

TITLE OF LESSON

Geometry Unit 1 Lesson 29 – Triangles, Part 7

Prove it! What's on the outside? What's on the inside? Of Geometry

TIME ESTIMATE FOR THIS LESSON

One class period

ALIGNMENT WITH STANDARDS

California – Geometry

1.0 Students demonstrate understanding by identifying and giving examples of undefined terms, axioms, theorems, and inductive and deductive reasoning.

2.0 Students write geometric proofs, including proofs by contradiction.

3.0 Students construct and judge the validity of a logical argument and give counterexamples to disprove a statement.

MATERIALS

Logic Questions – Teacher Page

Logic Problems Answers – Teacher Page

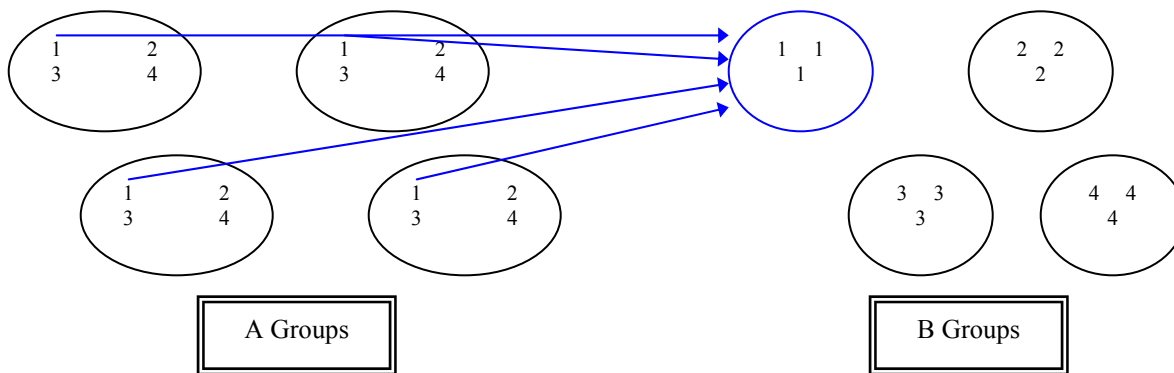
LESSON OBJECTIVES

To continue with:

- Congruent Triangles
 - Proofs of Congruence
 - Learning by teaching
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EXPLANATION OF LESSON

Today, students, working in small groups, will do the same 8 proofs that you did as a class yesterday. It's their turn to do some of the teaching. This method of teaching is known as the **jigsaw** method. Jigsawing is a great way to make sure all students participate and learn. The best way to describe how it works is with a visual:



First, divide students into groups (A Groups) of from two to five students. Three or four work best. The easiest way to do this is to give them numbers so each group has a 1, a 2, and so on. They don't do anything with these groups yet, but they'll come back to these groups after their B Groups.

Then, you move them into their B Groups: all 1's together, all 2's together, and so on. Once they're in these groups, you'll assign each group one problem from yesterday to prove, no group getting the same one. They have to work together to prove it and all students must record their work because the next step is to move them back into their A Group. In their A Groups, students must present the proofs they did with their B Groups to the rest of their A group.

For example, if the 2's (in B Groups) get Problem 2, when the students move back into their A Groups, each number 2 has to present Problem 2 to his A Group.

Before class, divide students into groups for two sets of the **jigsaw** activity. Try to group students with similar abilities for the B Groups so they will have to work together, rather than have one student do the work while others relax.

FOCUS AND MOTIVATE STUDENTS

- 1) Homework Check – Collect all proofs from yesterday! Students may NOT use them in class today. Pass back graded work and have students place in the appropriate sections of their binders.
 - 2) **Agenda** – Have students copy the agenda.
 - 3) Group Work – (5 minutes) Remind students of your challenge from yesterday. If they are all able to do all of these proofs before the end of class, you'll be able to do something fun. Ask if everyone has read over the proofs from yesterday. Briefly explain the **jigsaw** activity to the students so they know what they're doing and know that they really have to understand each proof before they leave their B Groups. Break them into their A Groups. Tell each what his number is, then move them into their B Groups. You may want to ask for a volunteer group to do Problem 6; otherwise it'll be easiest to just hand them out in order—1's get problem 1 and so on. Have students in their B groups assign group roles (see *Group Roles* below).
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ACTIVITIES – INDIVIDUAL AND GROUP

1. Group Proofs – (10 minutes) Give each group one problem from yesterday. The size of your class will determine how many you can do in each round of jigsaw. With the drawing above, the students can complete the first four proofs with the first round. Let them know they have 10 minutes to complete the proof. Make sure they have access to all of their postulates, theorems, terms, and definitions, but NOT the proofs from yesterday! This may take some vigilance on your part. Also, tell them they should let you know when they have finished it. If any group finishes particularly quickly, ask them to explain to you how they did the proof, and, if they understand it, give them another to work on.
2. Group Corrections – (10 minutes) At the end of 10 minutes, call time. Ask how many have finished their proofs. If most have not, give them five more minutes. If most have, move them back into their A Groups. Explain that in these groups, each student will teach the rest of the group the proof his B Group did. Again, it's easiest to just start with problem 1 and go from there. It is the responsibility of the others in each A group to make sure the proof is correct. If it is not, as a group, the A group should correct it. Once all students in the group agree that it is correct, they should all sign that student's paper with the proof, and move on to the next student's proof.
3. Group Proofs – (10 minutes) At the end of 10 minutes, call time. You can now divide them into different A and B Groups, or leave them as they were. Back to B groups, where you'll give them the next set of problems. In case you have an extra group, make sure you have an extra problem or two on hand, or change one of the givens from one of the proofs they've already finished.
4. Group Work – Continue this process until they have completed all problems. As they're working, write the homework assignment on the board. Be sure to collect all signed proofs before the students leave and give them enough time to write the homework assignment down. Check their binders to see the assignment.
5. Additional Proofs – If you have a class that just breezed through these, try some of the **Logic Questions** in the *Teacher Pages (Logic Questions and Logic Problems Answers)*.

Note: The answers are given in a separate document from the questions in the logic problems to encourage you to try to think through them before you give them to you students.
6. Wrap Up – As they're leaving, congratulate them: They've just done their first proofs! Explain that this is a huge step in understanding geometry, but also in learning to build strong arguments and analyze information.

7. Homework Review – Explain the homework assignment. Answer any questions. Also, remind students that tomorrow they will be working on Photoshop and applying what they've learned about proofs to their designs in Photoshop.
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HOMEWORK

- 1) **Journal 2:** Write a 200-word journal on the benefits of being able to prove something to someone else. Include in the essay the answer to the question “How can I use the reasoning skills I learn in geometry in other parts of my life?”
 - 2) Organize binders. Due at the beginning of Lesson 30.
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GROUP ROLES

Although students will be in groups this period, every student must act as recorder. Also, most students will have the opportunity in their A groups to act as presenter. As you group students, assign or have one student choose to be facilitator and one be the timekeeper.

Facilitator – It is your responsibility to make sure your group stays focused.

Time Keeper – Your job is to make sure your group completes the task in the amount of time given.

DOCUMENTATION FOR PORTFOLIO

None