Parallelogram & Kite & Triangle Midsegment Properties

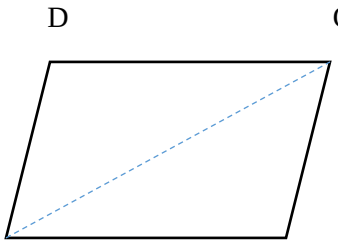
http://www.mathsisfun.com/definitions/parallelogram.html

Parallelogram Diagonals Theorem

A diagonal of a parallelogram separates it into two congruent triangles.

Parallelogram Definition:

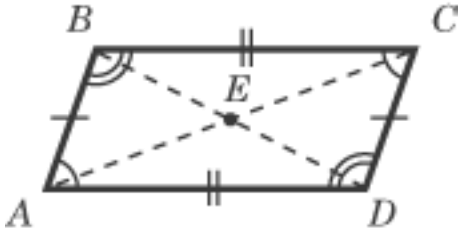
A Parallelogram is a flat shape with opposite sides parallel and equal in length.



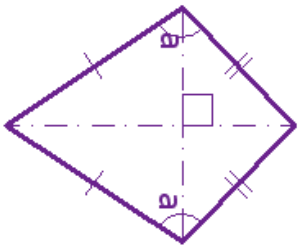
Given: $\square$ ABCD is a parallelogram

Prove: $\Delta ABC \cong \Delta CDA$

STATEMENTS	REASONS

Parallelogram Opposite Angles Corollary The opposite angles of a parallelogram are congruent. (Lesson 5.5) **Parallelogram Consecutive Angles Corollary** The consecutive angles of a parallelogram are supplementary. (Lesson 5.5) **Parallelogram Opposite Sides Corollary** The opposite sides of a parallelogram are congruent. (Lesson 5.5) **Parallelogram Diagonals Corollary** The diagonals of a parallelogram bisect each other. (Lesson 5.5)	 $\angle B \cong \angle D,\ \angle A \cong \angle C$ $m\angle B + m\angle C = 180°$ $m\angle A + m\angle D = 180°$ $AE = CE, \quad BE = DE$

http://www.mathsisfun.com/definitions/kite.html



Kite Definition -

A quadrilateral (4-sided flat shape with straight sides) with two distinct pairs of congruent adjacent sides.

Kite Angles Theorem The nonvertex angles of a kite are congruent.

GIVEN: Kite $ABCD$ with congruent sides as marked. [See Figure 4.14(a).]

PROVE: $\angle B \cong \angle D$

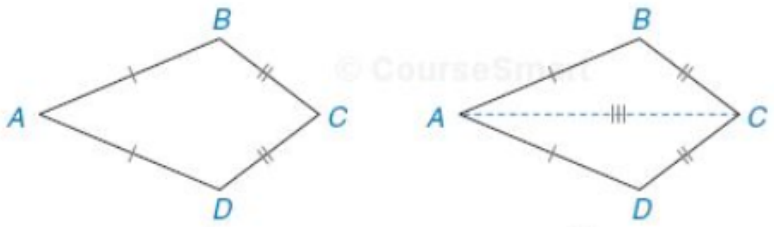


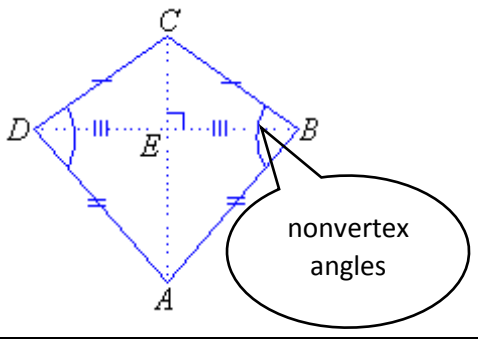
Figure 4.14

PROOF	
Statements	**Reasons**
1. Kite $ABCD$	1. ?
2. $\overline{BC} \cong \overline{CD}$ and $\overline{AB} \cong \overline{AD}$	2. A kite has two pairs of $\cong$ adjacent sides
3. Draw $\overline{AC}$ [Figure 4.14(b)]	3. Through two points, there is exactly one line
4. $\overline{AC} \cong \overline{AC}$	4. ?
5. $\triangle ACD \cong \triangle ACB$	5. ?
6. ?	6. CPCTC

Kite Diagonals Corollary The diagonals of a kite are perpendicular.

Kite Diagonal Bisector Corollary The diagonal connecting the vertex angles of a kite is the perpendicular bisector of the other diagonal.

Kite Angle Bisector Corollary The vertex angles of a kite are bisected by a diagonal.



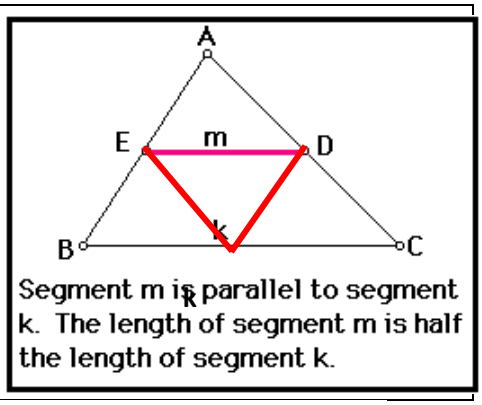
http://www.mathopenref.com/trianglemidsegment.html

Midsegment of a Triangle Definition

A line segment joining the midpoints of two sides of a triangle.
A triangle has 3 possible midsegments.

Three Midsegments Theorem
A midsegment of a triangle is parallel to the third side and half the length of the third side.

Three Midsegments Corollary:
The three midsegments of a triangle divide it into four congruent triangles.



GIVEN: In Figure 4.16(a), $\triangle ABC$ with midpoints M and N of $\overline{AB}$ and $\overline{AC}$, respectively.

PROVE: $\overline{MN} \parallel \overline{BC}$

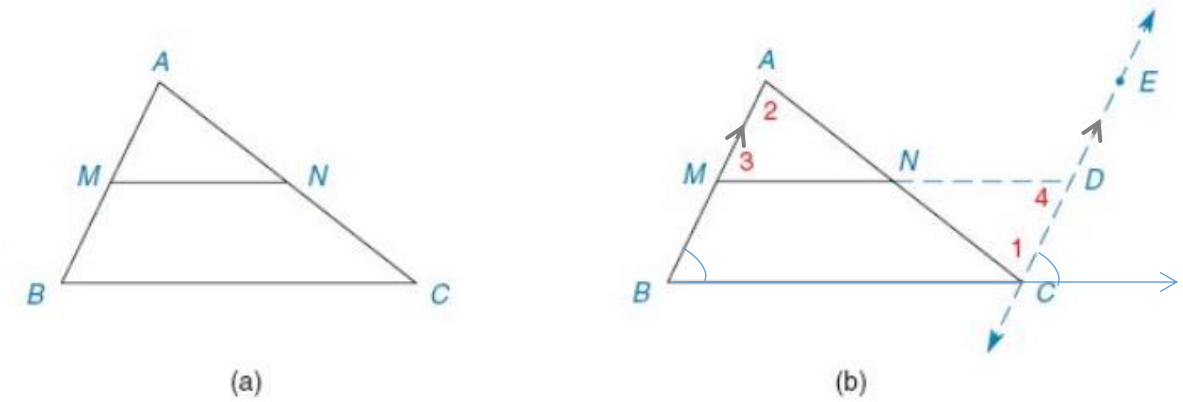


Figure 4.16

STATEMENTS	REASONS