

NAME _____ DATE _____

LAB # _____

POLARIS DETERMINATION

PROBLEM: What is the relationship between the latitude of an observer and the altitude of Polaris?

OBJECTIVES: When you are finished with this lab, you should be able to:

1. Prove the Polaris Rule works by geometric construction
2. Understand the precession of Earth's axis

BACKGROUND: The Earth's axis rotates (or precesses), just like a spinning top can wobble back and forth. Therefore, the North Pole (the northern point of Earth's rotational axis) will not always point toward the same star field.

The period of Earth's precession is 26,000 years. While the pole star in the northern hemisphere is now Polaris (which is positioned nearly above the North Pole), in 3000 BC the pole star was Thuban, a star in the Draco constellation. In 14,000 AD, Vega in the Lyra constellation will be Earth's Northern Pole Star.

VOCABULARY: write definitions on a separate piece of paper.

precession
Polaris
Pointer stars

constellation
horizon

PROCEDURE:

On two separate pieces of paper, draw 2 Polaris proofs. Be sure each diagram includes the following labels: equator, axis horizon, sight line to Polaris, Polaris, and all of the important angles. Show proofs for both 30° and 55° north latitudes.

CONCLUSION QUESTIONS: answer on a separate piece of paper.

1. How does the Polaris Rule support the shape of the Earth?
2. Assuming Earth has a circumference of 40,000 km what distance would 10° of latitude cover? One degree of latitude? Show your work.
3. Describe 2 situations that would prevent you from using Polaris to navigate by.