

Unit 2 Lesson 6: Side-Angle-Side Triangle Congruence

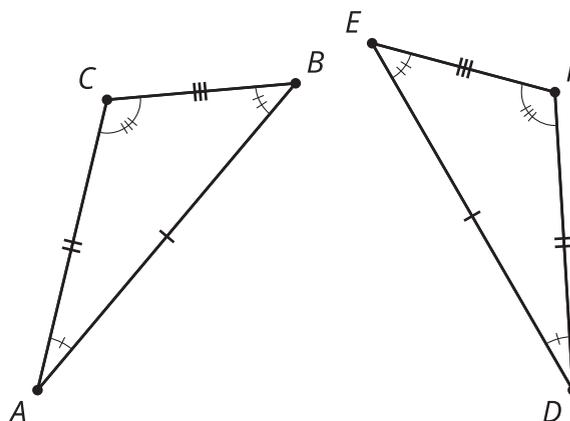
1 Information Overload? (Warm up)

Student Task Statement

Highlight each piece of given information that is used in the proof, and each line in the proof where that piece of information is used.

Given:

- $\overline{AB} \cong \overline{DE}$
- $\overline{AC} \cong \overline{DF}$
- $\overline{BC} \cong \overline{EF}$
- $\angle A \cong \angle D$
- $\angle B \cong \angle E$
- $\angle C \cong \angle F$



Proof:

1. Segments AB and DE are the same length so they are congruent. Therefore, there is a rigid motion that takes AB to DE .
2. Apply that rigid motion to triangle ABC . The image of A will coincide with D , and the image of B will coincide with E .
3. We cannot be sure that the image of C coincides with F yet. If necessary, reflect the image of triangle ABC across DE to be sure the image of C , which we will call C' , is on the same side of DE as F . (This reflection does not change the image of A or B .)
4. We know the image of angle A is congruent to angle D because rigid motions don't change the size of angles.
5. C' must be on ray DF since both C' and F are on the same side of DE , and make the same angle with it at D .
6. Segment DC' is the image of AC and rigid motions preserve distance, so they must have the same length.
7. We also know AC has the same length as DF . So DC' and DF must be the same length.

8. Since C' and F are the same distance along the same ray from D , they have to be in the same place.
9. We have shown that a rigid motion takes A to D , B to E , and C to F ; therefore, triangle ABC is congruent to triangle DEF .

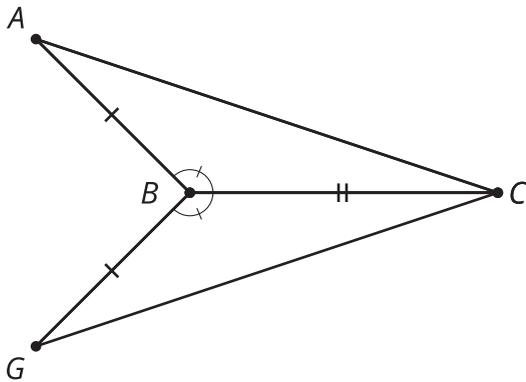
2 Proving the Side-Angle-Side Triangle Congruence Theorem

Student Task Statement

- Two triangles have 2 pairs of corresponding sides congruent, and the corresponding angles between those sides are congruent. Sketch 2 triangles that fit this description and label them LMN and PQR , so that:
 - Segment LM is congruent to segment PQ
 - Segment LN is congruent to segment PR
 - Angle L is congruent to angle P
- Use a sequence of rigid motions to take LMN onto PQR . For each step, explain how you know that one or more vertices will line up.
- Look back at the congruent triangle proofs you've read and written. Do you have enough information here to use a proof that is like one you saw earlier? Use one of those proofs to guide you in writing a proof for this situation.

Activity Synthesis

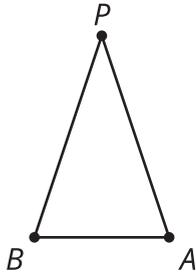
$\overline{AB} \cong \overline{GB}$, $\overline{BC} \cong \overline{BC}$, $\angle ABC \cong \angle GBC$ so $\triangle ABC \cong \triangle GBC$



3 What Do We Know For Sure About Isosceles Triangles?

Student Task Statement

Mai and Kiran want to prove that in an isosceles triangle, the 2 base angles are congruent. Finish the proof that they started. Draw the **auxiliary line** and define it so that you can use the Side-Angle-Side Triangle Congruence Theorem to complete each statement in the proof.



Draw _____.

Segment PA is congruent to segment PB because of the definition of isosceles triangle.

Angle _____ is congruent to angle _____ because _____.

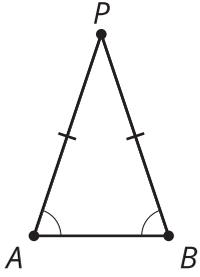
Segment PQ is congruent to itself.

Therefore, triangle APQ is congruent to triangle BPQ by the Side-Angle-Side Triangle Congruence Theorem.

Therefore, _____.

Activity Synthesis

$\overline{AP} \cong \overline{PB}$ so $\angle A \cong \angle B$



Images for Activity Synthesis

