

1086-P5-902

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35294-1170. *An Open-Ended Problem: Hexagon Numbers.*

An *equiangular hexagon* is a six-sided convex polygon all of whose internal angles are equal. Imagine that you have an unlimited supply of congruent equilateral triangles. A number of these triangles can be placed with edges adjoining (fully, not overlapping) so as to form an equiangular hexagon. The first two hexagon numbers are six and ten. Call a positive integer  $n$  a *hexagon number* provided that with  $n$  of your congruent equilateral triangles, you can build an equiangular hexagon. *What are the hexagon numbers?* We will show how, using manipulatives, this problem, and others that flow from it, can be introduced to students, working individually or in collaborative groups, in grades 5-16. There are multiple entry- and exit-levels for this problem. Such problems help students understand what mathematics actually is, as a study in its own right as opposed to (merely) a tool. (Hexagon numbers are not to be confused with *hexagonal numbers*: The  $n^{\text{th}}$  hexagonal number is the number of points on a regular hexagon with  $n$  regularly spaced points on a side, including the vertices.) (Received September 15, 2012)