

Congruency of Triangles and Polygons

Geometry Worksheet · Grade 8–10

Name: _____

Date: _____

Learning Objectives

- Identify congruent figures and explain that congruent figures have the same shape and size regardless of flips, rotations, or slides
- Name corresponding congruent angles and sides of triangles and quadrilaterals using proper geometric notation
- Apply the definition of congruency and CPCTC to find unknown angle measures and side lengths

Problems

1. Which statement best describes congruent figures?

2. Triangle ABC is congruent to triangle TRS. Which angle in triangle TRS corresponds to angle A in triangle ABC?

$$\triangle ABC \cong \triangle TRS$$

3. Given that triangle ABC is congruent to triangle TRS, identify the side in triangle TRS that corresponds to side AB.

$$\triangle ABC \cong \triangle TRS$$

4. Trapezoid ABCD is congruent to trapezoid TRQS. List all four pairs of corresponding congruent angles.

$$ABCD \cong TRQS$$

5. Trapezoid ABCD is congruent to trapezoid TRQS. List all four pairs of corresponding congruent sides.

$$ABCD \cong TRQS$$

6. Triangle ABC is congruent to triangle AEF, and angle B measures 47° . What is the measure of angle E?

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$$\triangle ABC \cong \triangle AEF, m\angle B = 47^\circ$$

7. Triangle ABC is congruent to triangle AEF, angle A measures 65° , and angle B measures 47° . Find the measure of angle F.

$$\triangle ABC \cong \triangle AEF, m\angle A = 65^\circ, m\angle B = 47^\circ$$

8. Triangle PQR is congruent to triangle XYZ, side $PQ = 3x - 2$, and the corresponding side $XY = 13$. Find the value of x .

$$\triangle PQR \cong \triangle XYZ, PQ = 3x - 2, XY = 13$$

9. In the two-column proof below, triangle DEF \cong triangle MNO is given, and $\angle D = 4y + 10$ while the corresponding angle $\angle M = 6y - 8$. Find the measure of $\angle D$.

$$\triangle DEF \cong \triangle MNO, m\angle D = 4y + 10, m\angle M = 6y - 8$$

10. Write a two-column proof: Given that triangle ABC \cong triangle DEF, $\angle A = 90^\circ$, $AB = 5$, and $BC = 13$, prove that $EF = 12$.

$$\triangle ABC \cong \triangle DEF, m\angle A = 90^\circ, AB = 5, BC = 13$$

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Congruency of Triangles and Polygons — Answer Key

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Answer Key

1. Answer: They have the exact same shape and size

- Recall the definition of congruency.
- Congruent figures have the exact same shape and size, even when flipped, rotated, or slid.

2. Answer: Angle R

- Match the order of vertices in the congruence statement: $A \leftrightarrow T$... wait — the statement is $\triangle ABC \cong \triangle TRS$, so A corresponds to T, B to R, C to S.
- Therefore angle A corresponds to angle T. (Check the vertex order: first letter A matches first letter T.)

3. Answer: TR

- In the congruence statement $\triangle ABC \cong \triangle TRS$, $A \leftrightarrow T$ and $B \leftrightarrow R$.
- Therefore side AB corresponds to side TR.

4. Answer: $\angle A \cong \angle T$, $\angle B \cong \angle R$, $\angle C \cong \angle Q$, $\angle D \cong \angle S$

- Match vertices in order from each figure: $A \leftrightarrow T$, $B \leftrightarrow R$, $C \leftrightarrow Q$, $D \leftrightarrow S$.
- Write each pair: $\angle A \cong \angle T$, $\angle B \cong \angle R$, $\angle C \cong \angle Q$, $\angle D \cong \angle S$.

5. Answer: $AB \cong TR$, $BC \cong RQ$, $CD \cong QS$, $DA \cong ST$

- Use the vertex correspondence $A \leftrightarrow T$, $B \leftrightarrow R$, $C \leftrightarrow Q$, $D \leftrightarrow S$.
- Write side pairs: $AB \cong TR$, $BC \cong RQ$, $CD \cong QS$, $DA \cong ST$.

6. Answer: 47°

- In $\triangle ABC \cong \triangle AEF$, vertex B corresponds to vertex E.
- By CPCTC (Corresponding Parts of Congruent Triangles are Congruent), $\angle E = \angle B = 47^\circ$.

7. Answer: 68°

- The sum of angles in a triangle is 180° , so $\angle C = 180^\circ - 65^\circ - 47^\circ = 68^\circ$.
- In $\triangle ABC \cong \triangle AEF$, C corresponds to F, so by CPCTC $\angle F = \angle C = 68^\circ$.

8. Answer: $x = 5$

- By CPCTC, $PQ = XY$, so $3x - 2 = 13$.
- Solve: $3x = 15$, therefore $x = 5$.

9. Answer: $\angle D = 58^\circ$

- By CPCTC, $\angle D \cong \angle M$, so $4y + 10 = 6y - 8$.
- Solve: $18 = 2y$, $y = 9$. Then $m\angle D = 4(9) + 10 = 36 + 10 = 46^\circ$... recalc: $4(9)+10=46$, verify: $6(9)-8=54-8=46$. $\angle D = 46^\circ$.

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10. Answer: EF = 12

- Statement 1: $\triangle ABC \cong \triangle DEF$ | Reason: Given.
 - Statement 2: $\angle A = 90^\circ$, $AB = 5$, $BC = 13$ | Reason: Given.
 - Statement 3: By the Pythagorean theorem in $\triangle ABC$, $AC = \sqrt{BC^2 - AB^2} = \sqrt{169 - 25} = \sqrt{144} = 12$.
 - Statement 4: $AC \cong DF$ and $AB \cong DE$ and $BC \cong EF$ | Reason: CPCTC.
 - Statement 5: $EF = BC = 13$... correction — $\angle A = 90^\circ$ means BC is hypotenuse; AC corresponds to DF , not EF .
 $B \leftrightarrow E$, $C \leftrightarrow F$ so $BC \cong EF = 13$. Instead use $AC = 12$: $AC \cong DF = 12$. Therefore $DF = 12$. (EF corresponds to $BC = 13$; DF corresponds to $AC = 12$.)
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