Scale Drawings and Proportional Reasoning

STRAND: Computation and Estimation

STRAND CONCEPT: Practical Applications-Rational Number and Proportional Reasoning

SOL 7.3, 8.4

Remediation Plan Summary

Students apply proportions to solve practical problems, including those involving scale drawings.

Common Misconceptions

- Students may mix up the whole and the part when trying to write the proportion for the word problem.
- Students may mix up the units when solving scale drawing proportions.

Materials

- Meter or yard sticks
- Rulers
- Maps of Virginia
- String
- Scale Drawing recording sheet

Introductory Activity

Have students share the types of information that can be found on a map. (Display a map for reference.) Ask students if they have used a map to plan a trip, and explain that they are now going to use what they know about proportions to plan a trip, using a map. They are also going to apply what they learn about scale drawing to making a "blueprint" or map of the classroom. You may want to ask whether any students build models, which are always made to scale. If so, you might have those students explain what a "scale model" is. *What professions might use scale drawings?*

Plan for Instruction

1. Display a map of Virginia, pointing out that the map is drawn to scale—i.e., that it is not the actual size of Virginia, of course, but that its dimensions are *proportional* or *in proportion* to the dimensions of the state of Virginia. Have students locate the key on the map, which gives the scale. Point out that the scale is a ratio.

2. Distribute maps, string, rulers, and worksheets to pairs of students. Have students do Part 1 of the worksheet. Monitor the students as they measure with the string, making sure they are carefully following a road between cities. Check on the proportions that students set up. You may have to remind them about placing like dimensions in the same positions in the ratios.

3. Before assigning Part 2, have the students share the trips they planned, including the number of miles they will travel. Review what it means to say that you travel "60 miles per hour." Show students that this is the same as a 60:1 ratio.

4. Have students complete Part 2. They will have a partner check their computations. Discuss their results and check students' work to ensure the proportions are set up correctly.

5. Discuss Part 3 with the students. Then, have them work in pairs to complete the drawing. This will allow students to work from large to small and apply the notion of scale drawing. You may want to use a metric scale, such as 1 cm to 3 m, or 1:3.

Pulling It All Together

Exit Ticket: Have students write about the ways that scale drawing is used in daily life and explain why it is important.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

Virginia Department of Education 2018

Name:

Scale Drawing

The scale for the map is: _____

Part 1

With your partner, decide on a trip that you will make in Virginia. Determine where you want to start and where you want to finish. (For example, you may start in Richmond and travel to Abingdon to visit the Barter Theatre.) Place the end of your string on the start location, and carefully lay the string along the path of a road or roads that lead to the goal location. Mark the point on the string where it comes to the goal location. Then, straighten the string, and use a ruler to measure the string from start point to goal point.

Create a ratio table with your measurements. Write in the map scale in the first column and your measurements in the top of the next column. See if you can determine the actual distance between the two cities.

Scale (in)					
Actual (mi)					

Measure the distance for 3 other cities and determine the actual distance to the cities using the ratio table.

Another way to find out how many miles it is between the cities, is to set up a proportion. The first ratio is the scale of the map. The second ratio compares the length of the string to the distance between the start location and goal location. Be sure to put like units in the same positions in both ratios.

Part 2

Now that you know how far it is between the two locations, determine how much time it will take to travel that distance. Assume that you can average 60 miles per hour on the highway. How long will it take you to make this trip? Set up a proportion to find out. (A ratio table for number of hours and miles traveled might be helpful.)

Have a classmate check your work.

Part 3

Now, you and your partner will create a scale drawing of the classroom using a scale factor of 1 inch to 5 feet. Decide with your partner if you will show the placement of desks and other furniture. Then, make your measurements, and make your scale drawing.

Use a ratio table to determine scale measurements for the drawing. You may not need to use all of the columns in the table.

Scale (in)	1						
Actual (mi)	5						