LESSON MAKER PRO

Rigid Matchups

Use matching parts to justify triangle congruence.

HIGH SCHOOL · MA.912.GR.2.7

MA.912.GR.2.7 "Justify the criteria for triangle congruence using the definition of congruence in terms of rigid transformations."

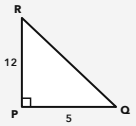
NAME _____ DATE _____

RIGID-MOTION PROOFS

Rigid transformations keep all lengths and angle measures unchanged. If matching parts fit SSS, SAS, ASA, AAS, or right-triangle HL, the triangles have the same size and shape, so a rigid transformation can map one onto the other.

WORKED EXAMPLE

Use the figure. Triangle XYZ is right at X with XY = 5 and XZ = 12. Justify that triangle PQR is congruent to triangle XYZ.



1. PQ = XY = 5.
2. PR = XZ = 12.
3. angle P and angle X are right angles.
4. Two sides and the included angle match, so use SAS.

Answer: triangle PQR is congruent to triangle XYZ by SAS.

PRACTICE 4 problems

1 In triangles ABC and JKL, AB = JK = 6, BC = KL = 8, and AC = JL = 10. Which criterion proves the triangles congruent?

ANSWER _____

2 AB = MN = 7, BC = NP = 9, and angle B = angle N = 64 degrees. Which criterion proves triangle ABC congruent to triangle MNP?

ANSWER _____

3 In triangles ABC and DEF, angle A = angle D = 42 degrees, angle B = angle E = 71 degrees, and AC = DF = 11. Which criterion proves the triangles congruent?

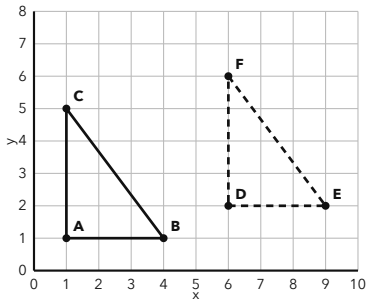
ANSWER _____

4 Right triangles XYZ and RST have congruent hypotenuses of 15 and one pair of congruent legs of 9. State the criterion and what it guarantees.

ANSWER _____

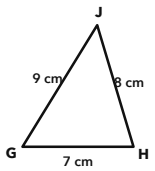
APPLY IT Show your work

1 A stage-crew app places triangular light panel ABC and panel DEF on the grid. What translation maps ABC to DEF, and why are the panels congruent?



ANSWER _____

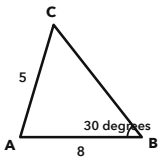
2 A gaming club prints the triangular logo shown. A second logo has corresponding side lengths 7 cm, 8 cm, and 9 cm. Which criterion proves the logos congruent, and what does that mean for cutting?



ANSWER _____

CHALLENGE One step up

The figure shows triangle ABC. Triangle DEF has DE = 8, DF = 5, and angle E = 30 degrees. A student says the triangles must be congruent because two sides and an angle match. Is the claim always valid? Explain.



WORK SPACE AND ANSWER

ANSWER KEY

Rigid Matchups

HIGH SCHOOL · MA.912.GR.2.7

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	In triangles ABC and JKL, AB = JK = 6, BC = KL = 8, and AC = JL = 10. Which criterion proves the triangles congruent?	**SSS**
2	AB = MN = 7, BC = NP = 9, and angle B = angle N = 64 degrees. Which criterion proves triangle ABC congruent to triangle MNP?	**SAS**
3	In triangles ABC and DEF, angle A = angle D = 42 degrees, angle B = angle E = 71 degrees, and AC = DF = 11. Which criterion proves the triangles congruent?	**AAS**
4	Right triangles XYZ and RST have congruent hypotenuses of 15 and one pair of congruent legs of 9. State the criterion and what it guarantees.	**HL; a rigid transformation maps one triangle onto the other.**

PART 2 · APPLY IT

1. **(x, y) maps to (x + 5, y + 1). A translation is a rigid transformation, so triangle ABC is congruent to triangle DEF.** Each vertex moves 5 units right and 1 unit up. Translations preserve lengths and angle measures.
2. **SSS; a rigid transformation can map one logo onto the other, so the same template fits both.** All three corresponding side lengths match. SSS guarantees congruence, which means the logos have identical size and shape.

CHALLENGE

No. The information is SSA, not a valid congruence criterion. SSA can make two different triangles.

Accept equivalent statements that a rigid transformation exists or maps one triangle onto the other. For the challenge, require that students identify SSA as insufficient.