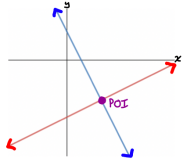
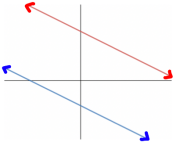
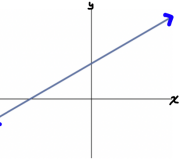


Unit 1- Linear Systems

Workbook

MPM2D

Graph	Slopes of Lines	Intercepts	Number of Solutions
<p>Intersecting</p> 	DIFFERENT	Usually different unless the lines intersect on an axis	1
<p>Parallel & Distinct</p> 	Same	Different	0
<p>Parallel & Coincident</p> 	Same	Same	Infinitely Many

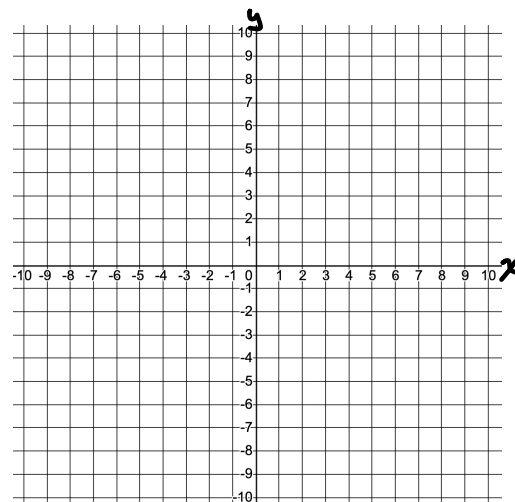
W1 – Solving Linear Systems by GRAPHING

MPM2D

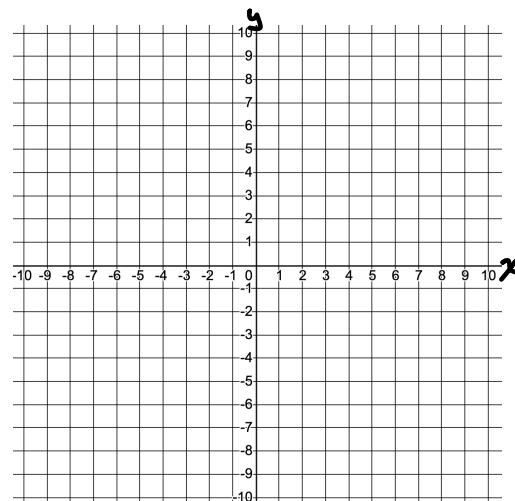
Jensen

1) Solve each system by graphing.

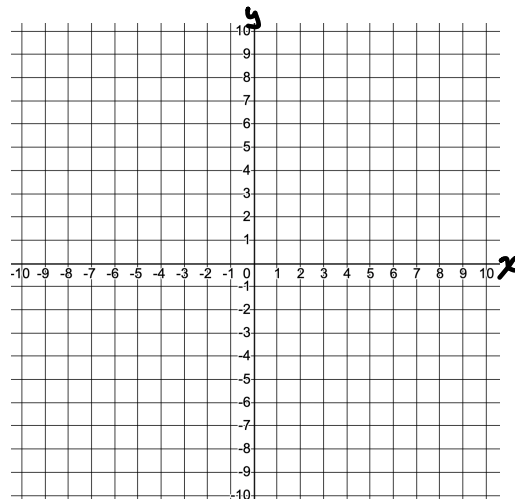
a) $\ell_1: y = 2x + 1$
 $\ell_2: y = x - 2$



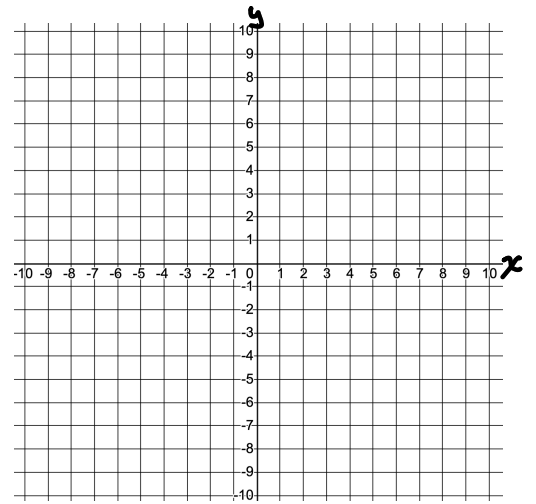
b) $\ell_1: x + 2y = 2$
 $\ell_2: x + y = 3$



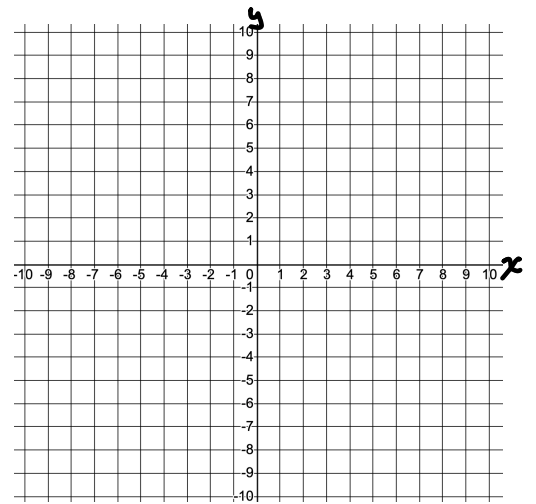
c) $\ell_1: y = 2x - 3$
 $\ell_2: 2x - y = 5$



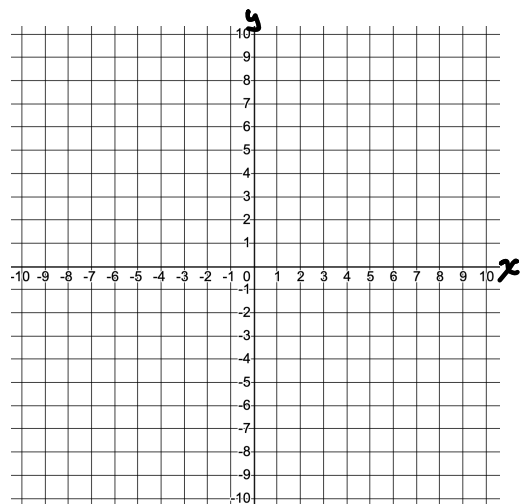
d) $l_1: 3x = y + 4$
 $l_2: 6x - 2y - 8 = 0$



e) $l_1: 3x + 2y = 3$
 $l_2: 2x + 10y = -5$



f) $l_1: 2x + 6y - 12 = 0$
 $l_2: 6x - 3y - 15 = 0$



2) Without graphing, determine whether each system has one solution, no solutions, or infinitely many solutions. Explain.

a) $\ell_1: 2x + y = 5$
 $\ell_2: 2x + 10y = -5$

b) $\ell_1: 3x - y = 0$
 $\ell_2: 6x - 2y = 3$

c) $\ell_1: x + y = 2$
 $\ell_2: 3x = 6 - 3y$

Answers:

1)a) $(-3, -5)$ b) $(4, -1)$ c) no solutions; parallel and distinct d) infinite solutions; parallel and coincident
e) $(1.5, -0.8)$ this is an approximate answer f) $(3, 1)$

2)a) one solution b) no solutions c) infinitely many solutions

W2 – Solving Linear Systems by SUBSTITUTION

Unit 1

MPM2D

Jensen

1) Solve each linear system using the method of substitution. Check your answers.

a) $\ell_1: y = 3x - 4$
 $\ell_2: x + y = 8$

b) $\ell_1: x = -4y + 5$
 $\ell_2: x + 2y = 7$

c) $\ell_1: y = -2x + 3$
 $\ell_2: 4x - 3y = 1$

d) $\ell_1: 2x + 4y = 2$
 $\ell_2: x = 1 - 2y$

e) $\ell_1: x + 2y = 3$
 $\ell_2: 5x + 4y = 8$

f) $\ell_1: 6x + 5y = 7$
 $\ell_2: x - y = 3$

g) $\ell_1: 2m + n = 2$
 $\ell_2: 3m - 2n = 3$

h) $\ell_1: 3a + 2b = 4$
 $\ell_2: 2a + b = 6$

i) $\ell_1: 2x + y = 4$
 $\ell_2: 4x - y = 2$

2) Find the point of intersection of each pair of lines.

a) $\ell_1: 2x = y + 5$
 $\ell_2: 3x + y = -9$

b) $\ell_1: 4x + 2y = 7$
 $\ell_2: -x - 7y = 6$

c) $\ell_1: p + 4q = 3$
 $\ell_2: 5p = -2q + 3$

d) $\ell_1: a + b + 6 = 0$
 $\ell_2: 2a - b - 3 = 0$

e) $\ell_1: x - 2y - 2 = 0$
 $\ell_2: 3x + 4y - 16 = 0$

3) Samantha works twice as many hours per week as Adriana. Together they work a total of 39 hours in one week.

a) Write an equation to represent the information in the first sentence.

b) Write an equation to represent the information in the second sentence.

c) Use the method of substitution to find the number of hours worked by each person.

4) Ugo plays hockey and is awarded 2 points for each goal and 1 point for each assist. Last season he had a total of 86 points. He scored 17 fewer goals than assists.

a) Write a linear system to represent the information

b) Solve the system

c) What does the solution represent in the context of this question?

5) Joanne's family decides to rent a hall for her retirement party. Pin Hall charges \$500 for the hall and \$15 per meal. Bloom Place charges \$350 for the hall and \$18 per meal.

a) Write two equations to represent the information.

b) Solve the linear system to find the number of guests for which the charges are the same at both halls.

Answers:

1) a) $x = 3, y = 5$ b) $x = 9, y = -1$ c) $x = 1, y = 1$ d) infinite solutions

e) $x = \frac{2}{3}, y = \frac{7}{6}$ f) $x = 2, y = -1$ g) $m = 1, n = 0$ h) $a = 8, b = -10$ i) $x = 1, y = 2$

2) a) $x = -\frac{4}{5}, y = -\frac{33}{5}$ b) $x = \frac{61}{26}, y = -\frac{31}{26}$ c) $p = \frac{1}{3}, q = \frac{2}{3}$ d) $a = -1, b = -5$ e) $x = 4, y = 1$

3) a) $S = 2a$ b) $S + A = 39$ c) Samantha worked 26 hours and Adriana worked 13 hours

4) a) $2g + a = 86; g = a - 17$ b) $g = 23, a = 40$ c) 23 goals; 40 assists

5) a) $C = 500 + 15n; C = 350 + 18n$ b) 50 guests

W3 – Solving Linear Systems by ELMINATION

Unit 1

MPM2D

Jensen

1) Solve using the method of elimination

a) $\ell_1: x + y = 2$
 $\ell_2: 3x - y = 2$

b) $\ell_1: x - y = -1$
 $\ell_2: 3x + y = -7$

c) $\ell_1: 3x + 3y = 7$
 $\ell_2: x + y = 3$

d) $\ell_1: 5x + 2y = -11$
 $\ell_2: 3x + 2y = -9$

2) Find the point of intersection of each pair of lines

a) $\ell_1: x + 2y = 2$
 $\ell_2: 3x + 5y = 4$

b) $\ell_1: 3x + 5y = 12$
 $\ell_2: 2x - y = -5$

c) $\ell_1: 3x + y = 13$
 $\ell_2: 2x + 3y = 18$

d) $\ell_1: 6x + 5y = 12$
 $\ell_2: 3x - 4y = 6$

3) Solve by elimination

a) $\ell_1: 3x - 2y = 5$
 $\ell_2: 2x + 3y = 12$

b) $\ell_1: 5m + 2n = 5$
 $\ell_2: 2m + 3n = 13$

c) $\ell_1: 3a - 4b = 10$
 $\ell_2: 5a - 12b = 6$

d) $\ell_1: 3h - 4k = 5$
 $\ell_2: 5h + 3k = -11$

4) Mehrad works in a department store selling sports equipment. Baseball gloves cost \$29 each and bats cost \$14 each. One shift, he sells 28 items. His receipts total \$647.

a) How many bats did Mehrab sell?

b) How many gloves did he sell?

5) Maria rented the same car twice in one month. She paid \$180 the first time for 3 days and she drove a total of 150 km. The next time, she also paid \$180 and had the vehicle for only 2 days, but travelled 400 km.

a) What was the cost per day?

b) What was the cost per km?

Answers:

1)a) $x = 1, y = 1$ **b)** $x = -2, y = -1$ **c)** no solutions **d)** $x = -1, y = -3$

2)a) $(-2, 2)$ **b)** $(-1, 3)$ **c)** $(3, 4)$ **d)** $(2, 0)$

3)a) $x = 3, y = 2$ **b)** $m = -1, n = 5$ **c)** $a = 6, b = 2$ **d)** $h = -1, k = -2$

4)a) 11 **b)** 17

5)a) \$50/day **b)** \$0.20/km

W4 – Solving Problems Involving Linear Systems

Unit 1

MPM2D

Jensen

- 1) Leanne works at a greenhouse. She needs to plant a total of 32 bulbs. Two types of bulbs are available. She is asked to plant three times as many crocus bulbs as tulip bulbs. How many of each should she plant?
- 2) James looks in his TV cabinet and finds some old Beta and VHS tapes. He has 17 tapes in all. He finds that he has three more Beta tapes than VHS tapes. How many of each type does he have?
- 3) The girls' soccer team held a fundraising car wash. They charged \$5 for each car and \$8 for each van. They washed 44 cars and vans and collected \$262. How many of each type of vehicle did they wash?

4) Rehman invests his summer earnings of \$3050. He invests part of the money at 8% per year, and the rest at 7.5% per year. After 1 year, these investments earn \$242 in simple interest. How much did he invest at each rate?

5) To join Karate Klub, David must pay a monthly fee of \$25 and an initial fee of \$200. If he chooses Kool Karate, he must pay an initial fee of only \$100 but \$35 per month.

a) After how many months is the cost the same at either karate club?

b) If David plans to try karate for 6 months, which club should he join?

c) If David decides to do karate for a year, which club should he join?

6) White vinegar is a solution of acetic acid in water. There are two strengths of white vinegar, a 5% solution and a 10% solution. How many ml of each solution must be mixed to make 50 ml of a 9% vinegar solution?

7) It took a patrol boat 5 hours to travel 60 km up a river against the current, and 3 hours for the return trip with the current. Find the speed of the boat in still water and the speed of the current.

8) Kareem took 5 hours to drive 470 km from Sudbury to Brantford. For part of the trip, he drove at 100 km/h. For the rest of the trip, he drove at 90 km/h. How far did he drive at each speed?

Answers

- 1) 24 crocus bulbs and 8 tulip bulbs
- 2) 10 beta tapes and 7 vhs tapes
- 3) 30 cars and 14 vans
- 4) \$2650 at 8%/year and \$400 at 7.5%/year
- 5) a) 10 months b) Kool Karate c) Karate Klub
- 6) 10 ml of the 5% solution, 40 ml of the 10% solution
- 7) boat in still water 16 km/h; current 4km/h
- 8) 200km at 100km/h; 270 km at 90km/h