B4.3: Problem Solving Using Dilations

Sample problems that can be solved using both traditional (static) and transformation (dynamic) methods - the transformation solutions are really elegant! You might have participants do these in groups, with each group taking responsibility for one problem, then have a gallery walk with poster presentations of solutions or status of work so far. Parenthetical statements are for professional development facilitators only. If needed, they might be available as hint cards for groups that need additional support.

1. Given a triangle, inscribe a square such that one side of the square is on one side of the triangle, and the remaining two vertices of the square are each on another side of the triangle.
   (Dilation: inscribe a square of some size in the triangle, and dilate to maximum size)
2. Given a sector of a circle, inscribe a square in this sector so that 2 vertices are on the circumference and one is on each of the radii defining the sector.
   (Dilation, similar to Q.1)
3. Given a circle and a point A. What is the locus of all points M that are midpoints of segment AN, for N a point on the circle?
   (Dilation: This is the dilation with scale factor ½ and center of dilation A)
4. Given 3 circles of 3 different radii, construct their pairs of common external tangents. Denote their intersections A, B, C. Prove the A, B, and C are collinear.
   (Composition of dilations)