

Title: Measuring Right Triangles in the Flags of the World

Grade: 6th

Objective:

Students will correctly record the measurement of the unknown side of three right triangles using the Pythagorean theorem.

Related SOL:

6.13 The student will

b) measure and draw right, acute, and obtuse angles and triangles.

Materials: 5 computers with internet access (CIA World Factbook); scrap paper; document camera

Time: 2 day lesson – 1 hour each day

Procedures:

1. Divide students into groups of three.
2. Give an overview of what will happen over the next two class periods. Give an example as reviewing the instructions.
 - Students will use the computers to find three flags of other countries that have right triangles in the patterns. When the groups have chosen three flags, the group's communication specialist will record the countries on the board to avoid repetition of countries across groups.
 - Students will then print off a picture of the three flags. Each member of the group will write down two numbers on small scrap sheets of paper (6 numbers total) and mix them up into one pile. Each member will select one flag and select two scrap sheets of paper. The numbers that each student selects will be the measurements of any two sides of the right triangle of his/her flag.
 - Working together, students find the missing measurement of the triangle. Students must write down all steps taken.
 - When finished, students are to use the CIA website to locate the country on a map and find two interesting facts about the country/flag.
 - The following day, students will present their work to the class in a way that they are teaching their classmates about the Pythagorean theorem. Using a document camera, students will show the flag and write the steps followed to find the missing side's measurement. Each presentation will be recorded through the document camera and one final class video will be made. The video will be posted to the class website's SOL Review folder.
3. Distribute handout with guidelines and instructions for the assignment.

Teacher Notes:

1. Lesson to follow instruction on Pythagorean theorem.
2. Have computers set up and internet on CIA website "Flags of the World" – <https://www.cia.gov/library/publications/the-world-factbook/docs/flagsoftheworld.html>
3. Work with colleagues to incorporate lesson with social studies unit and/or English.

Evaluation:

1. Assess student understanding of right triangles by the selection of flags.
2. Assess students' ability to use the Pythagorean theorem by the explanation of steps followed during the presentation and if the correct unknown measurements was found.

Differentiation:

Differentiation is built into the lesson when grouping students.

Source:

1. Original lesson plan by Laurie Goode.
2. Central Intelligence Agency. (2008). *The World Factbook: Flags of the World*. Retrieved November 3, 2008 from <https://www.cia.gov/library/publications/the-world-factbook/docs/flagsoftheworld.html>

Reflection

Bringing technology into the middle school math curriculum to support learning and to allow student interaction with the content is challenging, especially for teachers who teach math in a traditional sense strictly with algorithms. The lesson plan above is an attempt to integrate technology (computers and document cameras) with a curriculum that focuses on teaching algorithms. Students are using the knowledge of the Pythagorean theorem to explore the equation in concrete items (flags).

There are two uses of technology in the lesson. On day one, students use computers to find applicable flags and research information of the countries and/or flag. On the second day, the document cameras assist groups when teaching. The document camera also provides a method for recording the presentations. The technology supports the content of the Pythagorean theorem by demonstrating how math extends beyond the classroom, which is a common struggle for students. For example, if sewing one of the chosen flags, the equation could be used to determine the amount of material that would be needed to make a flag. It takes the equation off of the trivial triangle on paper and transposes it to an item that has a purpose.

The technology used inspires student learning by giving ownership of the work to the students. Allowing students to choose their own flags is intended to increase student motivation for the assignment. In addition, students are encouraged to be creative during their presentation on day two, being reminded that there is much that can be done with and without the document camera to make their presentation memorable (i.e. dressing up, singing a song, etc.).

The relative advantage of the technology used in this lesson is the amount of material accessible on one website (a collection of the world's flags) and the ability to easily archive the presentations. One way to use the recorded presentations is for standardized testing review later in the year. Without the computers, students may have to be given flags, removing choice from the lesson, or take time to research different flags from multiple sources, which would detract from the main objective of the lesson.

If the computers or website were to fail during this lesson, an alternative would be to have students create their own flags with different colors of construction paper. Though

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students would not be expanding their multicultural knowledge, they would be able to fulfill the requirements for this lesson which is to measure the unknown side of a right triangle. On day two, students could use a projector rather than the document camera to show the math steps, but this would not allow the presentations to be recorded. If a tape recorder was available, the presentations could be recorded in this way and paired with a copy of the transparencies to record the presentations. Also, students could take notes on the presentations to help remember the information for future use.