

# The Diagonals of a Non-convex Kite Do Not Cross

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**Theorem J.** If kite  $ABCD$  is non-convex then the diagonals  $AC$  and  $BD$  do not cross.

*Proof.* Let  $ABCD$  be a non-convex kite. By definition of a non-convex figure one of the diagonals, either  $AC$  or  $BD$ , lies outside  $ABCD$ . For now assume  $BD$  lies outside of  $ABCD$ . We must show  $AC$  and  $BD$  do not cross. By way of contradiction, assume  $AC$  and  $BD$  cross. Let  $X$  be the point where  $AC$  and  $BD$  cross. Since  $BD$  lies outside  $ABCD$ ,  $X$  must lie outside  $ABCD$ . But  $X$  lies on  $AC$ , so  $X$  must lie inside  $ABCD$ . Therefore,  $X$  cannot lie inside and outside the kite at the same time, which makes this a contradiction. Something to remember is that we know  $AC$  has to lie inside the kite if  $BD$  lies outside of the kite because of Mr. Maggert's 4.2 proof.

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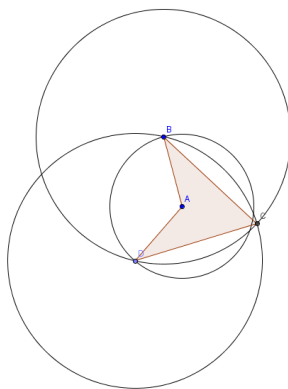


Figure 1: A non-convex kite

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