Diagonals in a Rectangle

Grace Freking

April 27, 2015

Theorem 3.3. The two diagonals of a rectangle are congruent and bisect each other.

Proof. Let ABCD be a rectangle. Create the two diagonals in the rectangle and label the point where they meet as X. We know that each pair of opposite sides of a rectangle are congruent by Theorem 3.2. So, AD is congruent to BC. By the definition of a rectangle, all four interior angles are right angles, so angle ADC is congruent to angle BCD. Because AD is congruent to BC, angle ADC and angle BCD are congruent, and they share the side CD, triangle ADC is congruent to triangle BCD by SAS in Euclid I. 4. Therefore, AC is congruent to BD. We know that a rectangle is a parallelogram by Theorem 3.1. By using alternate angles in Euclid I. 29, angle BAC is congruent to angle ACD. Similarly, angle ABD is congruent to angle BDC. This makes triangle AXB congruent to triangle CXD by ASA in Euclid I. 26. Since triangle AXB is congruent to triangle CXD, then AX is congruent to XC. This makes the diagonal BD bisect diagonal AC. Since triangle AXB is congruent to triangle CXD, then BX is congruent to XD. This makes diagonal AD bisect diagonal BC. Therefore, the diagonals of a rectangle bisect each other.

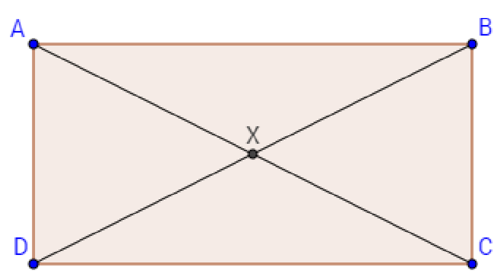

Figure 1: Rectangle ABCD

□