

Name _____ Date _____

Partners _____

Vectors: Lab #4

by Mary Lou West, Bob Dorner

Equipment: sextant, double meter sticks

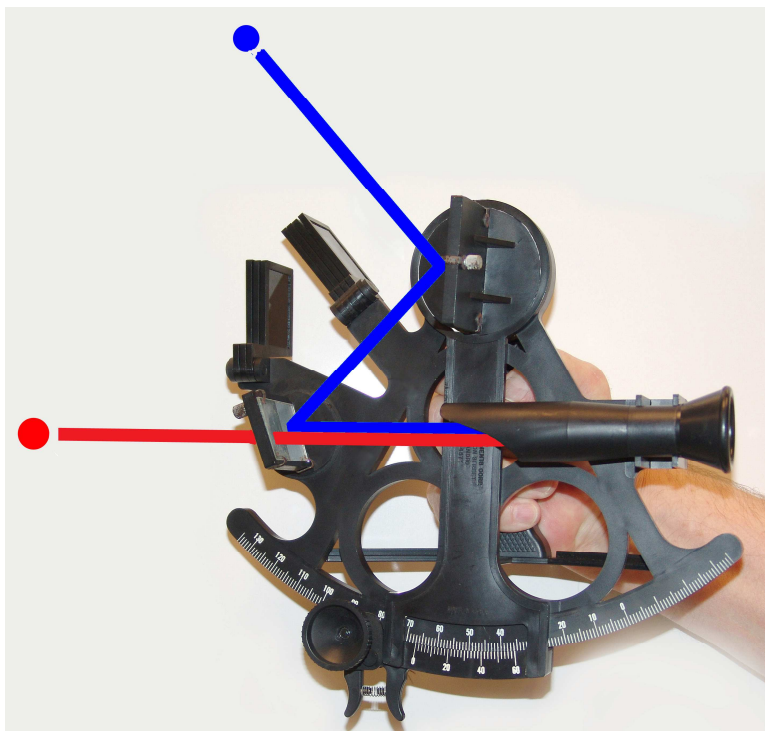
Objective: to become familiar with using vector sums and trigonometric methods to measure heights and distances

Procedure:

1. How to use a sextant:

This is an instrument that enables you to establish the angle between two visually notable objects that appear some distance away from your vantage point. Notice that the telescope-like eyepiece is aimed at a surface comprised of a piece of clear glass and a mirror. With the sextant held vertically, as pictured, the reference object in the mirror should appear to be above the reference object in the clear glass. The sextant is held near your eye so that one of the two visual reference objects is viewed through the glass. For example, the first could be the horizon and the second might be a star.

To bring the second object into view level with the first object requires adjusting the radius arm which carries the mirror. In the picture this is the vertical beam connecting the adjusting knob-



vernier scale to the round pivot center at the top. Attached to the pivot point is another mirror that reflects the second object to the first mirror and hence to the eyepiece and your eye.

After the difficult job of adjusting the radius arm and moving the sextant you should see both images next to each other in the eye piece. This takes a bit of practice so try it inside the room before venturing outside. In class we will discuss the calibration of the sextant. The sextant is really very much like a precise optical protractor. For height measurements the sextant is held vertically as shown. However, to measure horizontal angles, it is turned and held horizontally. There is an assortment of filters that swing out of the viewing path. These will not be used in this lab.

Practice, practice, practice before you go out.

2. Measure the height of Richardson Hall

- a) Select a position in front of the building at a distance at least half of the building's height. Measure the distance from the building, and use the sextant to measure the angle from your position to the top of the building. It is a good idea to do each measurement at least twice. Calculate the height.
- b) Estimate the height by some other method, such as counting bricks.
- c) Compare the methods as to ease and accuracy.

3. Width of Richardson Hall

- a) Make whatever measurements you need to calculate the width.
- b) Is the width the same north/south and east/west, i.e. is the building square?

4. What is the displacement from the front door of the Music Building to the northwest corner of the Drop In Center?

Consult with all your team members to devise a plan.

5. Write up a group report for next week and all sign it.