



How Many Noses Are in Your Arm?

(Measurement)

Objective

Students will apply the concept of ratio and proportion to determine the length of the Statue of Liberty's torch bearing arm.

Overview of the Lesson

By showing different sized pictures of the teacher participating in a marathon race, students are introduced to the term *ratio*. Students view a video of the Statue of Liberty and are asked how long the arm would be if the nose measures 4 feet 6 inches. Given chart paper, string, and rulers, students develop their own strategy for finding the solution. They measure the length of their nose and the length of their arm and form a ratio. Using proportions, students compute the length of the statue's arm. Group results are displayed and compared. The actual length of the Statue of Liberty's arm is located in the almanac and compared to the lengths determined by the students.

Materials

Each Group:

- ① Rulers
- ② String
- ③ Almanac
- ④ Calculators
- ⑤ Chart paper and colored markers

Procedure

Introduce the lesson by using small and large photographs to review the concept of ratio. You may wish to have students investigate the relationship between their arm span and their height or the measurement of the length of their foot to the measurement of the distance around their fist. The ratio is about 1 to 1.

Form groups of four students each. Each student is to assume one of the following roles: recorder, calculator, task master and presenter.

Show a picture, or video, of the Statue of Liberty to the students. Have them identify it and share any facts about it.

Inform students that the Statue of Liberty's nose measures 4 feet 6 inches from the bridge to the tip. There may be students in your class that are about as tall as her nose is long!

Students can use the string, rulers, calculators and what they know about body parts to determine the length of the Statue of Liberty's right arm, the one holding the torch. Allow each group to decide on their problem solving strategies and to proceed on their own.

Note: Students can solve this problem without knowing formal procedures for solving proportions.

On chart paper, groups record the procedures and strategies they used to find their solutions. So that strategies can be compared, all of the charts are displayed.

Instruct students to find the exact length of her arm using references such as the almanac or the encyclopedia. (The actual length of her arm is 42 feet.)

Finally, if groups did not arrive at 42 feet, explore possible reasons for the discrepancies. Answers may include: the measure of their nose might not have been from the bridge to the tip; her body is not in proportion; her arm and torch would look too long if it were in proportion; if the arm is too long, it may not be able to withstand the weather and time; the artist did not know mathematics.

Extensions & Connections

Have each student compare the ratios of the measurement of the length of their nose to the length of their arm. Based on the class data, ask students to either support an argument for or against making a generalized statement concerning this ratio.

Resources

Burns, Marilyn. *About Mathematics*. (1992) Math Solutions Publications. Sausalito, California.

Ideas for Online Discussion

(Some ideas may apply to more than one standard of the **NCTM Professional Standards for Teaching Mathematics**.)

Standard 1: Worthwhile Mathematical Tasks

- ❶ This lesson used the Statue of Liberty as focus for the problem. When planning lessons, tasks should center around student interests, dispositions, and experiences. How do you select tasks that consider these factors?
- ❷ Students were left to develop their own strategies for determining the measure of the Statue of Liberty’s arm. Do you feel comfortable with this approach? When do you feel this “open-ended” approach should be used?

Standard 3: Students’ Role in Discourse

- ❸ This *Standard* recommends that students “should be the audience for one another’s comments.” (p. 45). Cite some examples of this from the lesson. What techniques do you employ to stimulate student discussion?

Standard 4: Tools For Enhancing Discourse

- ❹ Do you feel that incorporating a variety of learning tools in your lessons is an essential ingredient for promoting student discourse? Which commercial tool would you like to know more about?

Standard 5: Learning Environment

- ❺ In this lesson, a student corrected another student’s work. Sometimes students do not value other students ideas or comments. What do you do to foster respect for others’ ideas in small and large group settings?