Key

Functions, Systems, and Equations

Review for test

7 A local radio station sponsors a T-shirt toss and floppy hat drop during home pro basketball games. The T-shirts cost the radio station $8 each, and the hats cost $12 each.

a. The promotional cost C for the radio station depends on the numbers of shirts s and hats h given away at the game. Write a rule expressing C as a function of s and h.

$C = 8s + 12h$

b. How will the radio station's cost change as the number of shirts given away increases? How will cost change as the number of hats given away increases?

Costs will increase $8 per shirt and $12 per hat.

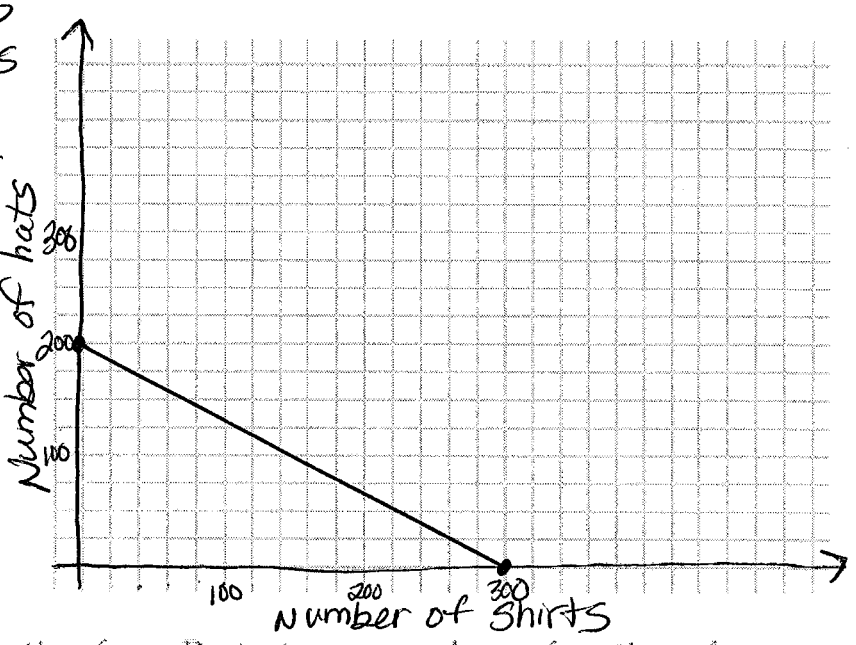
c. Suppose the radio station has budgeted $2,400 per game for giveaways. Write an equation that represents the question, "How many shirts and hats can the radio station give away for $2,400?"

$2400 = 8s + 12h$

d. List 4 solutions to your equation from Part c. Draw a graph that shows all of the possible solutions.

Answers will vary. Some possible solutions are:

300 shirts and 0 hats
150 shirts and 100 hats
75 shirts and 150 hats
0 shirts and 200 hats



e. Rewrite your equation from Part c to express h as a function of s. Explain what the slope and h-intercept of this linear function tell you about the situation.

$2400 = 8s + 12h$
$-12h \quad -12h$
$\frac{2400 - 12h}{8} = \frac{8s}{8}$
$s = (2400 - 12h)/8$

$s = 300 - 1.5h$

Slope: For every hat given away, 1.5 fewer shirts can be given away

s-int: If 0 hats are given away, then 300 shirts are given away.

Rewrite each of the following linear equations to express y as a function of x. Determine the slope and y-intercept for the graph of the solution set of each equation.

a. $2x + y = 6$
$-2x \quad -2x$
$y = 6 - 2x$

Slope: -2
y-int: 6

b. $8x - 5y = 20$
$-8x \quad -8x$
$\frac{-5y}{-5} = \frac{20 - 8x}{-5}$
$y = -4 + \frac{8}{5}x$

Slope: $8/5$
y-int: -4

c. $-4x - 3y = 15$
$+4x \quad +4x$
$\frac{-3y}{-3} = \frac{15 + 4x}{-3}$
$y = -5 - \frac{4}{3}x$

Slope: $-4/3$
y-int: -5

1. To participate in a school trip, Kim had to earn $85 in one week. Kim could earn $8 per hour babysitting and $15 per hour for yard work, but Kim's parents limit work time to 8 hours per week.

a. Write two equations, one that represents the condition on total number of hours to be worked and the other which relates the number of hours worked at each job toward the fund-raising goal.

$x + y = 8$

$8x + 15y = 85$

x = # hours babysitting
y = # hours doing yard work

b. Solve the system of equations you wrote in Part a to find out how many hours Kim will have to work at each job to exactly meet the income goal and the time constraint.

By substitution:

$y = 8 - x$

$8x + 15(8 - x) = 85$

$8x + 120 - 15x = 85$

$-7x = -35$

$x = 5$

$y = 8 - 5 = 3$

5 hrs babysitting
3 hours yard work

By elimination:

$-8(x + y = 8) \Rightarrow -8x - 8y = -64$

$8x + 15y = 85 \Rightarrow 8x + 15y = 85$

$7y = 21$

$y = 3$

$x + 3 = 8$

$x = 5$

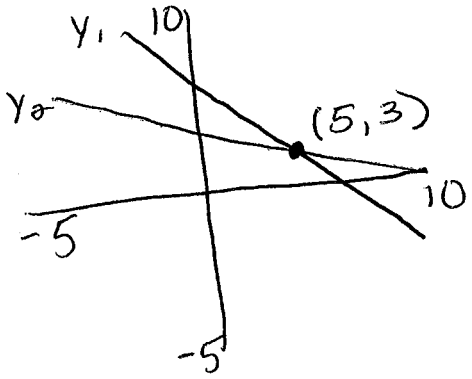
c. Explain why you chose that method to solve the system.

Answers will vary.

By graphing:

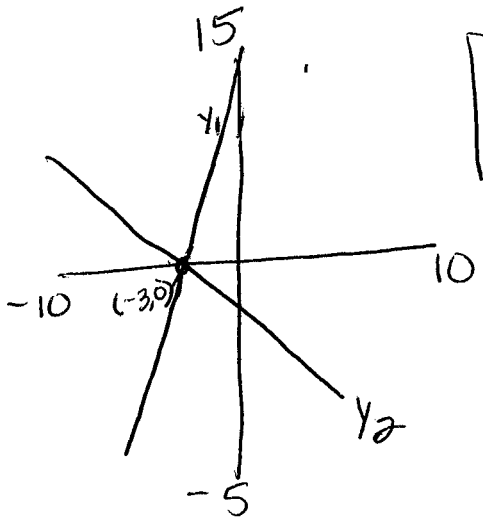
$Y_1 = 8 - x$

$Y_2 = (85 - 8x)/15$



2. Solve by graphing:

$\begin{cases} y = 5x + 15 & y_1 \\ y = -x - 3 & y_2 \end{cases}$



$x = -3$
$y = 0$

3. Solve by substitution:

$\begin{cases} y = 3x - 5 \\ 8x - 4y = 30 \end{cases}$

$8x - 4(3x - 5) = 30$

$8x - 12x + 20 = 30$

$-4x = 10$

$x = -2.5$

$y = 3(-2.5) - 5$

$y = -12.5$

4. Solve by elimination:

$3(2x + 3y = 5)$
$2(-3x + 2y = -14)$

$6x + 9y = 15$
$-6x + 4y = -28$

$13y = -13$
$y = -1$
$2x + 3(-1) = 5$
$2x - 3 = 5$
$2x = 8$
$x = 4$

OR

$2(2x + 3y = 5)$
$-3(-3x + 2y = -14)$

$4x + 6y = 10$
$9x - 6y = +42$

$\frac{13x}{13} = \frac{52}{13}$
$x = 4$
$2(4) + 3y = 5$
$8 + 3y = 5$
$3y = -3$
$y = -1$

Laura and Andy are trying to earn money to buy airplane tickets to visit their favorite aunt, Annie. Laura's ticket is going to cost her \$280 while Andy found a ticket for \$230 on the Internet. To earn their money, they have both decided to mow lawns and babysit. Laura charges \$7 per hour for babysitting while Andy charges \$5 per hour. To mow a lawn, Laura charges \$14 per lawn while Andy charges \$16 per lawn.

a. Write an equation relating income from Laura's work to her ticket cost. Use B to represent number of hours babysitting and L to represent number of lawns mowed. Use the same variables to write another equation relating income from Andy's work to his ticket cost.

Laura: $7B + 14L = 280$
Andy: $5B + 16L = 230$

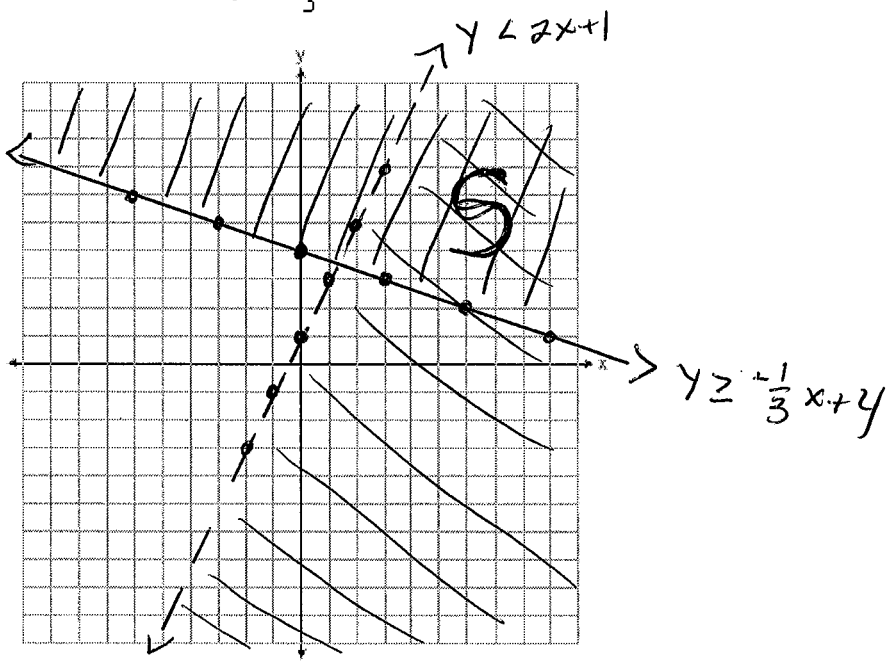
b. Is it possible that Laura and Andy could each reach their ticket price goal by mowing the same number of lawns and babysitting the same number of hours? If so, find those numbers; if not, explain how you know.

There is a possibility they could reach their goal. The common solution is 30 hrs of babysitting and 5 lawn jobs.

On the set of axes below, solve the following system of inequalities graphically.

$$y < 2x + 1$$

$$y \geq -\frac{1}{3}x + 4$$



State the coordinates of a point in the solution set.

Any point in the region labeled S.

(5,3) for example

Solve the following system of equations algebraically or graphically:

$y = x^2 + x - 6$

$y + x = 2$

Algebraically:

$y = x^2 + x - 6$

$y = 2 - x$

$x^2 + x - 6 = 2 - x$
$+x \quad +x$

$x^2 + 2x - 6 = 2$
$-2 \quad -2$

$x^2 + 2x - 8 = 0$

$(x+4)(x-2) = 0$

$x+4=0 \quad x-2=0$

$x = -4 \quad x = 2$

$y + -4 = 2 \quad y + 2 = 2$

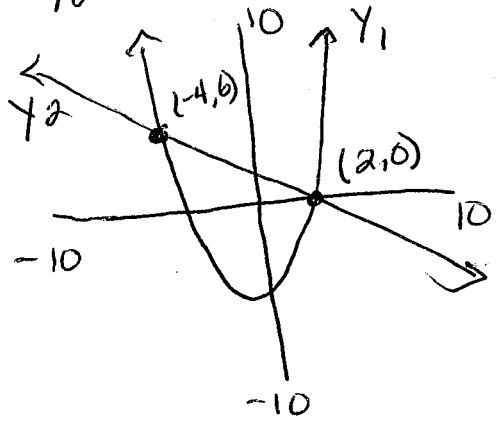
$y = 6 \quad y = 0$

$(-4, 6) \quad (2, 0)$

Graphically:

$Y_1 = x^2 + x - 6$

$Y_2 = 2 - x$



(-4,6) and (2,0)