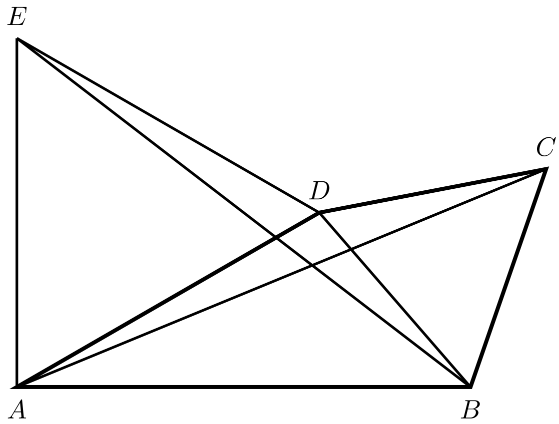
1131. *Proposed by Ayoub B. Ayoub, Pennsylvania State University, Abington College, Abington, PA*

$ABCD$ is a convex quadrilateral in which $\triangle BCD$ is equilateral and $m\angle DAB = 30^\circ$. Show that $(AC)^2 = (AD)^2 + (AB)^2$.

Solution by **Rex H. Wu**, *Brooklyn, NY.*



In quadrilateral $ABCD$, connect BD. Erect equilateral $\triangle ADE$ externally. Connect AC and BE. We know $\triangle BCD$ is equilateral and $m\angle DAB = 30^\circ$.

A rotation of 60° clockwise around point D would superimpose $\triangle ADC$ onto $\triangle EDB$. Therefore, $AC = BE$.

In $\triangle AEB$, $m\angle EAB$ is 90°. Applying the Pythagorean theorem, we have $(BE)^2 = (AE)^2 + (AB)^2 = (AD)^2 + (AB)^2 = (AC)^2$.

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