

MPM2D – Unit Test #1 Linear Systems

LS1	/13
LS2	/12
LS3	/11
LS4	/16

Name: _____

Instructions:

1. Read each question carefully before answering.
2. Express all fractions in lowest terms.
3. Do not change fractions to decimals unless exact!
4. Calculators can be used but cannot be shared. Your phone is not a calculator!
5. Good Luck !!

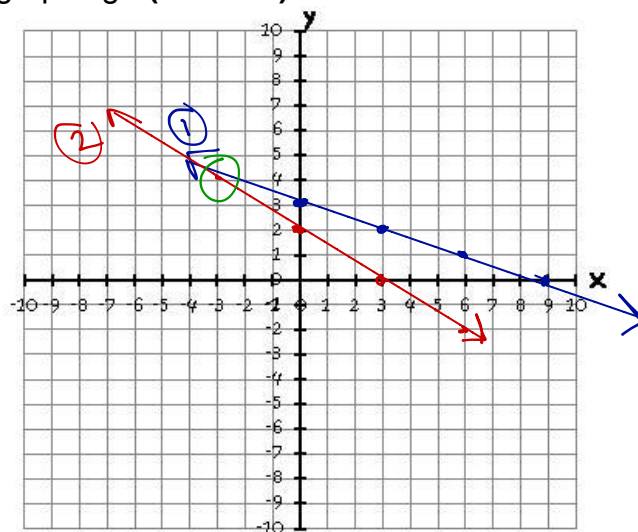
LS1	I can model problems involving linear relations and systems using tables, graphs, and equations.	
		13

1. Solve the following linear system by graphing. (5 marks)

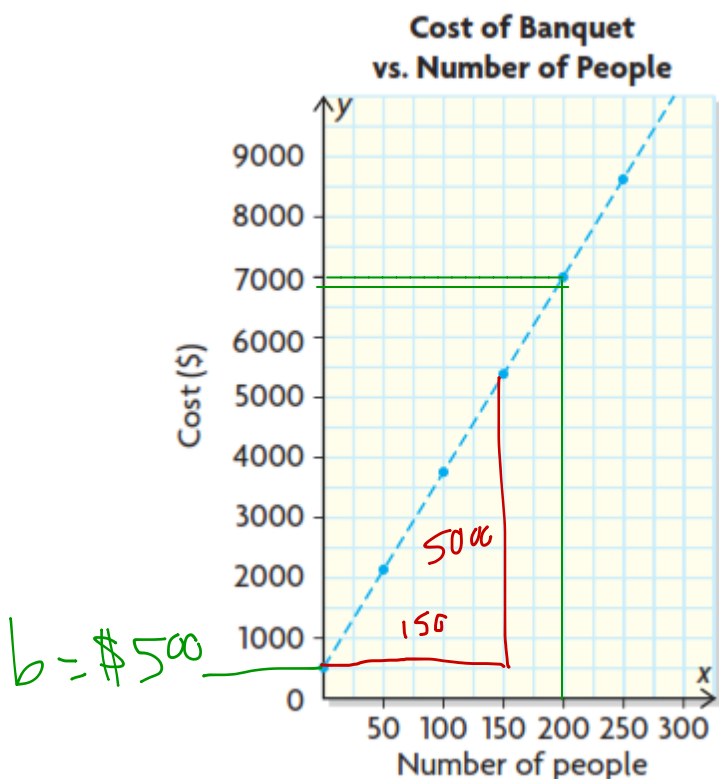
① $y = \frac{-1}{3}x + 3$ $m = -1/3, b = 3$

② $y = \frac{-2}{3}x + 2$ $m = -2/3, b = 2$

P.O.I. (-3, 4)



2. The graph shows how the charges for a banquet hall relate to the number of people attending a banquet.



a) What is the charge for the banquet hall if 200 people attend? (1 mark)

\$ 7000

b) Determine the equation for this linear relation. (3 marks)

$y = mx + b$

$m = \frac{5000}{150} = 33.3$

$y = 33.3x + 500$

$x_1, y_1 \quad x_2, y_2$

3. What is the slope of the line that contains (-2, 6) and (4, -3)? (2 marks)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-3 - 6}{4 - (-2)}$$

$$= \frac{-9}{6}$$

$$m = -\frac{3}{2}$$

4. Determine the slope of the equation $2x + 7y - 14 = 0$. (2 marks)

$$2x + 7y - 14 = 0$$

$$-2x + 14 = -7y$$

$$7y = -2x + 14$$

$$y = -\frac{2}{7}x + 2$$

$m = -\frac{2}{7}$

LS2	I can solve systems of linear equations using an algebraic method.	12
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5. Solve the following linear system using the algebraic method of substitution. Show all of your work. (6 marks)

$$\begin{cases} \textcircled{1} & 2x + 3y = 9 \\ \textcircled{2} & x - 5y = 11 \end{cases}$$

Isolate x in $\textcircled{2}$ ✓

$$x = 11 + 5y \textcircled{3}$$

sub. $\textcircled{3}$ in $\textcircled{1}$

$$2x + 3y = 9$$

$$2(11 + 5y) + 3y = 9$$

$$22 + 10y + 3y = 9$$

$$13y = 9 - 22$$

$$13y = -13$$

$$y = -1$$
 ✓

sub $y = -1$ in $\textcircled{3}$ ✓

$$x = 11 + 5y$$

$$x = 11 + 5(-1)$$

$$x = 11 - 5$$

$$x = 6$$
 ✓

P.O.I. $(6, -1)$ ✓

6. Solve the following linear system using the algebraic method of elimination. Show all of your work. (6 marks)

$$\textcircled{1} \quad 2x + y = 2$$

$$\textcircled{2} \quad x - \frac{1}{2}y = 4 \quad \textcircled{2} \times 2 \quad 2x - y = 8 \quad \textcircled{3}$$

$$\textcircled{1} - \textcircled{3} \quad 2x + y = 2$$

$$2x - y = 8$$

$$2y = -6$$
 ✓

$$y = -3$$
 ✓

sub $y = -3$ into $\textcircled{1}$

$$2x + y = 2$$

$$2x - 3 = 2$$

$$2x = 5$$

$$x = 2.5$$
 ✓

P.O.I. $(2.5, -3)$

LS3	I can solve problems that arise from realistic situations involving linear systems described in words or represented by equations.	
		11

7. EDHS is holding a homecoming dinner and dance. The cost of the tickets to attend the dinner and dance afterwards is \$40 per person. The cost of the tickets to attend the dance only is \$25 per person. If a total of 350 tickets have been sold and \$11 750 has been collected, determine how many people are attending the dinner and dance and how many will be attending the dance only. (7 marks)

✓ Let x represent # of tickets for dinner and dance
 ✓ Let y represent # of tickets for dance only
 ✓ ① $x + y = 350$
 ✓ ② $40x + 25y = 11750$
 Isolate x in ① $x = 350 - y$ ③
 sub ③ into ②
 $40(350 - y) + 25y = 11750$
 $14000 - 40y + 25y = 11750$
 $-15y = 11750 - 14000$
 $-15y = -2250$
 $y = 150$
 $x = 200$

8. Nicole is a cashier at a convenience store. She has a total of \$120 in bills. She has 13 bills, consisting of \$5 bills, \$10 bills, and \$20 bills. If she has two \$20 bills, how many \$5 bills and \$10 bills does she have? Show your work. (4 marks)

✓ Let f represent the # of \$5 bills
 ✓ Let t represent the # of \$10 bills
 ✓ $f + t = 11$ ①
 $5f + 10t = 80$ ②
 $f = 11 - t$ ③
 sub ③ into ②
 $5f + 10t = 80$
 $5(11 - t) + 10t = 80$
 $55 - 5t + 10t = 80$
 $5t = 25$
 $t = 5$
 $f = 6$

LS4	I can connect solutions of linear relations and systems to corresponding graphs and equations.	
		16

9. Two lines in a linear system have the same slope, but different y-intercepts. How many solutions does the linear system have? (1 mark)

$y = 5x + 3$
 $y = 5x + 6$
 parallel lines
 \therefore no solution.

10. A snowstorm is tracking on a path modelled by the equation $2x + 5y = -19$ while at the same time a band of freezing rain is moving along the path $6y - 8x = -54$. The town of Essex is at the coordinates $(3, -5)$. Will Essex have a snowstorm, freezing rain, snow and freezing rain, or clear weather. Justify your answer with calculations. (5 marks)

Snowstorm

$$2x + 5y = -19$$

$x = 3, y = -5$

Ls	Rs
$2(3) + 5(-5)$	-19
$6 - 25$	-19
-19	-19

\therefore Essex has snowstorm

Freezing Rain

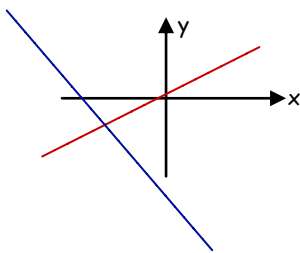
$$6y - 8x = -54$$

Ls	Rs
$6(-5) - 8(3)$	-54
$-30 - 24$	-54
-54	-54

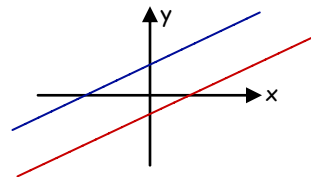
\therefore Essex has freezing rain

11. Illustrate, with a sketch, each of the following scenarios possible for the number of solutions to a linear system. (3 marks)

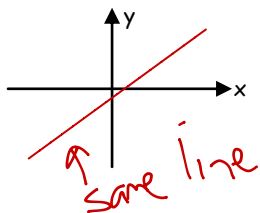
a. One solution



b. No solutions



c. Infinite # of solutions



Complete each sentence using one of the words given below. Each word can be used only once. (7 marks)

12. The place where a graph crosses the x-axis is called the x Int.
13. In the equation $y = 5x + 2$, 5 is a coefficient of the variable x.
14. Let $x = 0$ to determine the y Int. of $y = 4x - 7$.
15. You can determine the Solution to $20 = 3x - 10$ by graphing $y = 3x - 10$.
16. The ordered pair at which two lines cross is called the P.O.I.

x-intercept
coefficient

y-intercept
point of intersection

equation
solution

variable