

Arithmetic, Geometry and Calculus III

by

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Does knowledge of arithmetic or geometry have any effect on a student's ability to learn higher mathematics? I make no claim to answer that question in this paper, but I do try to approach the problem. In both the fall of 2007 and the fall of 2008, I taught Calculus III to over 200 students. Calculus III goes by various names: *Vector Calculus*, *Multivariable Calculus*, *Calculus of Several Variables*. There is a lot of material in the course and it goes very fast. However, there is little use of basic arithmetic or geometry.

On the first day of class in 2007 I gave a ten question basic arithmetic test, which can be found at <http://www.math.jhu.edu/~wsw/ED/arith.pdf>. I divided the students into two groups, those who got 8-10 of the problems correct and those who got 0-7 of the problems correct. When the course was over I looked at the final exam and divided students up into four groups based on their score for the final. The maximum score was 29. For each of these four groups I have graphed the percentage of each type of student (0-7 or 8-10) in that group. See the graph on the next page.

On the first day of class in 2008 I gave a ten question geometry test, which can be found at <http://www.math.jhu.edu/~wsw/GEOM/geometry.pdf>. I divided the students into two groups, those who got 4-10 of the problems correct and those who got 0-3 of the problems correct. When the course was over I looked at the final exam and divided students up into four groups based on their score for the final. The maximum score was 27. For each of these four groups I have graphed the

percentage of each type of student (0-3 or 4-10) in that group. See the graph on this page.

Figure 1: Arithmetic test scores and final exam scores

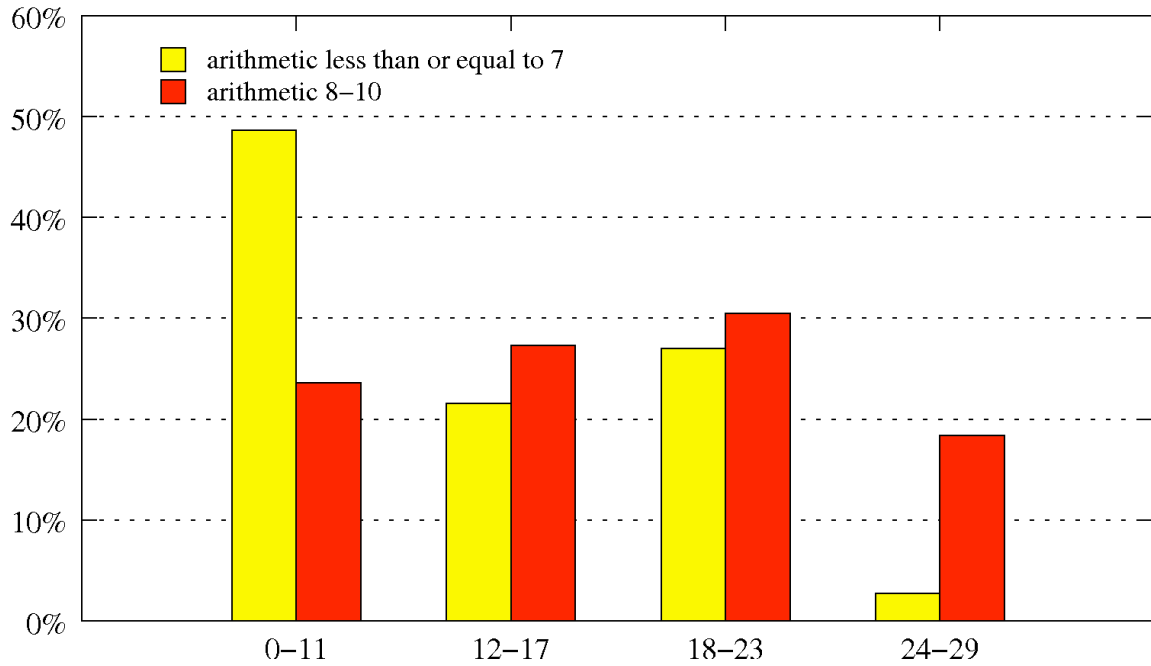
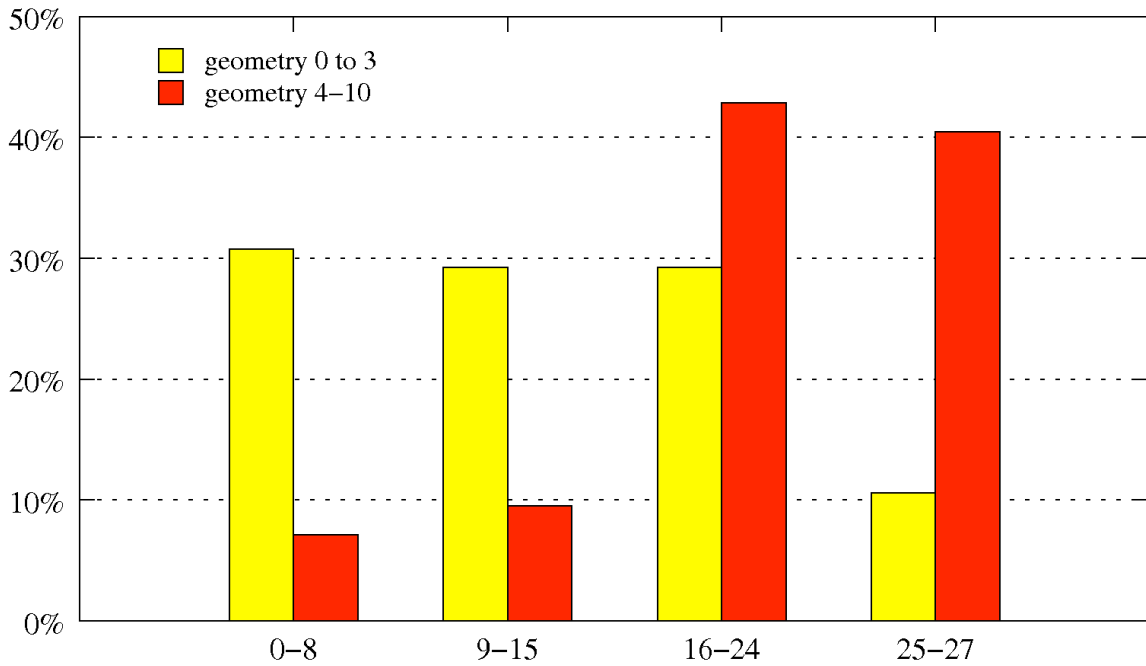


Figure 2: Geometry test scores and final exam scores



The students who dropped the course were assigned the bottom group on the final exam. For almost all of the students, this is a required course. I leave it to the reader to interpret these results in whatever way they want.