \\ \hline -0.20y = -2.4 \\ y = 12 \\ x = 8 \end{array}$$

C - Extended Answer - show all your work/reasoning, 4 points each
 *note: you may use a table of values or a graph to solve the systems

1. Melissa is selling cans of juice and bottles of water at a sports event. The price of a can of juice is \$2.50 and a bottle of water costs \$1.50.

One hour after she opens the counter, the cash register indicates that she has sold 120 beverages worth a total of \$220. Melissa observes that she has 100 cans of juice left and that she has sold half her bottles of water.

At the end of the event, if Melissa has sold all of her beverages, what will be the total value of the sales?

After 1 hour:

$$\begin{aligned} 2.50x + 1.50y &= 220 \\ x + y &= 120 \end{aligned}$$

$$\begin{aligned} 2.50x + 1.50y &= 220 \\ - 2.50x + 2.50y &= 300 \\ \hline \end{aligned}$$

$$\begin{aligned} -y &= -80 \\ \text{water: } y &= 80 \\ \text{total: } 80 \times 2 &= 160 \end{aligned}$$

juice-

$$x = 40$$

$$\begin{aligned} \text{total: } 40 + 100 &= 140 \end{aligned}$$

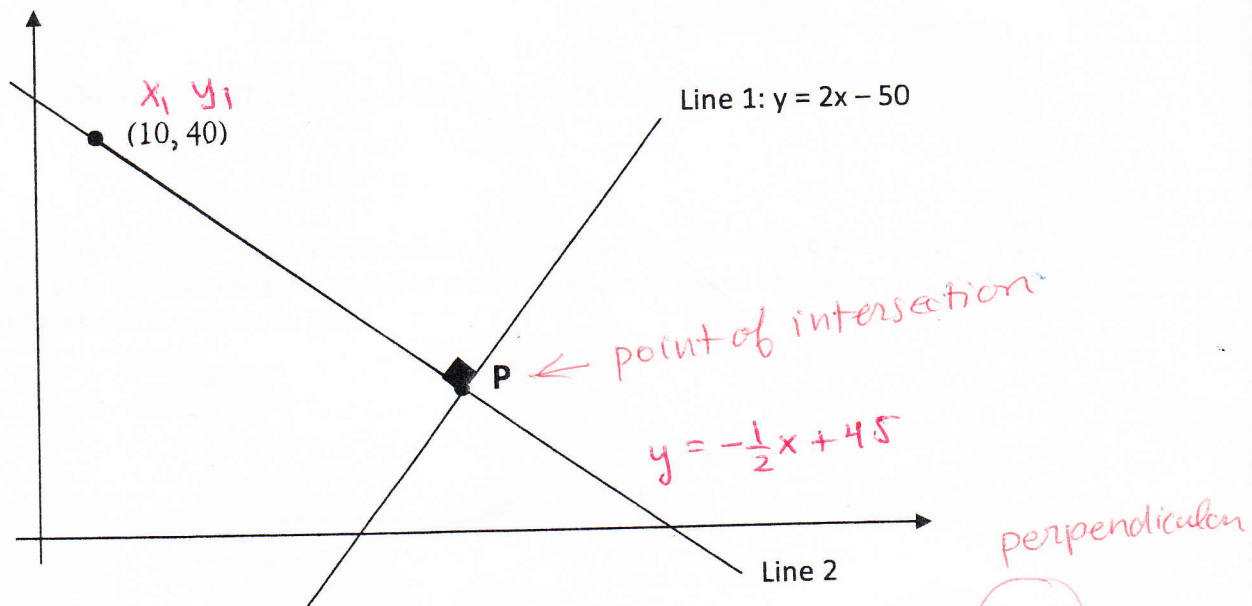
$$140 \text{ juice total} \times 2.50 = 350$$

$$160 \text{ water total} \times 1.50 = 240$$

$$\underline{590}$$

The total sales at the end of the event will be \$ 590

2. In the Cartesian plane below, line 1 and line 2 intersect at point P. Line 1 has the equation $y = 2x - 50$ and is perpendicular to line 2. What are the coordinates of point P?



slope: $\frac{2}{1} \rightarrow -\frac{1}{2}$

$$b = 40 - \frac{1}{2}(10)$$

$$= 40 + 5$$

$$= 45$$

Comparison

$$2x - 50 = -\frac{1}{2}x + 45$$

$$2.5x = 95$$

$$x = 38$$

$$y = 2(38) - 50$$

$$y = 26$$

The coordinates of point P are: (38, 26)