

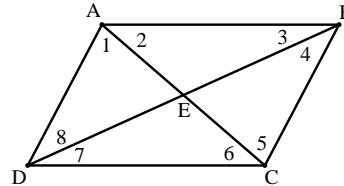
Common Core Geometry Proof – Parallelograms_3

Diagonals Bisect

Theorem: If a quadrilateral is a parallelogram, then the diagonals bisect each other.

Given: Parallelogram ABCD
Diagonals \overline{AC} and \overline{BD}

Diagram:



Prove: \overline{AC} and \overline{BD} bisect each other at E

Statements	Reasons
1. Parallelogram ABCD; Diagonals \overline{AC} and \overline{BD}	1. Given
2. $\overline{AD} \parallel \overline{BC}$	2. Definition of Parallelogram
3. $\angle 1$ & $\angle 5$ and $\angle 8$ & $\angle 4$ are alternate interior angles	3. Definition of Alternate Interior Angles
4. $\angle 1 \cong \angle 5$; $\angle 8 \cong \angle 4$	4. Theorem: If two parallel lines are cut by a transversal, then the alternate interior angles formed are congruent.
5. $\overline{AD} \cong \overline{BC}$	5. Theorem: If a quadrilateral is a parallelogram, then the opposite sides are congruent.
6. $\triangle AED \cong \triangle CEB$	6. ASA \cong ASA
7. $\overline{AE} \cong \overline{CE}$ and $\overline{DE} \cong \overline{BE}$	7. Corresponding Parts of Congruent Triangles are Congruent (CPCTC)
8. E is the midpoint of \overline{AC} and \overline{BD}	8. Definition of Midpoint
9. \overline{AC} and \overline{BD} bisect each other at E	9. Definition of Line Segment Bisector