

## Lab Framework

**Text:**CORD Classic

**Unit number and title:**9 Using Ratios and Proportions

**Developed by:**Brian Ellis

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### Lab Title

## Using Ratios in Horticulture

**Contact Information:** (bellis@ephrataschools.org)

**Short Description:** (Using ratios in mixing soil for the greenhouse)

### LAB PLAN

**TEACHER:** Teacher Prep/ Lesson Plan

- **Lab Objective**
  - a. Explain greenhouse soil characteristics based on plant requirements.
  - b. Choose correct soil amendment according to plant requirements.
  - c. Calculate appropriate soil amendment ratios.
  - d. Correctly calculate volume of individual soil amendment to yield correct proportion.
  - e. Properly mix a soil according to proportions.
  
- **Statement of pre-requisite skills needed** (i.e., vocabulary, measurement techniques, formulas, etc.)
  - Unit 1 Learning Problem-solving Techniques
  - unit 2 Estimating Answers
  - Unit 3 Measuring in English and Metric Units
  - Unit 7 Working with shapes in Two dimensions
  
- **New Vocabulary**
  - Constant Ratio
  - Direct Porportional relationship
  - Equal Ratios
  - Grade
  - Inverse Proportional Relationship
  
- **Materials List**
  - a. Soil components (Vermiculite, Sand, Bark, Sunshine Mix #1, #2, Compost, Perlite, Peat Moss.)
  - b. Sunshine mix #1 is a light soil with lots of porosity.
  - c. Sunshine mix #2 is a light soil with more water holding capacity.
  - d. Sunshine mix #3 is a high water holding capacity soil typically used in seed germinating.
  - e. 1 gallon container
  - f. Concrete mixer/wheelbarrow/32 gallon garbage can
  
- **GLEs addressed**
  - Math: (1.1.5)
  - Reading: (Reading)

Writing: (Writing)

- **Leadership Skills**  
SAE (Supervised Agricultural Experience, CDE (Agronomy, Nursery/Landscape)
- **SCAN Skills**  
All
- **Set-up information**
  - a. Pick a particular soil mix (4:2:2:1)
  - b. Pick a convenient total volume needed to make.
  - c. Example 9 gallons then actually mix soils components in these proportions.  
Solution: the four components will add up to the total, so we can express this soil as  $4/9:2/9:2/9:1/9$ . Since our desired volume is 9 gallons, we can just multiply this out and we get 4:2:2:1 parts respectively. So the steps are to add the four components to get the total. The ratio of each component is the amount of material- for the first one, 4- divided by the total. This gives us  $4/9$ . We then multiply that by the desired volume- in this case 9- to get our final answer, 4.
- **Lab organization(-Grouping/leadership opportunities/cooperative learning expectations; -Timeline required)**
  - Students can be put in groups of two
  - Students can pick 4 components of soil Total weight needs to be 9lbs.
  - Use the soil mix to plant 4 petunia plants
  - Record the ratios and record them on the flower pots
  - Observe plant growth and discuss with other students
- **Teacher Assessment of student learning** (scoring guide, rubric)
  - Students will be graded on the ability to do ratios
  - Lab set up and clean up
  - Data entry and final results
- **Summary of learning** (to be finished after student completes lab)
  - discuss real world application of learning from lab
  - opportunity for students to share/present learning
  - Explain the math concept or theory and show students how it applies using the terminology of math. (Enhance the math in your lesson)  
Fractions are an easy way to represent ratios and proportions, and that's what we've been using here. What do we call this number on top? (numerator) Numerator means number- and the numerators in the example problem are just the number- or amount- of each component. What do we call this number on the bottom (denominator). Where have you seen the word "denomination" used? (with respect to money) Denomination means "name" or "identification." In our example, the denominator identifies the total. How do we figure out the total? (add the components or numerator) Then we can represent the proportion of each component as the numerator, or number, divided by the denominator or total. Our desired volume can be thought of as the number of totals we want at the end. For the materials that we want 2 of, we want 9 times  $2/9$ , or 2 gallons each, for our final mix.
- **Optional activities**
  - Challenge students and Expand the enhancement

Groups of students determine correct soil ratios needed for situations listed below and then use proper equipment to mix the correct ratio to be used in the greenhouse.

- a. Hanging basket with high water leaching capability.
- b. Seedling mix with increased water holding capability.
- c. Cactus mix with increased water leaching capability.

Ask students to identify another situation where ratios could be used to solve a problem, write a story problem to describe the situation and solve the problem.

- **Career Applications**
  - Horticulturists
  - Farming
  - Restaurant Industry
  - Business

**LAB TITLE: Using Ratios in Horticulture**

**STUDENT INSTRUCTIONS:**

- **Statement of problem addressed by lab**  
What ratio of soil mix is best for growing plants
  
- **Grouping instructions and roles**  
Students can be put in groups of two  
Students can pick 4 components of soil Total weight needs to be 9lbs.  
Use the soil mix to plant 4 petunia plants  
Record the ratios and record them on the flower pots  
Observe plant growth and discuss with other students
  
- **Procedures – steps to follow/instructions**  
Choose 4 components for your soil mix and weigh them to make a total of 9lbs of your soil  
Record the weight of each component  
Write out the ratio for each component  
Plant 4 petunias (one to a pot)  
Record the ratios on the flower pots  
Observe and record plant growth
  
- **Outcome instructions**  
Students will observe differences in plant growth depending on the soil components and the ratios that were mixed
  
- **Assessment instructions (peer-teacher)**  
You are graded on ratio conversions  
Lab set up and clean up  
Data entry and journaling

## **Lab Data Collection**

**Student:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Unit:** 9 \_Using Ratios and Proportions\_\_\_\_\_

**Lab Title:** Soil Ratios

**Criteria:** Write the problem/objective in statement form

**Data Collection:** Record the collected/given data

**Calculations:** Complete the given calculations to solve for an answer(s)

**Summary Statement:**

**Other Assessment(s)**