

Mix it Up

NAME _____

In this activity, you will work with mixtures of two colors (in this case, using a container of beads) to understand the effect of combining two different mixtures and to predict the percent concentration of the final mixture.

Your group should have the following:

- a container of red beads
- a container of white of beads
- a measuring scoop
- three (3) empty containers

Label the empty containers as Container 1, Container 2, and Container 3.

1. Add 3 level scoops of red beads and 1 level scoop of white beads to Container 1. Assuming that each scoop has the same number of beads, what percent of the beads in Container 1 are red? (This value is known as the *percent concentration* of red beads.) Explain how you decided. Label the container appropriately.

2. Add 2 scoops of red beads and 3 scoops of white beads to Container 2. What is the percent concentration of red beads? Explain how you decided. Label the container appropriately.

Stir the beads in each container to ensure that the beads are evenly mixed.

3. Add one scoop from Container 1 and two scoops from Container 2 to Container 3. Estimate the percent of red beads in Container 3. Describe how you estimated the percent concentration.

4. Stir the beads in Container 3 so that they are evenly mixed.
- a. Remove a sample of beads from Container 3, and count the number of red and white beads.

Red: _____ White: _____

- b. Calculate the percent concentration of red beads in the sample. How closely does the mix in your sample match your estimate from Question 3?
- c. If your answers to Question 3 and 4a are very far off, which answer do you think is more accurate? Explain why you think that.

5. In the table below, summarize your answers from the above questions.

	CONTAINER 1	CONTAINER 2	CONTAINER 3
% CONCENTRATION OF RED BEADS			

6. Develop a strategy to calculate the percent concentration of red beads in Container 3. Use this strategy to determine the percent concentration if 1 scoop of a 75% mixture of red beads is combined with 2 scoops of a 40% mixture of red beads. If you do not get a reasonable answer, either refine your strategy or check your calculations.

7. Generalize your strategy. Write a formula (in words) that describes how to determine the percent concentration of red beans in Container 3 when the percent concentrations and the number of scoops from Containers 1 and 2 are known.
8. Test your word formula with another mixture. Separate the red and white beads and return them to their original containers. Make up the new problem by deciding how many scoops of each color to put into Containers 1 and 2. Then, determine the percent concentrations of red beads in each container. Finally, decide how many scoops from Containers 1 and 2 to combine in Container 3 for the final mix. (At each step, stir the beads so they are evenly distributed.)
- Calculate the percent concentration of red beads in Container 3 by taking a sample and counting the number of red and white beads.
 - Use your word formula from Question 7 to calculate the percent concentration of red beads in Container 3.
 - If your word formula did not yield similar results as the experiment, check your work and correct the formula as needed.
9. On a separate sheet of paper, write your formula and a description of how to use the formula for solving other mixture problems. Be clear in your instructions, because another group of students will use the process that you describe.

Exchange your instructions from Question 9 with another group of students. Solve the following problem using instructions from the other group.

Whole milk has a 4% concentration of fat, and low-fat milk has a 1% concentration of fat. If three cups of whole milk are combined with five cups of low-fat milk, what is the percent concentration of fat in the resulting mixture?

10. In the left column below, record the instructions or steps that the other group gave you. In the right column, show the work that you did to follow the process. Record the final solution in a complete sentence.

INSTRUCTIONS/STEPS AS DESCRIBED BY OTHER GROUP	YOUR WORK TO FOLLOW THE INSTRUCTIONS

11. Did the process yield reasonable results? Explain how you decided. If the answer is not reasonable, check your work. If necessary, help the other group revise their instructions, then make corrections above as needed.

12. In a complete sentence, record the correct solution to the word problem.