Parallelism of a Rhombus

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April 30, 2015

Theorem 1.6. If ABCD is a rhombus, then ABCD is a parallelogram.

Proof. Let ABCD be a rhombus. Draw diagonal AC. Sides AB, BC, DC, and AD are congruent by definition of a rhombus. We know triangle ADC is congruent to triangle ABC by Euclid I.8 because side AB is congruent to side DC, side BC is congruent to side AD, and they share the base AC.

Triangle ADC is an isosceles triangle because side AD is congruent to side DC. By Euclid I.5 we know that angle CAD is congruent to angle DCA. Since triangle ADC is congruent to triangle ABC we know angle DCA is congruent to its corresponding angle BCA. Since angle DCA is congruent to angle CAD then angle CAD is also congruent to angle BCA.

Since angle CAD is congruent to angle BCA by Euclid I.27 we know that side AB is parallel to side DC. By Euclid I.33 we know that side AD is parallel to side BC. Since side AB is parallel to side DC and side AD is parallel to side BC we know that rhombus ABCD is a parallelogram.
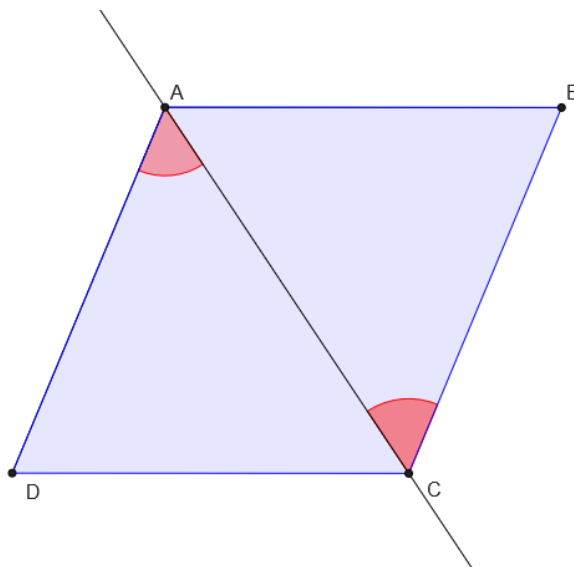

Figure 1: Rhombus ABCD

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