

Stephanie Whitney
High School (Algebra 2)
Cool Tools to Solve Word Problems
Percent Concentration Problems

A. Objectives:

- Students will build a model of a percent concentration problem and will develop a formula which can be used to solve similar problems
- Algebra 2 PASS Skill 2:11
Students will solve multistep problems using concepts of percents.
- NCTM Standards
Algebra 9-12
 1. Use symbolic algebra to represent and explain mathematical relationships.
 2. Draw reasonable conclusions about a situation being modeled.

Resources:

NCTM Illuminations activity “Making Sense of Percent Concentrations”

Found at <http://illuminations.nctm.org/LessonDetail.aspx?ID=L640>

Materials: (for each group)

- A container of white beads
- A container of red beads
- A measuring scoop
- 3 empty containers
- Copy for teacher of overhead projection sheet
- Copy for each student: student activity “Mix it up”, and assessment questions

B. Instruction

a. Introduction:

I will write an example of a mixtures problem on the board. For example (this is a problem from Saxon’s Algebra 2 book):

“Two solutions are to be mixed to make 50 ml of a solution that is 16% bromine. One solution is 10% Bromine and the other is 40% bromine. How much of each should be used?”

We will discuss what answers would make sense, which quantity we will need the most of and why. Next, I will show an overhead with some more sample thinking problems with percent in component mixtures (from Illuminations activity listed above)

<http://illuminations.nctm.org/Lessons/PercentConcentrations/MixItUp-OVH-Mixtures.pdf>

b. Instructional Process

I will break the students up into groups of two for the activity. I will give each group their materials and a copy of the mix it up activities sheet

(from Illuminations)

<http://illuminations.nctm.org/Lessons/PercentConcentrations/MixItUp-AS-Mixtures.pdf>

Overview of activity:

In this lesson, students will perform a hands-on-activity with mixtures of beads. They will create two mixtures in which they combine a given percentage of each color. After they create these, they will combine the two mixtures to create a third mixture and will determine the percent of each color of beads are used.

They will then come up with a formula to express the percents in the final mixture and use this formula to solve other mixture problems. They will also write their formula in words and let the other group try to use their formula to solve chemical mixture problems.

c. Closure

In closure we will discuss the formulas the students came up with and how these might be applied to solve other types of mixture problems (for example: mixtures with evaporation or total unknown).

C. Assessment

I will assess the students informally by monitoring and assisting them as they work on the project. In formal assessment, I will ask them to answer the questions on the following page using the formulas they created in the group. (The last six of these are taken from Saxon's Algebra 2)

D. Modification/Accommodations

Modifications could be to place students weaker in math/algebra skills with a stronger partner. Instructions for each step in the activity could be given orally as well to help a student who struggles with reading comprehension.

E. Reflection

I taught this lesson 9/1/06 as a review of percent concentrations to my pre-calculus class (3 seniors and 1 junior). They had struggled with this type of problem in Algebra 2. The activity seemed to help them to get a better grasp on the concept than they had in the past. They did still struggle with the problems that were applications on the worksheet, but the problem was the algebra involved in solving the equations, and when we had reviewed that they were fine.

Next time I teach this lesson I will go over more types of applications problems and review the algebra involved before I turn them loose on the questions from the worksheet.

I had to spend less time on the lesson than I would have wanted to due to activities around the school. I would like to designate 2 days to do the project and worksheet in the future.

Name _____

Percent Concentrations Worksheet

Find the percent of the final solution using the formula you developed in class.

1. Molly made a picture of lemonade by combining 4 cups of lemonade that was 5% lemonade instant with 4 cups of lemonade that was 20% lemonade instant. What percent lemonade instant was the final picture of lemonade?

2. Lolly preformed an experiment in chemistry class by combining a beaker containing 30 ml of a 50% saline solution with 20 ml of an 8% saline solution. Find the percent saline of the final solution.

Percent Application Problems. Put the information from the problems below into the formula you developed in class. Remember that when you have two solutions that have unknown quantities to write them both in terms of the same variable. For example if two quantities have a sum of 50, one quantity could be called x and the other $(50-x)$.

3. Two solutions are to be mixed to make 50 ml of a solution that is 16% bromine. One solution is 10% Bromine and the other is 40% bromine. How much of each should be used?

4. It was necessary to mix 1000 gallons that were 56% Fluorine. If one solution was 20% Fluorine and another was 80% Fluorine, how much of each one should be used?

5. A chemist has one solution that is 25% salt and 75% water and another solution that is only 5% salt. How many milliliters of each should she use to get 1400 ml of a solution that is 10% salt?

