

Scale Drawing

Lesson Plan

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Goal:

Grade and Course: 8th grade Mathematics

KY Standards: MA-08-2.2.1, MA-08-2.1.1, MA-08-3.1.4

Objectives: The students should learn to use ratio and proportions in real life situations. They should learn to be accurate in their measurements of lengths of objects and be able to scale down a 3-dimensional object to 2-dimensional drawings.

Resources/materials needed: Meter sticks, 1\4 in graph paper

Description of Plan: We work through one example of a scale drawing of an object in the classroom as a group. Then we find the dimensions of another object in the room and ask the students to individually complete a drawing. Finally, the students must create a scale drawing of an object not present in the classroom only using the measurements given.

Lesson Source: This is activity we wrote up, but there are many similar activities described on the web. Much of the inspiration is from the OPB NTTI website www.opb.org/education/ntti/2003/scalemedown .

Instructional Mode: Lecture and Group Work

Date Given: Feb. 5, 2008

Estimated Time: 1 hr

Date Submitted to Algebra³: Feb. 11, 2008

Scale Drawing

This is a three part activity.

Part 1 – Scale Drawing of the Board

This part should be done together as a class.

Step 1: Define scale drawing for the students as a drawing that is similar to the actual object. (Define similar figures if necessary.)

Step 2: Choose an object in the room to measure. We used the bulletin board. Have some students measure the length and the width of the board in cm. Write down these measurements.

Step 3: With the class, choose a scale factor. Keep in mind the size of the graph paper. If the squares are $1\frac{1}{4}$ in by $1\frac{1}{4}$ in, a good scale may be $10\text{cm} = 1\frac{1}{4}$ in. Use ratios to convert your measurements in cm to inches. Organize this information in a table comparing actual measurements to scaled measurements.

Step 4: Complete the scale drawing on the graph paper. Label the sides appropriately in cm or m.

Part 2 - Scale Drawing of a Desk

Step 1: Tell the students that they will make a scale drawing of Ms. Easterling's desk. They will be drawing three views of the table that are proportional to the real table but smaller. They will be drawing a plan view, as if they were looking down at the table from the ceiling, and two elevation views, as if they were sitting on the floor looking directly at the side of the table.

Step 2: As a class measure the dimensions of the desk. Choose students to measure the height, length, width, distance between legs on length, distance between legs on width, and distance of the empty space between the desk and the floor to the nearest cm, $\frac{1}{2}$ cm, or $\frac{1}{4}$ cm.

Step 3: Choose a scale factor and use ratios to compute the scaled measurements. On their graph paper, students should organize the information in a table that includes the actual dimensions and the scaled

dimensions of various table parts. Be sure the students understand that each measurement is scaled by the same factor and this creates proportional sizes.

Step 4: Once the table is completed, the students should create and label the scale drawing.

Step 5: Ask students to finish the activity by calculating some proportions from their measurement charts. They should explain how they know their drawing was proportional by using these calculations.

Part 3 -- Scale Drawing of the Great Pyramid of Giza



Step 1: Tell the students that now that they have seen how to make a scale drawing from an object in the room, they are going to make a scale drawing and model of the Great Pyramid in Egypt. Discuss what shapes you will see in a plan view and an elevation view of the pyramid.

Step 2: Give the students the dimensions of the pyramid. The length of the base is 755.5 ft and the height is 485 ft. Have the students choose an appropriate scale for the drawing. Use trial and error, showing the students some calculations for different scales.

Step 3: Draw the two views on graph paper. The plan view will show the area of the base divided into four triangles. The elevation view will be a triangle. Discuss with the students how they can draw the triangle even if they don't know the length of all the sides. (You can use the Pythagorean Theorem although this is not necessary.)

