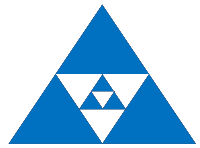
1. The sum of all of the interior angles of seven polygons is $180 \cdot 17$. Find the total number of sides of the polygons.

2. The pattern in the figure below continues inward infinitely. The base of the biggest triangle is 1. All triangles are equilateral. Find the shaded area.



3. Given a regular pentagon, find the ratio of its diagonal, d, to its side, a.

4. $ABCD$ form a rhobus. E is the intersection of AC and BD. F lie on AD such that $EF \perp FD$. Given $EF = 2$ and $FD = 1$. Find the area of the rhobus $ABCD$.

5. In the 2009 Rice Olympics, Willy and Sammy are two bikers. The circular race track has two lanes, the inner lane with radius 11, and the outer with radius 12. Willy will start on the inner lane, and Sammy on the outer. They will race for one complete lap, measured by the inner track. What is the square of the distance between Willy and Sammy's starting positions so that they will both race the same distance? Assume that they are of point size and ride perfectly along their respective lanes.

6. Equilateral triangle ABC has side length of 24. Points D, E, F lie on sides BC, CA, AB such that $AD \perp BC$, $DE \perp AC$, and $EF \perp AB$. G is the intersection of AD and EF. Find the area of the quadrilateral $BFGD$.

7. Four disks with disjoint interiors are mutually tangent. Three of them are equal in size and the fourth one is smaller. Find the ratio of the radius of the smaller disk to one of the larger disks.

8. Three points are randomly placed on a circle. What is the probability that they lie on the same semicircle?

9. Two circles with centers A and B intersect at points X and Y. The minor arc $\angle XY = 120°$ with respect to circle A, and $\angle XY = 60°$ with respect to circle B. If $XY = 2$, find the area shared by the two circles.

10. Right triangle ABC is inscribed in circle W. $\angle CAB = 65°$, and $\angle CBA = 25°$. The median from C to AB intersects W at D. Line l_1 is drawn tangent to W at A. Line l_2 is drawn tangent to W at D. The lines l_1 and l_2 intersect at P. Compute $\angle APD$.