Applied Math Lab
(Supplemental for CORD Algebra 1)

Text: CORD
Volume: 1 Chapter: 2
Unit number: 9
Title of unit: Using Ratios and Proportions
Developed by Michael Callahan, Shoreline School District,
Michael.callahan@shorelineschools.org
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Outline:

1. **Overview and Lab Instructions**
2. **Student Handout(s)**
3. **Rubric**

In this lesson, students apply proportions to examine real life questions. In "Little People Rule", they pretend to be shrunk to one foot tall. They measure items in the classroom and use ratios and proportions to find out the size of these items if they are shrunk proportionately. Then they write a story like Gulliver's Travels using their numbers.

Little People Rule

LAB PLAN

TEACHER: *(Teacher Prep/Lab Plan)*

- **Lab Objective**
  Students will write proportions in a real life example.
  Students will practice measuring in English and metric units.
  Students will use tools to measure quantities and solve problems that involve scaling these measurements.

- **Statement of prerequisite skills needed** *(Vocabulary, Measurement Techniques, Formulas, etc.)*
  Students must be familiar with measuring using a tape measure.
  Students must be able to write a fictional story in a one-paragraph format.

- **Vocabulary**

Ratio	Precision
Proportion	Accuracy
Scale	Equality
Tape measure	Numerator/denominator

- **State Standards addressed:**
  - **Math (PARTIAL):**

A.1.1.A Select and justify functions and equations to model and solve problems
A.1.2.D Determine whether approximations or exact values of real numbers are appropriate depending on the context and justify the selection
A.1.3.B Represent a function with a symbolic expression, as a graph, in a table, and using words and make connections among these representations
A.1.8.A Analyze a problem situation and represent it mathematically

  - **Writing:**

3.3. Know and applies writing conventions for the appropriate grade level

  - **Leadership**

Students work in pairs that must communicate to record their measurement data. One student will report their calculations to the class.

SCAN Skills/Workplace Skills:
Writing: B. Records information completely and accurately.
Arithmetic: Performs basic computations. D. And uses tables to convey quantity information.

- **Teacher Preparation:**
  - Materials:

Group Materials: chart paper and markers
Student Materials: Tape measure, table hand out, calculator

  - Set-Up Required:

Teacher should locate a reading passage that involves scale as an anticipatory activity (Gulliver's Travels, One Foot Tale, etc.)

- **Lab Organizational Strategies:**
  - Grouping/Leadership/Presentation Opportunities:
    Pairs are used to measure and calculate proportions. Some will be asked to volunteer their results from the pair. But.
  - Expectations:
    Each student will hand in a table with measurements, calculation of proportions, and the writing passage
  - Time-line:
    One math lesson approx. 40 minutes to receive instruction and modeling on how to measure and calculate proportions
    One writing lesson approx. 20 minutes to write passage

- ***Introductory Ideas:***

Read a passage from "Gulliver's Travels", "If You Could Hop Like a Frog", or other text involving scaling/shrinking/growing as a class, and do a few of the conversions to get the students thinking about how the world would be different if they had attributes in proportion to animals or other stages of life.

- ***Explore Ideas:***

Model one of the items on the worksheet so students have a grasp of what they need to explore. After modeling one of the items, turn the students loose with measuring tools to find the measurements needed on the worksheet. The students should work alone or in pairs. Once students have the proper measurements, they need to set-up and solve the proportions for each item measured.

Once all students have completed the measurements and set-up and solved the proportions to find the "new size" values, the students have to write a 3- to 5-paragraph story. The story needs to have at least an introduction paragraph, a body paragraph(s), and a conclusion. The story needs to be written in a manner as if they were shrunk down to one foot tall. They also need to include at least 5 items from the worksheet into their story. (Some students will include their own test using their measurements at the end of the story. Some students will draw pictures to illustrate their stories. Students should be given an opportunity to present their stories to the class voluntarily for extra credit).

Below is a brief example of a story (may be good to read to class to get them started):

"The Incredible Shrinking Woman"

"One day after the final school bell rang at 3:05, I was outside my classroom doing hall duty. When I returned to my room I discovered a surprise on my desk, a small bag of tasty looking chocolates. There was no note, but I was hungry so I took my first bite. Immediately, the room began to expand until it seemed the ceiling was miles away. Suddenly, I realized I had shrunk. I ran around in circles calling for help until I stumbled over a large wooden plank. I soon realized it was a ruler; I laid down next to the ruler and discovered that instead of being 5'3" tall, I was now exactly one foot in height.

I decided I had nothing to lose so I pulled out another chocolate – that one inch square chocolate had shrunk with me. I ate the shrunken chocolate and leaned against a desk to think. Suddenly, the desk shrunk proportionally with me…

- ***Summarize Ideas:***

Many middle school students have poor writing skills. Therefore, before starting the writing portion of the activity, you will probably want to review how to write a paragraph, story, etc.

This is a lab that you would want to use once your students are introduced to the concepts of ratios and proportions. For this lab not much guided practice is required, outside of modeling one measurement on the worksheet. The whole project is a good application of proportions that should give them a more personal view and a better understanding of proportions.

- **Post Lab Follow-Up/Conclusions**
  - Discuss real world application of learning from lab:
    - Where do we use scaling (maps, construction, models. Etc.)
  - Career Applications:
    - Trades, Architecture, Engineering
  - Optional or Extension Activities:
    - Do metric measurements after English
    - Build scale models or make maps

Name_____ Date_____

LITTLE PEOPLE RULE

What would the world be like if you were only one foot tall?

- The following project will help you answer this question.

1. Find the actual measurements of the items in the table (make sure you label the untis).

2. Write a ratio using your height in inches: 12" : _____ (actual height)

3. Set up a proportion for each item and write it in the appropriate space.

4. Solve the proportion (round answers to the nearest tenths place). Write your answers in the "new size" column (make sure you label).

"LITTLE PEOPLE RULE"
MEASURING AND SCALING
English Measurement

	Actual Height	**Proportion Set-Up**	**New Size**
Your Height			
Pencil			
Desk Length			
Desk Width			
Door Height			
Foot Length			
Chair Height			
Little Finger Length			
Room Length			
Room Width			

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SCORING RUBRIC

Score/Description	5 points	4 points	3 points	2 points
Measurements (rounded to nearest 1/2 inch or cm)	10 measurements	5 measurements	3 measurements	2 measurements
Proportions-Scale Set up	At least 8 are correct	At least 3 are correct	At least 1 is correct	None are correct but work shown
Calculation of New Sizes	At least 6 are accurate	At least 2 are accurate	None are accurate	Little focused effort made
Additional items measured beyond those supplied (extra credit)	3 or more	At least 2	At least 1	None
Leadership – class sharing/coaching	Volunteer to present and helped partner	Helped partner	Put forward good effort	Limited support for the learning community
Writing	Three paragraphs with a beginning-middle-end	At least one paragraph with logical organization	A paragraph that follows intent of lesson	Name on paper and a few sentences

Total Possible Points = 30 pts. Scholars will have at least 20 pts.