

Geometry: Similarity in Polygons

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Name: _____ Date: _____ Score: / 10

DIRECTIONS

Determine similarity, find missing values, and justify your answers using angle and side relationships.

1 Are the polygons similar? State why or why not:
 $\triangle ABC: \angle A = 50^\circ, \angle B = 60^\circ, \angle C = 70^\circ$ $\triangle DEF: \angle D = 50^\circ, \angle E = 60^\circ, \angle F = 70^\circ$
Answer: _____

3 Solve for x if the polygons are similar:
 $\frac{x}{4} = \frac{9}{6}$
Answer: _____

5 Are the rectangles similar? Explain:
Rectangle 1: 4 x 10 **Rectangle 2: 6 x 15**
Answer: _____

7 Determine if the triangles are similar:
 $\triangle PQR: PQ = 8, QR = 12, PR = 16$ $\triangle XYZ: XY = 6, YZ = 9, XZ = 12$
Answer: _____

9 Write a similarity statement for the polygons:
Pentagon ABCDE with $\angle A \cong \angle F, \angle B \cong \angle G, \angle C \cong \angle H, \angle D \cong \angle I, \angle E \cong \angle J$ and proportional sides
Answer: _____

11 Are the polygons similar? Find the scale factor:
Hexagon 1 sides: 3, 6, 9, 12, 6, 9 Hexagon 2 sides: 4, 8, 12, 16, 8, 12 All corresponding angles congruent
Answer: _____

2 Find the scale factor from ABCD to EFGH:
 $AB = 6, BC = 9, EF = 2, FG = 3$
Answer: _____

4 Find the missing angle if polygons are similar:
Polygon 1 angles: $80^\circ, 100^\circ, 75^\circ, 105^\circ$ Polygon 2 angles: $80^\circ, 100^\circ, 75^\circ, ?$
Answer: _____

6 Solve for x and y if the quadrilaterals are similar:
 $\frac{x}{5} = \frac{12}{10}, \frac{y}{8} = \frac{12}{10}$
Answer: _____

8 Find the perimeter of the larger polygon:
Smaller polygon perimeter: 24 cm, Scale factor: $\frac{5}{2}$
Answer: _____

10 Solve for x given similar polygons:
 $\frac{2x + 3}{7} = \frac{15}{5}$
Answer: _____

12 Solve for both x and y:
Similar quadrilaterals with sides: $\frac{3x-1}{10} = \frac{10}{25}$ and $\frac{y+2}{6} = \frac{10}{25}$
Answer: _____



Answer Key & Solutions

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TEACHER NOTE

Remind students that two polygons are similar if and only if all corresponding angles are congruent AND all corresponding sides are proportional. Encourage students to write similarity statements in the correct vertex order to reinforce corresponding parts. Stress that the scale factor is always written as a ratio of the first polygon

1 Are the polygons similar? State why or why not:
 $\triangle ABC: \angle A = 50^\circ, \angle B = 60^\circ, \angle C = 70^\circ$ $\triangle DEF: \angle D = 50^\circ, \angle E = 60^\circ, \angle F = 70^\circ$

$$= \triangle ABC \sim \triangle DEF$$

All three corresponding angles are congruent ($50^\circ, 60^\circ, 70^\circ$), so the triangles are similar by the Angle-Angle (AA) criterion.

2 Solve for x if the polygons are similar:

$$\frac{x}{4} = \frac{9}{6}$$

$$= x = 6$$

Cross-multiply: $6x = 36$, then divide both sides by 6 to get $x = 6$.

5 Are the rectangles similar? Explain:

Rectangle 1: 4×10 Rectangle 2: 6×15

$$= \frac{4}{6} = \frac{10}{15} = \frac{2}{3}$$

Check the ratios: $4/6 = 2/3$ and $10/15 = 2/3$. Since corresponding sides are proportional and all angles are 90° , the rectangles are

7 Determine if the triangles are similar:

$\triangle PQR: PQ = 8, QR = 12, PR = 16$ $\triangle XYZ: XY = 6, YZ = 9, XZ = 12$

$$= \frac{8}{6} = \frac{12}{9} = \frac{16}{12} = \frac{4}{3}$$

All three pairs of corresponding sides share the same ratio 4:3, so the triangles are similar by SSS Similarity.

9 Write a similarity statement for the polygons:

Pentagon ABCDE with $\angle A \cong \angle F, \angle B \cong \angle G, \angle C \cong \angle H, \angle D \cong \angle I, \angle E \cong \angle J$ and proportional sides

$$= ABCDE \sim FGHIJ$$

Since all corresponding angles are congruent and sides are proportional, write the similarity statement matching vertices in order: $ABCDE \sim FGHIJ$.

11 Are the polygons similar? Find the scale factor:

Hexagon 1 sides: 3, 6, 9, 12, 6, 9 Hexagon 2 sides: 4, 8, 12, 16, 8, 12 All corresponding angles congruent

$$= \frac{3}{4} = \frac{6}{8} = \frac{9}{12} = \frac{12}{16} = \frac{3}{4}$$

All corresponding side ratios equal $3/4$ and all angles are congruent, so the hexagons are similar with a scale factor of $3:4$.

2 Find the scale factor from ABCD to EFGH:

$$AB = 6, BC = 9, EF = 2, FG = 3$$

$$= \frac{AB}{EF} = \frac{6}{2} = 3$$

Divide a side of ABCD by the corresponding side of EFGH: $6 \div 2 = 3$, confirming a scale factor of 3:1.

4 Find the missing angle if polygons are similar:

Polygon 1 angles: $80^\circ, 100^\circ, 75^\circ, 105^\circ$ Polygon 2 angles: $80^\circ, 100^\circ, 75^\circ, ?$

$$= \angle = 105^\circ$$

Corresponding angles of similar polygons are congruent, so the missing angle must equal 105° to match the corresponding angle in Polygon 1.

6 Solve for x and y if the quadrilaterals are similar:

$$\frac{x}{5} = \frac{12}{10}, \quad \frac{y}{8} = \frac{12}{10}$$

$$= x = 6, y = 9.6$$

For x: $x = 5 \times (12/10) = 6$. For y: $y = 8 \times (12/10) = 9.6$.

8 Find the perimeter of the larger polygon:

Smaller polygon perimeter: 24 cm, Scale factor: $\frac{5}{2}$

$$= P = 24 \cdot \frac{5}{2} = 60 \text{ cm}$$

Multiply the smaller perimeter by the scale factor: $24 \times (5/2) = 60 \text{ cm}$.

10 Solve for x given similar polygons:

$$\frac{2x + 3}{7} = \frac{15}{5}$$

$$= x = 9$$

Cross-multiply: $5(2x + 3) = 105$, so $10x + 15 = 105$, giving $10x = 90$ and $x = 9$.

12 Solve for both x and y:

Similar quadrilaterals with sides: $\frac{3x-1}{10} = \frac{10}{25}$ and $\frac{y+2}{6} = \frac{10}{25}$

$$= x = \frac{5}{3}, y = \frac{2}{5}$$

For x: $3x - 1 = 10 \times (10/25) = 4$, so $3x = 5$ and $x = 5/3$. For y: $y + 2 = 6 \times (10/25) = 2.4$, so $y = 0.4 = 2/5$.

