



Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
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Discovering Conic Sections in the Motion of Heavenly Bodies

Guide for Curriculum Unit 07.03.07

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The development of mathematics, from its very beginnings, has been about problem solving. The study of the heavens, in addition to the quest for knowledge about the world around us, was required in order for human beings to be able to better navigate, and map, the vast world around them. Rather than focus on the abstract and procedural nature of mathematics we will attempt to put a human face on what is a very human endeavor. Additionally, we will emphasize the problem solving and practical aspects of the whole enterprise. By having students "discover" ways to solve problems in a historical context we hope to facilitate a deeper and better understanding.

The unit will specifically investigate the origins of conic sections and the possible role of the sun dial in that discovery. The circle will be used to describe Ptolemy's universe. Kepler's First Law, in particular, will be used to model the path of orbits. Parabolas will be used to describe the trajectory of rockets and other Earth launched projectiles. Hyperbolas will be used to describe the paths of unbound objects in space. This is an introductory unit in conic sections suitable for high school Algebra II or Precalculus courses.

(Developed for Pre-Calculus, grade 11; recommended for Algebra II, grades 10-11, and Pre-Calculus, grade 11)

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