

# MATH IN THE WETLANDS FIELD TRIP

Summer Field Trip #2

## Summary

Students conduct hands-on restoration and monitoring projects utilizing the fraction and volume math concepts they are covering in summer school. This practical application of math concepts includes transplanting native plants and monitoring invasive plant populations using transects and quadrats.

## Objectives

Students will:

- Know how to record data in a simple chart.
- Know how to make predictions based on a data set.
- Understand how to compute volume in a real-world situation.
- Understand at least one real-world application of the use of fractions
- Know the correct procedure for transplanting plants.

## California Content Standards Addressed

Grade Five - *Science 6.g*: "Record data by using appropriate graphic representations and make inferences based on those data."

Grade Five - *Mathematics; Number Sense 2.3*: "Solve simple problems including ones arising in concrete situations, involving the addition and subtraction of fractions and mixed numbers, and express answers in the simplest form."

Grade Five - *Mathematics; Measurement and Geometry 1.3*: "Understand the concept of volume and use the appropriate units in common measuring systems to compute the volume of rectangular solids."

Grade Five- *Mathematics; Statistics, Data Analysis, and Probability 1.3*: "Use fractions and percentages to compare data sets of different sizes."

Grade Six- *Mathematics; Number Sense 2.4*: "Determine the least common multiple and the greatest common divisor of whole numbers; use them to solve problems with fractions."

Grade Six- *Mathematics; Statistics, Data Analysis, and Probability 3.2*: "Use data to estimate the probability of future events."

## The Basics

### Grade Level

6-8

### Subject Areas

life sciences

### Duration

2-3 hours (Depending on transportation and teacher availability)

### Number of Docents needed: 4-5

(With docent training prior to field trip)

## Outline

*There are six pieces to this lesson:*

- 1) Introduction (10 minutes)
- 2) Transplanting and Volume Math (35 minutes)
- 3) Explanation of transect Study (5 minutes)
- 4) Field Transect Study (30 minutes)
- 5) Classroom Math Activity and Analyzing Results (30 minutes)
- 6) Evaluation and Snack (10 minutes)

## Materials and Handouts

*All handouts referred to in this section can be found in the Summer Program Field Trip #2 folder at the WERC. Or, you may print out the .pdf files from the website.*

- 1) Glass container of M&M's and lemon drops from second presentation (See materials and procedures in Summer Program classroom Presentation #2 lesson plan)

*For transplanting and volume math:*

- 1) A large amount of native plants ready for transplanting (At least one for each student)
- 2) Potting soil
- 3) Bone meal
- 4) Fish meal
- 5) Kelp meal
- 6) Measuring cups with ounce marks (one for each student)
- 7) Transplanting pot (one for each student)
- 8) Gardening gloves (one pair for each student)

*For transects and classroom math:*

- 1) 4 or 5 quadrats (See materials section in Summer Program classroom Presentation #2 lesson plan for explanation and directions for construction.)
- 2) Bristly Ox Tongue fraction posters from Summer Program Classroom Presentation #2.
- 3) 2 measuring tapes
- 4) Stakes

5) Signs for transects A and B. These can be found in the tool shed at the WERC. Or they may be constructed by staple gunning a cardboard sheet to a wooden post or sturdy plastic rod. Then write Transect A on one and Transect B on the other.

6) Overhead projector and screen

7) Transparency of “Quadrat Math Classroom worksheet”.

*For each student:*

- 1) A copy of “Soil Recipe and Volume Math” worksheet
- 2) 2 copies of “Quadrat Field Study worksheets”
- 3) A copy of “Quadrat Math Classroom Worksheet”
- 4) Clipboard and pencil
- 5) A copy of “Summer Math Program Post Participation Evaluation”
- 6) Snack

## **Procedure**

### **1) Introduction (10 minutes)**

- Re-introduce yourself and docents.
- Ask the students if they remember the word “restoration” from your last presentation. What does it mean? What are some examples of restoration? Show the students the glass container with M&M’s and lemon drops used in the last presentation. Ask the students what the M&M’s represent? The lemon drops? How can we help the native plant seeds fight against the invasives?
- Tell the students that they will do some restoration. They will do some transplanting and monitoring. You may wish to use these words or to explain the processes without using the vocabulary depending on the maturity of the group. Either way, describe why they are important.
- Go over the agenda for the day.

### **2) Transplanting and Volume Math (35 minutes)**

- 1) Explain to the students that they are going to transplant some native plants in small containers to bigger containers. Why is this important? What is the point of transplanting? (To help the plant become stronger before we plant it in the wetland.) Show the students which plants they are working with and demonstrate the correct way

to transplant it. Have the students repeat back to you how to transplant without hurting the plant.

- 2) Also, explain that in addition to transplanting, the students are creating their own soil mixture for the new pot. *At this time, pass out the Soil Recipe and Volume Math sheet.* Go over the sheet with the kids. Explain that they must come up with the proper ounce amounts for the various soil inputs (potting soil, fish meal, kelp meal, bone meal) by using the given fractions. All students must write down the correct answers and get their answers checked by a docent before creating their soil mixture and transplanting their plants. Tell them to ignore the bottom part of their sheet that asks them about watering the plants. You will give them instructions for that later.
- 3) Have the students work on the sheet in small groups while docents float around and help. Once everyone in a group has gotten the correct answers, they may move to the worktables.
- 4) Have each docent stay with each small group and make sure that the students are using the measuring cups correctly, measuring correct amounts, and treating their transplants with care.
- 5) Once a group is done with all their transplants, explain to the group the next step on their sheet. It is time to water the transplants but we have made it into an experiment. Demonstrate filling a measuring cup up to the top and then pouring the water over the transplant until water comes out the bottom. Then stop and count how many ounces of water went into the transplant pot.
- 6) Let the students work on the watering portion of their worksheet. Have them put their watered transplants in a designated tray and clean up their workstation. Come back together in the outdoor classroom once all the students have finished. If some groups finish before others, the docents may show their groups around the greenhouse and native plant garden.

### **3) Explanation of Transect Study (5 minutes)**

*The first part of this explanation is in Classroom Presentation #2. It is a good idea to look up the end of that lesson before reading this lesson.*

- 1) Ask the students if anyone remembers from your last presentation what a transect is? What about a quadrat? Does anyone remember the fraction estimation activity? Refresh

their memories by putting one of the Bristly Ox Tongue fraction posters on the ground with a quadrat over it. Can anyone guess the fraction of B.O.T. in the square?

- 2) Now we are going out onto the ESHA to monitor how well the Bristly Ox Tongue is doing. There might be a smaller amount of it in the areas where we have done restoration. Why might that be? Is that good or bad for the wetland? We are going to monitor the ESHA using the fraction estimation method that we have been practicing.
- 3) Explain that there are two tape measures labeled A and B. The tape measures will be our transects. Have each of the groups stand together. Each group will get a quadrat numbered to correspond with their group number. Explain that each group will put their quadrat on the ground at each transect where the group number corresponds to a tenth. For instance, group one puts their quadrat down at number 10 on the tape measure, group two put their quadrat down at number 20 on the tape measure, and so on.
- 4) Pass out the Field Transect Activity worksheets so that each student has two. You may explain how to fill it out in a large group or train the docents ahead of time on how the sheets work and have docents explain it to their small groups.
- 5) It is time to head out on to the ESHA.

#### **4) Field Transect Study (30 minutes)**

*At this time, the students are in small groups. The docents lead the groups to Transect A then Transect B where they put the quadrats down at their specified spot on the tape measure and estimate the fraction of the square that B.O.T. is taking up. The students are encouraged to draw what they seen in the square on to their sheets to help them estimate. Make sure they are not putting the quadrats directly over the tape measure. They have a full 30 minutes for this so encourage them to take their time.*

#### **5) Classroom Math Activity and Analyzing Results (30 minutes)**

*When all the students are done on the ESHA, have them go into the classroom and sit in their groups at the tables.*

- 1) Turn on the overhead and put the transparency of the Field Transect Classroom worksheet on the overhead fill out the first section with the fractions that each group estimated for each transect. Pass out the Classroom worksheets to each student and give them time to copy down the class data from the transparency.

- 2) Now work through the sheet with them section by section. At the beginning of each section give them the math tools they need to complete the section. Give them an example or do one of the fractions together. They must work in their groups to find the answers for the rest of the section. When it seems that they are done go over the section together as a class, writing the correct answers on the transparency as you go. They might not have gotten to improper fractions yet in school so you might have to explain this concept in order to do the last two sections.
- 3) Once the worksheet is complete, ask the students which transect had more Bristly Ox Tongue? A or B? Why might this be? Is the restoration working? What should we do to make it better?
- 4) Thank the class for helping the WERC with monitoring the restoration work.

#### **6) Snack and Evaluations (10 minutes)**

- 1) Pass out snack and evaluation sheets. Students should fill out sheet while eating.
- 2) When they are done with evaluations, collect clipboards, pencils, and evaluations. The students get to keep their other worksheets or put them in the recycling.
- 3) Collect trash from snack.
- 4) If there is time do a closing circle with the students. If not, thank the kids for participating and ask them to thank the docents.