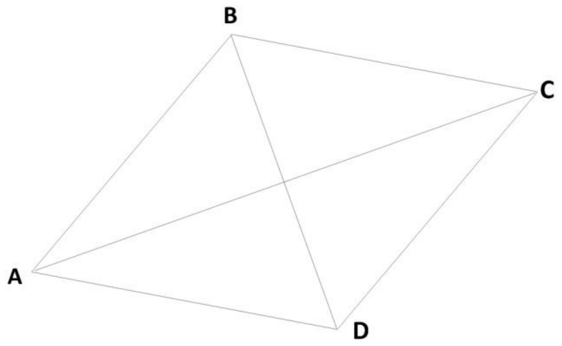
# Answer on Question #43545, Math, Other

**Task:** Prove that in any parallelogram the sum of the squares on the diagonals is twice the sum of the squares on two adjacent sides.

**Answer:**




We have parallelogram ABCD with diagonals AC and BD. Using the Law of Cosines:

$\Delta ABC : AC^2 = AB^2 + BC^2 - 2 \cdot AB \cdot BC \cdot \cos \angle B;$

In $\Delta ABD : BD^2 = AB^2 + AD^2 - 2 \cdot AB \cdot AD \cdot \cos \angle A;$

But $AD = BC; \angle A = 180^0 - \angle B.$

$BD^2 = AB^2 + BC^2 - 2 \cdot AB \cdot BC \cdot \cos(180^0 - \angle B) \Rightarrow$

So we have $BD^2 = AB^2 + BC^2 + 2 \cdot AB \cdot BC \cdot \cos \angle B; \Rightarrow$

$AC^2 + BD^2 = 2(AB^2 + BC^2)$