ALBERT

Name _____ Date _____

AA Similarity Worksheet

Geometry · Common Core HSG-SRT.A.3

> Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

Practice

Builds the skill step by step.

1. Two angles of one triangle are congruent to two angles of another. What can you conclude?
   A. The triangles are similar (AA).
   B. The triangles are congruent.
   C. Nothing.
   D. The triangles are right triangles.

2. $\triangle ABC$ has $m\angle A = 40°$ and $m\angle B = 60°$. $\triangle DEF$ has $m\angle D = 40°$ and $m\angle E = 60°$. What is $m\angle F$?

3. Two right triangles each have a 35° angle. Are they similar?
   A. Only if the hypotenuses are equal.
   B. Yes, by AA: the right angles and the 35° angles match.
   C. You can't tell.
   D. No, the sides might differ.

4. One triangle has angles 50° and 70°. Another has angles 50° and 60°. Are they similar?
   A. You can't tell without side lengths.
   B. No. Only one pair of given angles matches.
   C. No. The angles are listed in a different order.
   D. Yes. Both triangles have angles of 50°, 60° and 70°.

5. In △ABC, DE is parallel to BC with D on AB and E on AC. Why is △ADE ~ △ABC?

   A. Because DE is shorter than BC.

   B. Because D and E are midpoints.

   C. ∠A is shared, and ∠ADE ≅ ∠ABC as corresponding angles, so AA applies.

   D. Because all triangles are similar.

6. Segments AE and BD cross at C, and AB ∥ DE. Why is △ABC ~ △EDC?

   A. Because C is the midpoint of both segments.

   B. Vertical angles at C are congruent, and alternate interior angles are congruent, so AA applies.

   C. Because AB = DE.

   D. Because the triangles share a side.

7. △ABC ~ △ADE by AA. AB = 6, AD = 9 and BC = 4. What is DE?

8. How many pairs of congruent angles does the AA criterion need?

   A. 1

   B. 3

   C. 2

   D. 0

9. Two isosceles triangles each have a 40° vertex angle. What does each base angle measure?

10. One triangle has angles 30°, x° and 2x°. A similar triangle has angles 30°, 50° and 100°. What is x?

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On Level

Grade-level practice.

1. Segments AE and BD cross at C, with AB ∥ DE. AC = 4, CE = 10 and AB = 6. What is DE?

2. A 6-foot person casts a 4-foot shadow. At the same time, a tree casts a 30-foot shadow. How tall is the tree?

3. In △ABC, DE ∥ BC with D on AB and E on AC. AD = 5, AB = 15 and DE = 4. What is BC?

4. Why are two pairs of congruent angles enough for similarity?

   A. Because any two triangles are similar.

   B. Because angles determine side lengths exactly.

   C. Because AA is the same as SSS.

   D. Dilate one triangle so one pair of corresponding sides match; then the triangles are congruent by ASA.

5. An altitude is drawn from the right angle of a right triangle to the hypotenuse. How many similar triangles are in the figure, counting the original?

6. A mirror is on the ground 4 feet from Lena and 20 feet from a building. Her eyes are 5 feet high, and she sees the top of the building in the mirror. How tall is the building?

7. In $\triangle ABC$, D is on AB and E is on AC with $\angle ADE \cong \angle ABC$. AD = 3, AB = 12 and AE = 4. What is AC?

8. Are any two equilateral triangles similar?

   A. Yes, all their angles are 60°.

   B. No, their sides can differ.

   C. Only if they are congruent.

   D. Only if they share a vertex.

9. One triangle has angles 50°, 60° and 70°. A similar triangle has angles $(x + 20)°$, $2x°$ and 70°, where $(x + 20)°$ matches the 50° angle. What is x?

10. In $\triangle ABC$, $DE \parallel BC$ with D on AB and E on AC. Prove $\triangle ADE \sim \triangle ABC$.

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Challenge

Multi-step and word problems that stretch it.

1. A right triangle has legs 6 and 8 and hypotenuse 10. What is the length of the altitude from the right angle to the hypotenuse?

2. In the same right triangle (legs 6 and 8, hypotenuse 10), the altitude to the hypotenuse splits it into two segments. How long is the segment next to the leg of length 6?

3. A 1.5-meter stick casts a 2-meter shadow. At the same time, a flagpole casts a 14-meter shadow. How tall is the flagpole?

4. Which pair of triangles is NOT similar?

   A. angles 45° and 45° in one; angles 45° and 90° in the other

   B. angles 30° and 90° in one; angles 60° and 90° in the other

   C. angles 40° and 60° in one; angles 40° and 70° in the other

   D. angles 20° and 80° in one; angles 80° and 80° in the other

5. $\triangle ABC \sim \triangle DEF$. Their perimeters are 24 and 36. $AB = 8$. What is DE?

6. Explain how the AA criterion follows from dilations and rigid motions.

7. Trapezoid ABCD has AB ∥ CD, AB = 12 and CD = 4. Its diagonals meet at E, and AC = 20. What is AE?

8. In two similar triangles, corresponding angles measure $3x°$ and $(x + 40)°$. What is x?

9. The altitude to the hypotenuse of a right triangle splits the hypotenuse into segments of 4 and 9. How long is the altitude?

10. The altitude to the hypotenuse of a right triangle splits it into segments of 4 and 12. How long is the leg next to the segment of 4?