1135-M5-1495 **Jerry Lodder*** (jlodder@nmsu.edu), Mathematical Sciences, Dept. 3MB, Box 30001, New Mexico State University, Las Cruces, NM 88003. *Figurate Numbers and Mathematical Induction.*

We outline certain topics in discrete mathematics that form the content of a course taught entirely from primary historical sources. It begins with Nicomachus's construction of the figurate numbers, which count the number of dots in regularly shaped figures, such as triangles, squares, pyramids. In his verbal description of the triangular numbers, Nicomachus identifies two geometrical methods for their construction, which today carry the names of a recursive construction and an iterative one. Other figurate numbers in dimension two, such as the square numbers or the pentagonal numbers can be described in terms of first and second differences. For higher dimensional numbers, patterns in their growth were identified by Pierre de Fermat, and can be motivated by certain quotients. Student exercises include identification of these patterns and a discussion of their validity. The module concludes with the work of Blaise Pascal, who arranged these numbers in one table according to a single recursive principle building on Nicomachus. Pascal generalizes Fermat's work by stating a method to compute the quotient of any two consecutive entries in the same base of his table. To justify why these patterns persist, Pascal develops a reasoning process known today as mathematical induction. (Received September 22, 2017)