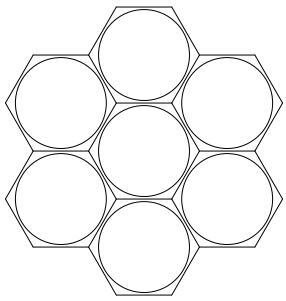
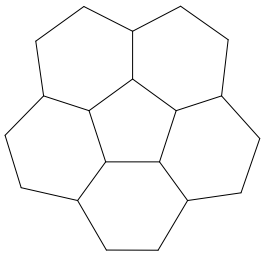
Sponsored by: UGA Math Department and UGA Math Club

TEAM ROUND / 1 HOUR / 210 POINTS
October 22, 2016

Problem 1 (How many pentagons?)**.** A golf ball is basically a sphere with a lot of circular dimples. Most of these are arranged in a hexagonal array like this:



But some dimples are pentagonal, surrounded by hexagons like this:



Assume that the golf ball is covered with these hexagonal and pentagonal dimples, and, as in the diagrams, three of these polygons meet at each vertex.

If there are 332 hexagons, how many pentagons are there?

Problem 2 (Pascal sums)**.** The 2016th row of Pascal's triangle begins

$$1, \quad 2016, \quad 2031120, \quad 1363558560, \quad \ldots.$$

Let

$S_1 =$ the sum of every 4th number, beginning with 1,
$S_2 =$ the sum of every 4th number, beginning with 2016,
$S_3 =$ the sum of every 4th number, beginning with 2031120,
$S_4 =$ the sum of every 4th number, beginning with 1363558560.

What is the difference between the largest and smallest S_i? Write your answer in terms of powers of 2.

Problem 3 (Pluses and minuses)**.** A sequence of N numbers, each ± 1, has the property that the sum of all N terms is 0 but no block of twenty consecutive terms sums to 0. What is the largest possible value of N?

RETURN THIS SHEET

Team ID:

Team name:

Answer 1:

Answer 2:

Answer 3: