

Discipline: Mathematics

Standard Category: Geometry & Mathematical Problem Solving and Communication

Lesson Focus: Identify similar triangles and use SAS theorem to solve problems

PA Standard(s):	Related TESOL Standard(s):
2.9.11G: Solve problems using analytic geometry. 2.9.11I: Model situations geometrically to formulate and solve problems. 2.5.11A: Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.	Goal 2: To use English to achieve academically in all content areas. Standards 2: Student will use English to obtain, process, construct, and provide subject matter information in spoken and written form.

Key Objectives in Accordance with TESOL Level:

Pre-Conversational Beginning	Intermediate	Advanced
Students will be able to: • Determine height of an object using mirror method.	Students will be able to: • Use the SAS theorem to find the missing length of a similar triangle.	Students will be able to: • Solve problems using the SAS theorem.

Materials:

1. Worksheets
2. Paper
3. Pencil
4. Calculator
5. 9" x 12" wall mirror

Procedures: (ESL suggestions are written in italics)

1. Introduce activity to entire group.
2. Demonstrate, giving step-by-step instruction on how to find the approximate height of a person using the mirror method.
3. Work with partners to find height of different objects.

Mirror Method:

Place a mirror on the floor. Have teacher stand 2 meters away from the mirror, measuring from the middle of the mirror to the teacher. Have a student stand opposite teacher and as he/she looks down into the mirror, begin moving backwards until he can see the top of the teacher's head. Measure the distance from the middle of the mirror to the student. Measure the height from the floor to the student's eye level. Using the SAS theorem, find the approximate height of the teacher.

Suggested

Level:

High School

Lesson Focus:

Identify similar triangles and use SAS theorem to solve problems

Teaching

Strategies:

Whole group instruction

Peer work

Question for understanding

Use diagrams or drawings when explaining

Assessment

Strategies:

Evaluate math process, not language.

Accept labeled diagrams for "explanations"

Simplify language of problem

Explain why and how the SAS theorem works *using simplified language and diagrams for the benefit of ESL student*. Demonstrate how the mirror works.

SAS Theorem:

If the measures of two sides of a triangle are proportional to the measure of the two corresponding sides of another triangle and the included angle are congruent, then the triangles are similar.

When completed, have students work in groups of two or three to find height of different objects: Example, height of the walls, height of each other, height of the chalk board, or height of the class clock. *Pair an ELL with a student who might be able to help him, either with primary language or through motions*. If possible, have students find height of different objects outside, like the flagpole or the school building.

Once background knowledge has been established, introduce the following, depending on level of student and progress:

Problem Solving:

Landscaping: Lamar Presley is planning to landscape his yard. First he needs to calculate the height of the tree in his back yard. He sights the top of the tree in a mirror that is 6.0 meters from the tree. It s on the ground and faces up. Lamar is 0.9 meters from the mirror and his eyes are 1.8 meters from the ground. How tall is the tree? Explain how you found your answer. *Draw diagram for ESL student. Simplify language. Allow students to use a list rather than paragraph form for their explanations.*

Assessment:

Beginner

Questioning for understanding. Simplify language of problem, example: substitute “sights” for “sees”, substitute “calculate” for “find”, explain “landscape”.

Correctives (Remedial activities) Return to concrete examples, and re-teach areas unlearned.

Allow ELL to demonstrate or draw how to find height of an object.

Intermediate

Give diagrams of triangles with missing side, and have student solve.

Advance

Give student different situations when SAS theorem would be used to find missing side.

Have students find real life examples for uses of this new learned theorem and make a word problem

Notes:

1. Do not “water down” the context.
2. Use simplified language, and speaking slowly might bring your point across. Even the simple words like landscape might confuse the student.

3. Do not ask individual student if he understands, but as students work in pairs, listen and observe as he work with peers

