

If at First You're Not the Same, Try Triangles! (Part 1)

Comparing Congruent and Similar Triangles

K20 Center, Kate Raymond
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Grade Level	10th Grade	**Time Frame**	120 minutes
Subject	Mathematics	**Duration**	2-3 class periods
Course	Geometry		

Essential Question

What does it mean for two objects to be "the same"?

Summary

Students will develop definitions of congruent and similar figures and use the definitions to find the missing sides and/or angles of congruent triangles.

Snapshot

Engage

Students construct triangles with given measures and write definitions for similar and congruent figures.

Explore

Students examine a pair of congruent triangles to determine what information is given, how that information can be conveyed easily and simply, and what conclusions they can draw from the information.

Explain

Students work with sample problems, then verbally discuss and explain what conclusions they are able to draw and why.

Extend

Students play a card game in which they match corresponding parts of congruent triangles.

Evaluate

Students complete a 3-2-1 reflection.

Standards

ACT College and Career Readiness Standards - Mathematics (6-12)

G603: Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles

Oklahoma Academic Standards for Mathematics (Grades 9, 10, 11, 12)

G.2D.1.7: Apply the properties of congruent or similar polygons to solve real-world and mathematical problems using algebraic and logical reasoning.

Attachments

- Congruent-Triangle-Set-Game-Playing-Cards - Spanish.docx
- Congruent-Triangle-Set-Game-Playing-Cards - Spanish.pdf
- Congruent-Triangle-Set-Game-Playing-Cards.docx
- Congruent-Triangle-Set-Game-Playing-Cards.pdf
- Defining-Congruence-and-Congruence-Statements-Day-1 - Spanish.pdf
- Defining-Congruence-and-Congruence-Statements-Day-1 - Spanish.pptx
- Defining-Congruence-and-Congruence-Statements-Day-1.pdf
- Defining-Congruence-and-Congruence-Statements-Day-1.pptx
- Triangle-Sets-Recording-Sheet - Spanish.docx
- Triangle-Sets-Recording-Sheet - Spanish.pdf
- Triangle-Sets-Recording-Sheet.docx
- Triangle-Sets-Recording-Sheet.pdf

Materials

- Straws
- Rulers
- Protractors
- Paper
- Six posters
- Markers
- Congruent Triangles Set Game Playing Cards (attached)
- Triangle Sets Recording Sheet (attached)
- Defining Congruence and Congruence Statements Day 1 (attached)

Engage

Teacher's Note

Before beginning class, you may want to place six posters around the room, numbered one through six, and place eight cups around the room that each contain multiple copies of a single round of the congruent triangle set game. This will allow you to save time during the lesson. Be sure to print the large cards (page 1) on blue/colorful cardstock or paper and the other cards on white cardstock or paper.

Begin by displaying **slide 1** of the attached slide deck. Place students in pairs and have them complete a Think-Pair-Share activity to respond to the prompt given.

Teacher's Note

As students share out their responses to this prompt, use guided questions to help them think more closely about their answers. Possible questions for students might include: Are all squares/triangles the same? Is a red triangle "the same" as a blue triangle? How do you know when two rectangles are really the same?

Explore

After discussing various thoughts about what it means for two geometric objects to be the same, go to **slide 2**, which asks students to create specific triangles based on some given information. Have students complete this activity working in pairs or groups of three. Make straws, rulers, protractors, and paper available to students to complete the activity on the slide. If you haven't already, hang six sheets of large paper or poster board, numbered one through six, around the room and allow students to tape their products to the appropriate poster.

Explain

After every group has created all six triangles, advance to **slide 3** and ask students to determine on which poster are all of the triangles the same. Ask students to justify how they know the triangles are the same. Record their responses on the slide.

Most students will readily agree that all of the triangles for numbers one through four are the same. As you ask students to justify how they know they are the same, the goal is to guide students to the point where they begin to place triangles on top of each other to show that they are the same.

Students may disagree about whether the triangles for poster five are all the same or not, as these triangles will be similar but not necessarily congruent.

Number six should result in two different (non-similar) triangles: one acute and one obtuse. Examples of each kind are attached to this lesson. In case each group creates the same triangle, have both triangles cut out and prepared so you can use them as a counter example. Students should conclude that not all triangles for poster number six are the same.

Go to **slide 4**, which gives two definitions of "the same." Ask students to determine which definition they like better, then reveal **slide 5**. Explain that the first is the definition of *congruent* while the second is the definition of *similar*; these are precise terms mathematicians use to indicate what exactly they mean by "the same."

Extend

Transition through **slides 6–10** to familiarize students with congruence statements and their purpose. Be sure to pause to let the students answer the questions each slide presents.

Tell students that they are going to use congruence statements to play a game. Pair students up (or place them in groups of three). If you have not already, place the eight cups containing the different rounds of the congruent triangle set game around the room and then make sure each student receives a copy of the "Triangle Sets Recording Sheet," which can be found under Attachments. Then, go to **slide 11** and explain the following rules of the game.

- There are eight cups around the room. Each cup contains one round of the game. The rounds can be completed in any order.
- For each round, there are 12 small (white) cards and one large (blue, or another color) card.
- At the beginning of the round, you will place the 12 small cards face up in any arrangement you and your partner(s) agree on.
- When the small cards are arranged, you will flip over the large card. It will show two congruent triangles with a congruence statement.
- Your job is to use the white cards to make as many pairs of equivalent (either equal or congruent) cards as possible.
- Whenever you see a pair, pick it up; you and your partner do not need to take turns.
- Once all the pairs have been made, record the pairs you made and the pairs your partner(s) made on the "Triangle Sets Recording Sheet." Each person gets one point for each pair made.
- When you are finished, return your set of cards to the appropriate cup and take a new set from a different cup.
- Continue until you have played all eight rounds.

Evaluate

Go to **slide 12**. Have students respond to the 3-2-1 reflection on the back of their recording sheet for the game above.

Resources

- K20 Center. (n.d.). 3-2-1. Instructional Strategies. https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f5059a7b
- K20 Center. (n.d.). Think-pair-share. Instructional Strategies. https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f5064b49