



ACTIVITY #4 - Celestial Navigation in the Age of Exploration

Lesson Essential Question: How did sailors and explorers determine their latitude on the open sea?

Objective: Students will examine the methods used in navigation to determine latitude with scientific instruments of the day.

Materials:

- **Navigation Tools Worksheet**
- **Link: Power Point PDF – Celestial Navigation Tools.**
- **Acrostic word sheet**

Vocabulary: Astrolabe, quadrant, celestial navigation, astronomy, Polaris, latitude, back-staff, cross-staff, chart, compass, quadrant, globe, armillary sphere, and sundial

S.T.E.M. Connections: Mathematics - geometry, time, Science - astronomy, meteorology, navigation.

Instructions:

1. Ask the students about how we navigate today; What tools and knowledge do we currently use? Have the students speculate what sailors and explorers needed to have knowledge of in order to perform navigation 400 years ago.

2. Students are shown models of navigational instruments and how they were used by viewing the link of the Celestial Navigation PowerPoint. While viewing the presentation, students take notes on each instrument using the Navigation Tools Worksheet.

CELESTIAL NAVIGATION PRESENTATION

3. Discuss as a class.

4. SUMMARY: Students create an acrostic summary using the word LATITUDE written vertically. Using each letter, students begin a word or phrase that related to how latitude was determined. *(example included)*





View the presentation and take notes on each instrument using the Navigation Tools Worksheet

CELESTIAL NAVIGATION PRESENTATION

Navigation Worksheet

Match the instrument to the description by writing a letter in the blank.

_____back-staff

_____cross-staff

_____chart

_____astrolabe

_____quadrant

_____globe

_____armillary sphere

_____sundial

- A.** Used to find the time of day. It is aligned with north and a shadow falls on the gauge to show the time.
- B.** This kind of innovative map was first used in the 15th century to show a view of the earth from outer space.
- D.** Also called a Davis Quadrant after its inventor, this instrument was used to sight the sun to find latitude. Since looking at the sun could injure the eye, shadows were employed to get a reading.
- E.** This map of the water was originally called a portolan. It was the first map of its kind: a literal representation of the coastline.
- F.** Used to find latitude. It uses different sized transoms to measure the height of an object above the horizon.
- G.** This instrument measured the altitude of an object above the horizon (noon altitude of sun or declination of a known star to determine latitude. Made by the Portuguese in 1481
- H.** Usually made from wood. Its name means a fourth of a circle. Like many of these instruments it used to measure the height of a star or the sun above the horizon.
- I.** A three-dimensional diagram of the stars, it looks like a series of rings attached to form a sphere.





ACROSTIC SUMMARY

Using each letter, begin a word or phrase that related to how latitude was determined during the Age of Exploration.

L _____

A _____

T _____

I _____

T _____

U _____

D _____

E _____