10.A Juice Experiments

Nelson is continuing his quest for the perfect juice. You have been hired as a consultant to the G. Ale Bar Company to assist him. He ran out of apple juice and is making the 20-cup batches for the taste test using two kinds of juice.

Fruity Flavor: 50% cranberry and 50% apple

Berry Blend: 20% cranberry and 80% apple

Fruity Flavor		Berry Blend		Mixture	
apple	cran	apple	cran	apple	cran
5	5	8	2	13	7
7.5	7.5	4	1	11.5	8.5
$0.50x$	—	$0.80y$	—	—	—

1. Make a table like the one above. List at least six possible mixtures. Add two columns to the table, showing the percents of cranberry and apple in the mixture.

2. Find the minimum and the maximum amount of cranberry juice possible in one of Nelson's mixtures. Then find the minimum and the maximum *percent*.

3. Repeat problem 2 for apple juice.

How many cups of Fruity Flavor and Berry Blend would you need to use to make 20 cups each of the cranberry-apple mixtures in 4-7? (Some are impossible.)

4. 30% cranberry, 70% apple

5. 25% cranberry, 75% apple

6. 10% cranberry, 90% apple

7. Choose your own percentages.

8. In the last line of the table, what is the meaning of x and y?

9. For Nelson's mixtures, what is the sum of x and y?

For each equation, 10-15:
   a. Write, in words, an interpretation of it in terms of the situation.
   b. If possible, find a value of x and of y that satisfies the equation, keeping in mind the answer to problem 9.

10. $0.50x + 0.20y = 7$

11. $0.50x + 0.80y = 8$

12. $0.50x + 0.80y = 0.25(x + y)$

13. $0.50x + 0.20y = 0.25(x + y)$

14. $x + y = 25$

15. $x - y = 10$

16. **Report** Write an illustrated report summarizing the results of this investigation. Your report should include, but not be limited to, answers to the following questions:
   *   What determines the maximum and the minimum amount of each kind of juice possible in the mixture?
   *   What determines the maximum and the minimum percent of each kind of juice in the mixture?
   *   How could you use systems of equations to solve problems like 4 through 6? Give examples.