

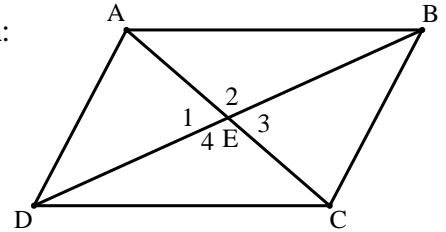
Common Core Geometry Proof – Parallelograms_4

Converse: Diagonals Bisect

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

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

Diagram:



Prove: ABCD is a parallelogram

Statements	Reasons
1. \overline{AC} and \overline{BD} bisect each other at E	1. Given
2. E is the midpoint of \overline{AC} and \overline{BD}	2. Definition of Line Segment Bisector
3. $\overline{AE} \cong \overline{EC}$ and $\overline{BE} \cong \overline{DE}$	3. Definition of Midpoint
4. $\angle 1$ & $\angle 3$ and $\angle 2$ & $\angle 4$ are vertical angles	4. Definition of Vertical Angles
5. $\angle 1 \cong \angle 3$ and $\angle 2 \cong \angle 4$	5. Theorem: If two angles are vertical angles, then they are congruent.
6. $\triangle AED \cong \triangle CEB$ and $\triangle ABE \cong \triangle CDE$	6. SAS \cong SAS
7. $\angle BAE \cong \angle DCE$ and $\angle ADB \cong \angle CBD$	7. Corresponding Parts of Congruent Triangles Are Congruent (CPCTC)
8. $\overline{AB} \parallel \overline{DC}$ and $\overline{BD} \parallel \overline{BC}$	8. Theorem: If alternate interior angles formed by two lines and a transversal are congruent, then the transversal cuts parallel lines.
9. ABCD is a parallelogram	9. Definition of Parallelogram