

ZMATH 2012a.00489

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From chords of circles to triangular numbers to volumes of spheres.

Math. Teach. (Reston) 103, No. 8, 616-621 (2010).

From the introduction: This “Delving Deeper” article is a bit different: It is inspired by a problem that Don Crossfield posed in *The Oregon Mathematics Teacher* and from which interesting mathematical discoveries emerged. To preserve a sense of the evolution of the ideas, we have presented this discussion in epistolary form. For example, the conversation that unfolds here takes place between two imaginary characters, Hypatia and Ptolemy. Also, we have eliminated casual talk and confusing references that occurred in the actual conversations but have not cleaned up the mathematical questioning, wondering, loose ends, and problem posing. Our goal is to share the excitement and intrigue of collaborative mathematical exploration. Although the result is a fictionalized account of our conversations, we have made it as faithful a representation as possible of the way the mathematical ideas developed.

Classification: G40

Keywords: circles; intersecting chords theorem; area; dynamic interpretation; plane geometry; product of segment of chords; three-dimensional analogs; generalization; spheres; circular cross sections; perpendicular planes