

Lesson Plan = For the Astronomy class, I see an excellent opportunity to bring in not only technology, but also math. This will be a field exercise to investigate basic geometry as it relates to Astronomy. We will use rectangular pieces of cardboard, approximately 1"x2", with a small hole in the middle and a length of small cord run through the hole, knotted to hold it in place. This is a Kamal, an ancient Arabic navigational device. It was used for both seagoing and desert-going navigation by lining up the top edge with the North Star, and the bottom with the horizon. The distance from the eye was then marked by tying another knot in the string that was held between the teeth, and the string stretched in front of the viewer to that distance. Thus a reference latitude was established. North of that latitude, the string had to be shorter; south it became longer, and over time the navigator built up a string of knots that corresponded to known destinations. In the ages before accurate timekeeping and longitude determination, this was a valuable aid to navigation. We will use the track field and one of the lights as the "North Star" (since this will be during the day), and apply the principles of the Kamal and simple geometry to see how the angle changes from different spots in the field, and the students will develop their own "rudder" in the string of the Kamal, supplemented by measurement of angle with a standard protractor. These will form the basis for later classes that discuss degrees, azimuth, measurement and navigation.

E.Q.: I can understand the relationship between distance and angles, and how it is applied to measurement and navigation.

SCOS GOALS & OBJECTIVES: To understand how early attempts at navigation affected our understanding, use, and measurement of celestial bodies, and how fields such as math are intricately interwoven with other studies.

ACTIVATING STRATEGIES: To build a foundation of practical understanding and application of methods used to measure the physical world as it relates to Astronomy, and to introduce the concept that there are many ways to define "location".

INSTRUCTIONAL PROCEDURES: use of a field exercise to measure relative position and distances with an simple navigational tool.

ASSESSMENT STRATEGIES: Summative in the form of a written essay on what the student did, and why it worked; Formative in discussing how this simple approach might be expanded for other uses.