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Counting periodic billiard paths on some tessellating polygons

Imagine standing at a frictionless billiard table with polygonal boundary π. Given a natural number n, how many ways can you roll a billiard ball so that it bounces around the table exactly n times, returns to its initial position, and repeats? This poster-presentation will present answers for π given by a rectangle, an equilateral triangle, an isosceles-right triangle, and a 30-60-90 triangle. Joint work with Andrew Baxter and Jonathan Eskreis-Winkler, at the DIMACS Institute Summer REU.