

Unit 3: Similarity

ADVANCED

Name: _____ Date: _____

Solve each problem and give an exact answer in plain-text notation (fractions like $\frac{3}{4}$, coordinates like (3, -4), ratios like 2:5). Show your reasoning but write only the final value on the answer line.

1. Triangle ABC is dilated with center P(2, -3) and scale factor $\frac{2}{3}$. Vertex A is at (-6, 9). Find the coordinates of the image A'. Give as (x, y) with fractions in lowest terms if needed.

Answer: _____

3. Two similar polygons have corresponding sides in the ratio 8 : 20. Write the ratio of their areas (smaller : larger) in lowest terms.

Answer: _____

5. Two triangles are similar. Their perimeters are 45 and 72. A side of the smaller triangle measures 15. Find the length of the corresponding side of the larger triangle.

Answer: _____

7. In triangle ABC, D is on AB and E is on AC with DE parallel to BC. Given AD = 8, DB = 12, and AE = 10, use the proportional-sides (side-splitter) relationship to find EC.

Answer: _____

9. In a right triangle, the altitude drawn to the hypotenuse divides it into two segments of length 9 and 16. Using the geometric-mean (altitude) relationship, find the length of the altitude.

Answer: _____

2. Triangle ABC ~ Triangle DEF by the AA criterion, with AB corresponding to DE. Given AB = 14, BC = 21, and DE = 35, find the length of EF.

Answer: _____

4. At the same time of day, a person 6 ft tall casts a shadow 7 ft long, and a nearby tree casts a shadow 42 ft long. Using similar triangles, find the height of the tree in feet.

Answer: _____

6. A dilation centered at the origin maps A(4, -2) to A'(10, -5). Find the scale factor as a fraction in lowest terms.

Answer: _____

8. Two similar triangles have corresponding sides in the ratio 3 : 7. The area of the smaller triangle is 45 square units. Find the area of the larger triangle.

Answer: _____

10. In a right triangle, the altitude to the hypotenuse creates a segment of length 4 adjacent to one leg, and the full hypotenuse has length 25. Using the geometric-mean (leg) relationship, find the length of that leg.

Answer: _____

11. A figure is dilated by scale factor $\frac{3}{2}$ and then the result is dilated by scale factor $\frac{4}{9}$ (both about the same center). Find the single net scale factor as a fraction in lowest terms.

Answer: _____

12. Triangle with side lengths 6, 8, 10 is similar to a larger triangle whose shortest side is 15 (6 corresponds to 15). Find the length of the larger triangle's longest side.

Answer: _____