

Interior Angles of Maggert's Pentagon

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For the sake of this proof, we will be considering the angles created where the sides intersect in Maggert's pentagon interior angles.

Theorem Maggert's Interior Angles. The interior angles in Maggert's polygon ABCDE added together are equal to the interior angles in the convex pentagon drawn around the vertices of Maggert's pentagon ADEBC added together.

Proof. Suppose ABCDE is a Maggert Pentagon and ADEBC is the convex pentagon drawn around the vertices of the Maggert Pentagon. Label the points where the sides of pentagon ABCDE intersect X and Y. We will show that angles XAY, YDE, DEY, XBC, BCX, CXB, AXY, AYX, and DYE on pentagon ABCDE added together are congruent to angles CAD, ADE, DEB, EBC, and BCA added together on pentagon ADEBC.

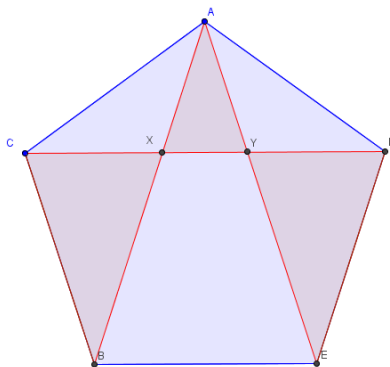


Figure 1: Pentagon ABCDE in red with intersections X and Y labeled and pentagon ADEBC in blue.

Angles CXA and AXD must add to two right angles since they exist from a straight line set up on another straight line (Euclid I.13); the same holds true for angles CYA and AYD. Angles XCA, CAX, and CXA must also add up to two right angles because they are the three angles of the triangle CAX; the same holds true for angles YDA, DAY, and DYA. Therefore, angles XCA and CAX must add up to angle AXD, and the angles YDA and DAY must add up to angle AYC. Angles CXB and DXB add up to two right angles by Euclid I.13 as well as angles CYE and DYE. All four angles then add up to four right angles. The angles

DXB, CYE, XBE, and XEB must add up to four right angles since they are the four angles of the quadrilateral BXYE. Therefore, angles CXB and DYE add up to the sum of angles XBE and XEB. In conclusion, all the angles in the regular pentagon ADEBC is accounted for in all the angles in Maggert's Pentagon ABCDE.

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