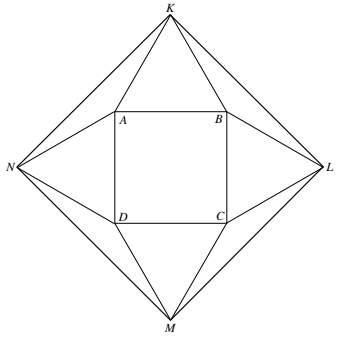
- Points K, L, M, and N lie in the plane of the square $ABCD$ so that AKB, BLC, CMD, and DNA are equilateral triangles. If $ABCD$ has an area of 16, find the area of $KLMN$.

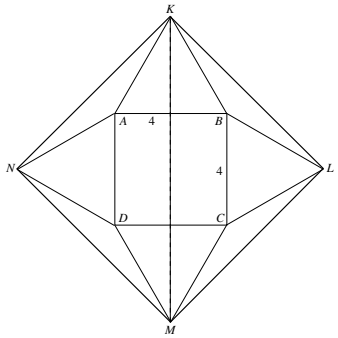


(A) 32 **(B)** $16+16\sqrt{3}$ **(C)** 48 **(D)** $32+16\sqrt{3}$ **(E)** 64

2003 AMC 12 A, Number #14— "Measure the diagonal"

- **Solution (D)** Quadrilateral $KLMN$ is a square because it has 90° rotational symmetry, which implies that each pair of adjacent sides is congruent and perpendicular. Since $ABCD$ has sides of length 4 and K is $2\sqrt{3}$ from side $\overline{AB}$, the length of the diagonal $\overline{KM}$ is $4+4\sqrt{3}$. Thus the area is

$$\frac{1}{2}(4+4\sqrt{3})^2 = 32+16\sqrt{3}.$$



Difficulty: Medium

NCTM Standard: Geometry Standard for Grades 9–12: Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.

Mathworld.com Classification:
Geometry > Plane Geometry > Miscellaneous Plane Geometry > Area