1068-37-163 **Michel L. Lapidus** (lapidus@math.ucr.edu), 900 Big Springs Rd., Surge Building, Department of Mathematics, Riverside, CA 92521, and **Robert G. Niemeyer*** (niemeyer@math.ucr.edu), 900 Big Springs Rd., Surge Building, Department of Mathematics, Riverside, CA 92521.

Consequences of tiling a prefractal flat surface.

Let R be a polygon with interior angles measuring as rational multiples of π. The compact set $\Omega(R)$ with boundary R is a called a *rational billiard*. Associated with $\Omega(R)$ is what is called a *flat surface* $\mathcal{S}(R)$. The prefractal approximation KS_n of the Koch snowflake fractal KS is a rational polygon and $\Omega(KS_n)$ is a rational billiard. Associated with this prefractal billiard is a prefractal flat surface $\mathcal{S}(KS_n)$.

Despite the fact that KS is a nondifferentiable curve (and, hence, each point of KS lacks a well-defined tangent), we describe a particular family of periodic orbits of $\Omega(KS)$. We then examine the corresponding closed geodesics on their associated prefractal flat surfaces. Finally, we state a variety of conjectures on the existence of a true fractal billiard and an associated "*fractal flat surface*" (Received January 19, 2011)