Triangle Congruence Worksheet

Geometry · Common Core HSG-CO.B.8

> Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.

Practice

Builds the skill step by step.

1. Two triangles have three pairs of congruent sides. Which criterion shows they are congruent?

   A. SSS

   B. SAS

   C. ASA

   D. AAS

2. Two sides and the angle between them are congruent to two sides and the angle between them in another triangle. Which criterion applies?

   A. SSS

   B. SAS

   C. ASA

   D. AAS

3. Two angles and the side between them are congruent to the matching parts of another triangle. Which criterion applies?

   A. SSS

   B. SAS

   C. ASA

   D. AAS

4. Which of these is NOT a triangle congruence criterion?

   A. SAS

   B. SSS

   C. ASA

   D. SSA

5. Which information does NOT guarantee two triangles are congruent?

   A. two angles and the included side

   B. two sides and the included angle

   C. three pairs of congruent angles

   D. three pairs of congruent sides

6. AB ≅ DE, BC ≅ EF and ∠B ≅ ∠E. Which criterion (SSS, SAS, ASA or AAS) shows △ABC ≅ △DEF?

7. ∠A ≅ ∠D, AB ≅ DE and ∠B ≅ ∠E. Which criterion (SSS, SAS, ASA or AAS) shows △ABC ≅ △DEF?

8. ∠A ≅ ∠D, ∠B ≅ ∠E and BC ≅ EF. Which criterion (SSS, SAS, ASA or AAS) shows △ABC ≅ △DEF?

9. AB ≅ DE, BC ≅ EF and AC ≅ DF. Which criterion (SSS, SAS, ASA or AAS) shows △ABC ≅ △DEF?

10. $AB \cong DE$, $BC \cong EF$ and $\angle A \cong \angle D$. What can you conclude?

    A. Nothing yet: this is SSA, which is not a congruence criterion.

    B. $\triangle ABC \cong \triangle DEF$ by SAS

    C. $\triangle ABC \cong \triangle DEF$ by SSS

    D. $\triangle ABC \cong \triangle DEF$ by ASA

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On Level

Grade-level practice.

1. In quadrilateral ABCD, AB ≅ CD and BC ≅ DA. Diagonal AC is drawn. Which criterion (SSS, SAS, ASA or AAS) shows △ABC ≅ △CDA?

2. Segments AC and BD bisect each other at E. Which criterion (SSS, SAS, ASA or AAS) shows △AEB ≅ △CED?

3. Why does SAS follow from the definition of congruence?

   A. Because SAS is an undefined term.

   B. Because all triangles are congruent.

   C. Because the triangles have the same area.

   D. A rigid motion can carry the angle and its two sides of one triangle onto the other, and then the third vertices must land on each other.

4. △ABC and △DEF have AB = DE = 5, m∠B = m∠E = 60° and BC = EF = 8. AC = 7. What is DF?

5. $\angle A \cong \angle D$ and $AB \cong DE$. Which additional fact proves $\triangle ABC \cong \triangle DEF$ by ASA?

   A. $\angle C \cong \angle F$

   B. $\angle B \cong \angle E$

   C. $AC \cong DF$

   D. $BC \cong EF$

6. $AB \cong DE$ and $\angle B \cong \angle E$. Which additional fact proves $\triangle ABC \cong \triangle DEF$ by SAS?

   A. $BC \cong EF$

   B. $AC \cong DF$

   C. $\angle A \cong \angle D$

   D. $\angle C \cong \angle F$

7. Two right triangles have congruent hypotenuses and one pair of congruent legs. Are they congruent?

   A. No. That is SSA.

   B. Only if they are isosceles.

   C. Yes. The Pythagorean Theorem makes the other legs equal too, so SSS applies.

   D. No. Right triangles need AAA.

8. Explain why SSA is not a triangle congruence criterion.

9. Kite ABCD has $AB \cong AD$ and $CB \cong CD$. Diagonal AC is drawn. Which criterion (SSS, SAS, ASA or AAS) shows $\triangle ABC \cong \triangle ADC$?

10. AB ∥ DC and AB ≅ DC. Segments AD and BC cross at E. Using only the two pairs of alternate interior angles formed by the parallel lines and the sides AB and DC, which criterion (SSS, SAS, ASA or AAS) shows △ABE ≅ △DCE?

ALBERT

Name _____ Date _____

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Challenge

Multi-step and word problems that stretch it.

1. $\angle A \cong \angle D$, $\angle C \cong \angle F$ and $BC \cong EF$. Which criterion (SSS, SAS, ASA or AAS) shows $\triangle ABC \cong \triangle DEF$?

2. Which pair of triangles must be congruent?

   A. areas of 12 in both

   B. sides 3, 4, 5 and sides 5, 4, 3

   C. sides 3, 4 with a 30° angle opposite the 3, in both

   D. angles 30°, 60°, 90° and angles 90°, 60°, 30°

3. In $\triangle ABC$ and $\triangle DEF$, $AB = DE = 6$, $AC = DF = 6$ and $m\angle A = m\angle D = 60°$. What is BC?

4. Which rigid-motion argument proves ASA?

   A. Measure every side of both triangles.

   B. Show the triangles have equal areas.

   C. Dilate one triangle until it matches.

   D. Move one triangle so the congruent sides match. The congruent angles force the other two sides onto the same rays, so the third vertices meet at the same point.

5. Why is AAS a valid criterion?

   A. Because angles determine side lengths.

   B. If two pairs of angles match, the third pair matches too, so ASA applies.

   C. It isn't valid.

   D. Because it has the same letters as SAS.

6. E is the midpoint of both AC and BD. Prove $\triangle ABE \cong \triangle CDE$.

7. Two triangles have the same perimeter and the same area. Must they be congruent?

   A. Yes, always.

   B. Only if they are right triangles.

   C. Yes, if both are acute.

   D. No. Different triangles can share both.

8. $\triangle PQR$ and $\triangle STU$ have $PQ = ST = 4$, $QR = TU = 6$ and $m\angle Q = m\angle T = 90°$. What is the exact length of PR?

9. Two triangles each have a 50° angle, a 60° angle and a 10 cm side between those angles. Are they congruent?

   A. Yes, by ASA.

   B. No, the third angle might differ.

   C. Yes, by SSS.

   D. No, ASA needs two sides.

10. In $\triangle ABC$, $AB = AC$. The bisector of $\angle A$ meets BC at D. Which criterion shows $\triangle ABD \cong \triangle ACD$ and proves the base angles are congruent?

    A. SAS

    B. SSS

    C. ASA

    D. AAS