

Geometry • Unit 2 Worksheet

Congruence

Name: _____

Date: _____

This unit is about proof. When you write 'these triangles are congruent', be ready to say HOW you know — which postulate or theorem, and what given information justifies each part.

Part A • CPCTC and Identifying Triangle Congruence

If two triangles are congruent, all corresponding parts are congruent (CPCTC).

1. Triangle ABC is congruent to triangle DEF, with A to D, B to E, C to F.

a. Name all pairs of congruent corresponding SIDES.

b. Name all pairs of congruent corresponding ANGLES.

c. Why does the ORDER of letters in the congruence statement matter? Give an example of a wrong ordering.

2. For each set of given information, name the congruence postulate/theorem that applies, OR write 'not enough info'.

a. Two sides of triangle 1 are congruent to two sides of triangle 2, and the angle BETWEEN those sides matches. _____

b. Three sides of triangle 1 are congruent to three sides of triangle 2. _____

c. Two angles of triangle 1 match two angles of triangle 2, and the side BETWEEN them matches. _____

d. Three angles of triangle 1 are congruent to three angles of triangle 2. _____

e. Two sides match, and a non-included angle matches (SSA). _____

Part B • Writing Proofs

3. Given: M is the midpoint of segment AB. CM is perpendicular to AB. Prove: triangle ACM is congruent to triangle BCM.

Diagram: Segment AB with midpoint M. From M a segment is drawn upward to a point C, perpendicular to AB.

Statements	Reasons
1. M is midpoint of AB; CM perp AB	Given
2.	
3.	
4.	
5.	

4. Given: ABCD is a parallelogram. Prove: triangle ABC is congruent to triangle CDA. (Hint: a parallelogram has two pairs of parallel sides — use alternate interior angles.)

Write as a NARRATIVE proof (sentences, not two columns):

Part C • The Perpendicular Bisector Theorem

5. The Perpendicular Bisector Theorem states: a point lies on the perpendicular bisector of a segment if and only if it is equidistant from the endpoints.

(a) Why does this theorem follow from triangle congruence? Outline an argument:

(b) Three towns A, B, C want to build a water tower equidistant from all three. Describe how to use perpendicular bisectors to find the location.

Part D • Quadrilateral Proofs

6. Given: ABCD is a parallelogram. Prove: the diagonals AC and BD bisect each other.
Sketch a labeled diagram (call the diagonals' intersection point E).

Narrative proof:

-
7. True or False — explain each.

a. If a quadrilateral has four congruent sides, it must be a square. T / F

b. If a quadrilateral has both pairs of opposite sides congruent, it must be a parallelogram. T / F

c. If a quadrilateral has congruent diagonals, it must be a rectangle. T / F

Part E • Error Analysis

8. Lin says: "In triangles ABC and DEF, $AB = DE = 5$, $BC = EF = 7$, and $\angle A = \angle D = 40$ degrees. Since I have two sides and an angle, that's SAS, so the triangles are congruent." Is Lin correct?

Yes / No:

If no, what is the error? Sketch a counterexample if you can.

9. Diego writes: "I want to prove $\triangle ABC \cong \triangle ABD$ where they share side AB. I'm given $AC = AD$ and $\angle CAB = \angle DAB$. By SAS, the triangles are congruent." Is Diego's proof valid?

Yes / No:

Justify — which sides and angles correspond, and why does the shared side count?

Part F • Synthesizing

10. An isosceles triangle has two congruent sides. Prove that the base angles (the ones opposite the congruent sides) are also congruent. (Hint: drop the perpendicular from the apex to the base.)

Narrative proof:

11. Open: come up with a CONJECTURE about diagonals of a rhombus (a quadrilateral with four congruent sides). Then OUTLINE a proof.

My conjecture:

Outline of proof:
