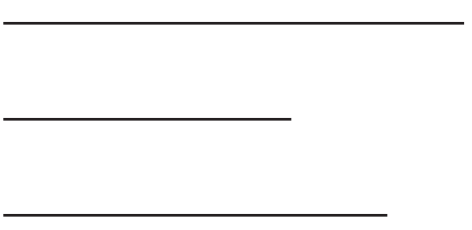
Unit 2 Lesson 9: Side-Side-Side Triangle Congruence

1 Dare to Be Different (Warm up)

Student Task Statement

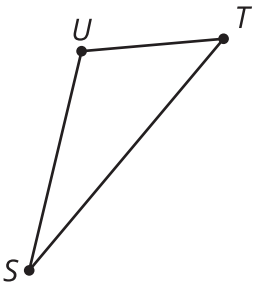
Construct a triangle with the given side lengths on tracing paper.

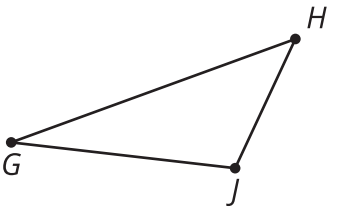


Can you make a triangle that doesn't look like anyone else's?

2 Proving the Side-Side-Side Triangle Congruence Theorem

Student Task Statement



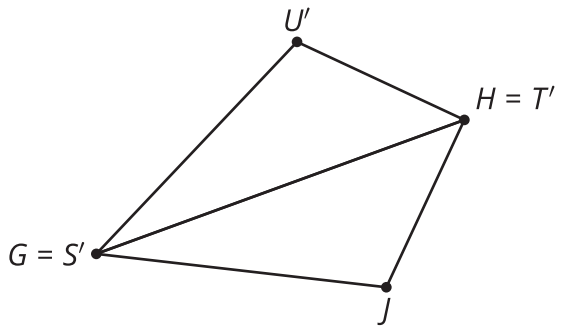


Priya was given this task to complete:

Use a sequence of rigid motions to take STU onto GHJ. Given that segment ST is congruent to segment GH, segment TU is congruent to segment HJ, and segment SU is congruent to segment GJ. For each step, explain how you know that one or more vertices will line up.

Help her finish the missing steps in her proof:

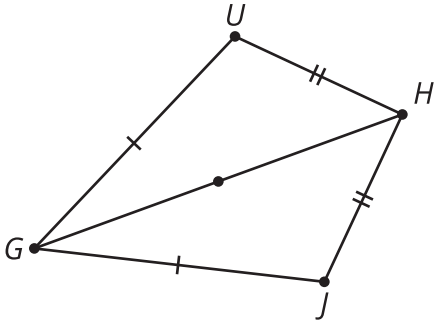
1. ST is the same length as _____, so they are congruent. Therefore, there is a rigid motion that takes ST to _____.
2. Apply this rigid motion to triangle STU. The image of T will coincide with _____ , and the image of S will coincide with _____.
3. We cannot be sure that the image of U, which we will call U', coincides with _____ yet. If it does, then our rigid motion takes STU to GHJ, proving that triangle STU is congruent to triangle GHJ. If it does not, then we continue as follows.
4. HJ is congruent to the image of _____, because rigid motions preserve distance.
5. Therefore, H is equidistant from U' and _____.
6. A similar argument shows that G is equidistant from U' and _____ .
7. GH is the _____ of the segment connecting U' and J, because the _____ is determined by 2 points that are both equidistant from the endpoints of a segment.
8. Reflection across the _____ of $U'J$, takes _____ to _____.
9. Therefore, after the reflection, all 3 pairs of vertices coincide, proving triangles _____ and _____ are congruent.



Now, help Priya by finishing a few-sentence summary of her proof. “To prove 2 triangles must be congruent if all 3 pairs of corresponding sides are congruent . . . .”

Activity Synthesis

$\overline{HU} \cong \overline{HJ}, \overline{UG} \cong \overline{JG}, \overline{HG} \cong \overline{HG}$, **so** $\triangle HUG \cong \triangle HJG$



3 What Else Do We Know For Sure About Parallelograms?

Student Task Statement

Quadrilateral $ABCD$ is a parallelogram. By definition, that means that segment AB is parallel to segment CD, and segment BC is parallel to segment AD.

Prove that angle B is congruent to angle D.

1. Work on your own to make a diagram and write a rough draft of a proof.
2. With your partner, discuss each other's drafts.
    - What do you notice your partner understands about the problem?
    - What revision would help them move forward?
3. Work together to revise your drafts into a clear proof that everyone in your class could follow and agree with.

Images for Activity Synthesis

$ABCD$ is a parallelogram so $\angle A \cong \angle C, \angle D \cong \angle B$