Richard Leher* and Daina Taimina. What stays the same? Children’s exploration of Line and Polygon on plane, cylinder, sphere and hyperbolic plane.

We report a multi-week study in which a class of fifth-grade students investigated “straight” curves and polygons on plane, cylinder, sphere and hyperbolic plane. Most of the participating students were from low-income families with diverse cultural and linguistic backgrounds, including Pacific Islander and Latino immigrant families, and rural white families. Student investigations featured literal and imagined motion to create curves and polygons on each surface from intrinsic and extrinsic perspectives. For example, we invited students to create tension on a rope, and after they agreed that the resulting path was straight, students wore video head cams and “baby crawled” without raising their heads, to experience straight paths from an intrinsic perspective. They also stood up and walked the same path to experience an extrinsic perspective. The same process was repeated for curves that they agreed were not straight. We propose to report some of the highlights of students’ investigations and the longer-term sense they made of them as indicated by their responses to the interview questions and tasks. (Received September 17, 2019)