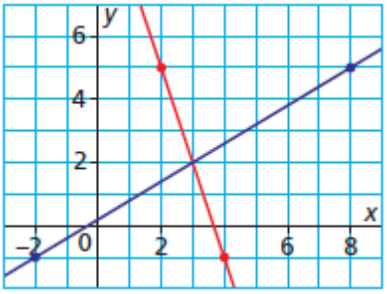
Math 10

Lesson 5-5 Love solving those linear equations

I. Assignment

1.



a) Which linear system is modelled by this graph? Explain how you know.

b) What is the solution of the linear system? Is it exact or approximate? How do you know?

2. To solve the linear system below by graphing, George and Sunita started with different steps:

$-x+4y=10$ ①

$4x-y=-10$ ②

George's Method

Equation ①: plot (0, 2.5) and (–10, 0)

Equation ②: plot (0, 10) and (–2.5, 0)

Sunita's Method

Equation ①: graph $y=\frac{1}{4}x+2.5$

Equation ②: graph $y=4x+10$

a) Explain what each student will probably do next.

b) Choose either method. Solve the linear system by graphing.

3.

a) Graph to solve this linear system.

$4x - 2y = 1$

$3x - 4y = 16$

b) Say whether the solution is exact or approximate, and how you know.

4. Use graphing technology to solve each linear system.

a) $2x+3y=13$, $5x-2y=1$

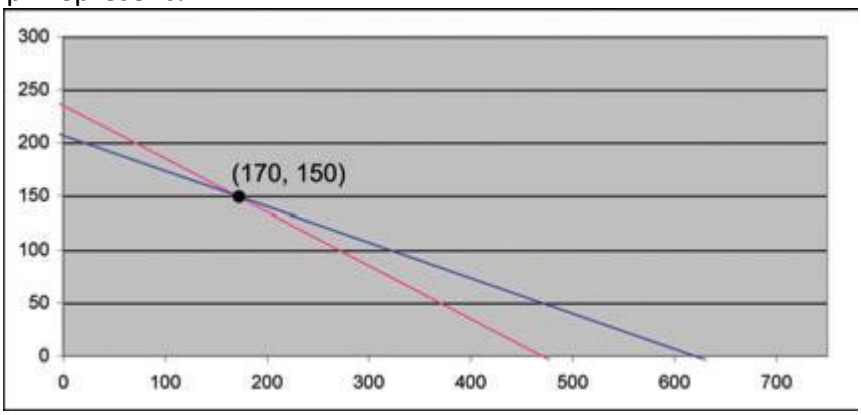
b) $y=\frac{1}{6}x-2$, $y=-\frac{1}{6}x+2$

c) $4x-5y=20$, $8x+5y=19$

5.

a) Write a linear system to model this situation: Table salt contains 40% sodium, and health experts recommend that people limit their sodium intake. For breakfast, Owen ate 2 bowls of cereal and 4 slices of bacon that contained a total of 940 mg of sodium. Natalie ate 1 bowl of cereal and 3 slices of bacon that contained a total of 620 mg of sodium.

b) This graph represents a linear system for the situation in part a. What does each line in the graph represent?



c) Solve this related problem: How much sodium is in 1 bowl of cereal and in 1 slice of bacon? Is the solution exact or approximate? How could you find out?

6. Solve each linear system by substitution.

a) $\begin{aligned} x+y&=-5 \\ x+3y&=-15 \end{aligned}$

b) $\begin{aligned} 7x+y&=10 \\ 3x-2y&=-3 \end{aligned}$

c) $\begin{aligned} \frac{1}{2}x+3y&=\frac{5}{6} \\ \frac{1}{3}x-5y&=\frac{16}{9} \end{aligned}$

d) $\begin{aligned} 0.6x-0.2y&=-0.2 \\ -0.03x-0.07y&=0.17 \end{aligned}$

7.

a) Why did Laura multiply equation ① by 4 and equation ② by 6 before she solved this linear system?

$$-\frac{3}{2}x-\frac{1}{4}y=-\frac{1}{2} \quad ①$$
$$\frac{1}{3}x+\frac{5}{6}y=\frac{19}{3} \quad ②$$

b) Why will the new linear system have the same solution as the original system?

c) Solve the linear system.

8.

a) Write a linear system to model this situation: Paul made bannock to celebrate National Aboriginal Day. He measured $5\frac{3}{4}$ 5 cups of flour using a $\frac{1}{4}$ cup measure and a $\frac{2}{3}$ cup measure. Paul used 1 more $\frac{1}{4}$ cup measure than $\frac{2}{3}$ cup measure.

b) Solve this related problem: How many measures of each size did Paul use?

9. When 30 identical rectangular tables are placed end to end, their perimeter is 306 ft. When the same tables are placed side by side, their perimeter is 190 ft.
   a) Draw a diagram of the first 3 tables to illustrate each arrangement.
   b) Write a linear system to model the situation.
   c) Solve the linear system to solve this related problem: What is the width and length of each table?

10. Sofia sketched a design for a blanket. She made the design with 150 shapes that were equilateral triangles and squares. Eighty-three of the shapes were blue. Forty percent of the triangles and 60% of the squares were blue. How many triangles and how many squares were in the design?

11. Solve each system by elimination.

a) $\begin{cases} -3x - y = 5 \\ 2x + y = -5 \end{cases}$ b) $\begin{cases} 2x - 4y = 13 \\ 4x - 5y = 8 \end{cases}$ c) $\begin{cases} 3x - 4y = 8.5 \\ 4x + 2y = 9.5 \end{cases}$

12. The key in one type of basketball court has the shape of a rectangle and a semicircle, with perimeter approximately 68 ft. The length of the rectangular part of the key is 7 ft. longer than its width.

   a) Write a linear system to model the situation.
   b) Solve this related problem: To the nearest foot, what are the length and the width of the rectangular part?

13.
   a) Write two linear systems where one system has infinite solutions and the other system has no solution.
   b) How can you use graphs to show the number of solutions of each linear system?
   c) How can comparing the slope-intercept forms for the equations in the linear system help you determine the number of solutions?

14. Grace and Olivia have 2-digit numbers on their hockey jerseys. They wrote three sets of clues to help some friends identify these numbers.
    Clue 1: The difference between the two numbers is 33.When you triple each player's number then subtract, the difference is 99.
    Clue 2: The sum of the two numbers is 57.When you divide each number by 3 then add the quotients, the sum is 20.
    Clue 3: The sum of the two numbers is 57. Their difference is 33.
    a) Which clues do not provide sufficient information to identify the two numbers? Explain.
    b) Identify the numbers using the clues that are sufficient. Verify that you are correct.

15. Determine the number of solutions for each linear system. Describe the strategies you used.

a) $\begin{cases} -x+5y=8 \\ 2x-10y=7 \end{cases}$

b) $\begin{cases} -\frac{3}{2}x+\frac{1}{4}y=-\frac{1}{4} \\ \frac{3}{4}x-\frac{y}{8}=\frac{1}{8} \end{cases}$

c) $\begin{cases} 0.5x+y=0.3 \\ -x+2y=0.6 \end{cases}$

d) $\begin{cases} 2x-y=-5 \\ 6x-3y=15 \end{cases}$