

Geometry: Proving Triangle Similarity

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Name: _____ Date: _____ Score: / 10

DIRECTIONS

Use similarity postulates and theorems to solve each problem. Show all work.

1 Identify the postulate shown:
 $\triangle ABC: \angle A = 50^\circ, \angle B = 60^\circ$ $\triangle DEF: \angle D = 50^\circ, \angle E = 60^\circ$
Answer: _____

3 Are the triangles similar? State why:
 $\triangle JKL: \angle J = 30^\circ, \angle L = 70^\circ$ $\triangle PQR: \angle Q = 30^\circ, \angle R = 70^\circ$
Answer: _____

5 Explain why the triangles are similar:
 $\angle 1$ and $\angle 2$ are vertical angles; $\angle R = \angle V = 45^\circ$
Answer: _____

7 Solve for x using AA similarity:
 $\triangle ABC \sim \triangle DEF, \angle A = (3x + 10)^\circ, \angle D = 55^\circ$
Answer: _____

9 Prove similarity using all steps:
 $\triangle ABC: \angle A = (2x + 5)^\circ, \angle B = 80^\circ$ $\triangle DEF: \angle D = 45^\circ, \angle E = 80^\circ$
Answer: _____

2 Find the missing angle in $\triangle PQR$:
 $\angle P = 45^\circ, \angle Q = 75^\circ, \angle R = ?$
Answer: _____

4 Find $\angle K$, then check similarity:
 $\triangle JKL: \angle J = 85^\circ, \angle L = 70^\circ$ $\triangle PQR: \angle P = 25^\circ, \angle R = 70^\circ$
Answer: _____

6 Find $\angle P$ to confirm similarity:
 $\triangle JKL: \angle J = 30^\circ, \angle L = 70^\circ$ $\triangle PQR: \angle Q = 85^\circ, \angle R = 70^\circ$
Answer: _____

8 Find x and y given similarity:
 $\triangle RST \sim \triangle XYZ, \angle R = (4x)^\circ, \angle X = 60^\circ, \angle S = (3y + 6)^\circ, \angle Y = 48^\circ$
Answer: _____

10 Find x, y, and write the similarity statement:
 $\triangle PQR: \angle P = (5x - 10)^\circ, \angle Q = (2y + 4)^\circ, \angle R = 66^\circ$ $\triangle STU: \angle S = 40^\circ, \angle T = 74^\circ, \angle U = 66^\circ$
Answer: _____



Answer Key & Solutions

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TEACHER NOTE

This worksheet reinforces the Angle-Angle (AA) Similarity Postulate, which states that two triangles are similar if two pairs of corresponding angles are congruent. Remind students that the sum of interior angles of a triangle equals 180° , which can be used to find missing angles and confirm similarity. Encourage students to write

1 Identify the postulate shown:
 $\triangle ABC: \angle A = 50^\circ, \angle B = 60^\circ$ $\triangle DEF: \angle D = 50^\circ, \angle E = 60^\circ$

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

Two pairs of corresponding angles are congruent ($\angle A \cong \angle D$ and $\angle B \cong \angle E$), so the triangles are similar by the AA Similarity Postulate.

2 Are the triangles similar? State why:
 $\triangle JKL: \angle J = 30^\circ, \angle L = 70^\circ$ $\triangle PQR: \angle Q = 30^\circ, \angle R = 70^\circ$

$$= \triangle JKL \sim \triangle QRP$$

$\angle J \cong \angle Q$ and $\angle L \cong \angle R$, giving two pairs of congruent corresponding angles, so the triangles are similar by AA.

5 Explain why the triangles are similar:
 $\angle 1$ and $\angle 2$ are vertical angles; $\angle R = \angle V = 45^\circ$

$$= \triangle RSW \sim \triangle VSB$$

Vertical angles are congruent, providing one pair; the given 45° angles provide a second pair, satisfying the AA Similarity Postulate.

7 Solve for x using AA similarity:
 $\triangle ABC \sim \triangle DEF, \angle A = (3x + 10)^\circ, \angle D = 55^\circ$

$$= 3x + 10 = 55 \Rightarrow x = 15$$

Since $\angle A$ corresponds to $\angle D$ and the triangles are similar, set $3x + 10 = 55$, giving $3x = 45$, so $x = 15$.

9 Prove similarity using all steps:
 $\triangle ABC: \angle A = (2x + 5)^\circ, \angle B = 80^\circ$ $\triangle DEF: \angle D = 45^\circ, \angle E = 80^\circ$

$$= 2x + 5 = 45 \Rightarrow x = 20$$

Set $\angle A = \angle D: 2x + 5 = 45$, so $x = 20$ and $\angle A = 45^\circ$. Since $\angle A \cong \angle D$ and $\angle B \cong \angle E = 80^\circ$, the triangles are similar by AA.

2 Find the missing angle in $\triangle PQR$:
 $\angle P = 45^\circ, \angle Q = 75^\circ, \angle R = ?$

$$= \angle R = 180^\circ - 45^\circ - 75^\circ = 60^\circ$$

The sum of interior angles of a triangle is 180° , so $\angle R = 180^\circ - 45^\circ - 75^\circ = 60^\circ$.

4 Find $\angle K$, then check similarity:
 $\triangle JKL: \angle J = 85^\circ, \angle L = 70^\circ$ $\triangle PQR: \angle P = 25^\circ, \angle R = 70^\circ$

$$= \angle K = 180^\circ - 85^\circ - 70^\circ = 25^\circ$$

$\angle K = 180^\circ - 85^\circ - 70^\circ = 25^\circ$. Since $\angle K \cong \angle P = 25^\circ$ and $\angle L \cong \angle R = 70^\circ$, the triangles are similar by AA.

6 Find $\angle P$ to confirm similarity:
 $\triangle JKL: \angle J = 30^\circ, \angle L = 70^\circ$ $\triangle PQR: \angle Q = 85^\circ, \angle R = 70^\circ$

$$= \angle P = 180^\circ - 85^\circ - 70^\circ = 25^\circ$$

$\angle K = 180^\circ - 30^\circ - 70^\circ = 80^\circ$ and $\angle P = 180^\circ - 85^\circ - 70^\circ = 25^\circ$. Since no two pairs of angles match, the triangles are not similar.

8 Find x and y given similarity:
 $\triangle RST \sim \triangle XYZ, \angle R = (4x)^\circ, \angle X = 60^\circ, \angle S = (3y + 6)^\circ, \angle Y = 48^\circ$

$$= 4x = 60 \Rightarrow x = 15; \quad 3y + 6 = 48 \Rightarrow y = 14$$

Set $4x = 60$ to get $x = 15$, and set $3y + 6 = 48$ to get $3y = 42$, so $y = 14$.

10 Find x, y , and write the similarity statement:
 $\triangle PQR: \angle P = (5x - 10)^\circ, \angle Q = (2y + 4)^\circ, \angle R = 66^\circ$ $\triangle STU: \angle S = 40^\circ, \angle T = 74^\circ, \angle U = 66^\circ$

$$= 5x - 10 = 40 \Rightarrow x = 10; \quad 2y + 4 = 74 \Rightarrow y = 35$$

Set $\angle P = \angle S: 5x - 10 = 40$, so $x = 10$. Set $\angle Q = \angle T: 2y + 4 = 74$, so $y = 35$. With $\angle R \cong \angle U = 66^\circ$ and $\angle P \cong \angle S = 40^\circ$, the triangles are similar by AA: $\triangle PQR \sim \triangle STU$.

