



SPACE[☆] awareness

EDUCATIONAL KIT: NAVIGATION THROUGH THE AGES

This kit contains a suite of activities related to the history of navigation, its methods, and the historic context. Special focus is put on celestial navigation where applicable.

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Curriculum topic:

Coordinate systems
Basic concepts, latitude, longitude
Celestial navigation
Constellations
Instruments
Satellite navigation

Big idea of Science:

Earth is a very small part of the universe.

Keywords:

ancient history, Arabia, astronomy, Bronze Age, celestial navigation, circumpolar, clocks, countries, Earth, equator, exploration, Galileo, geography, GPS, history, Indian Circle, James Cook, John Harrison, kamal, latitude, longitude, map, Mediterranean, meridian, navigation, North Star, Polaris, pole height, positioning, satellites, seasons, speed of light, stars, Sun, sundial, trilateration, Vikings

Education level:

Secondary

Language:

English

Core Skills:

Asking questions
Developing and using models
Planning and carrying out investigations
Analysing and interpreting data
Using mathematics and computational thinking
Constructing explanations
Communicating information

Type of learning activity:

Full enquiry

INTRODUCTION

Navigation is an art that evolved for millennia of human history and seafaring. While in the beginning, sailors relied on coastal features, their successors soon dared to explore the open sea. Celestial objects were the dominating tools to find the course to their destinations. Still, it remained an art for many centuries nevertheless. This kit explores the scientific and technological progress of determining a position on the earth and of finding the way on open seas. By including exciting historical facts, it extends from the first documented mariners of the Bronze Age via the Age of Exploration until the modern inventions of global satellite positioning systems like Navstar GPS and Galileo.

RESOURCES TABLE

Theme Category	Title	Topic	Short description
Navigation Through the Ages	Navigation in the Ancient Mediterranean and Beyond	Cardinal Directions and Celestial Navigation with the Stars	The students learn how ancient mariners were able to determine the cardinal directions and to navigate using celestial objects. The lesson is embedded into the



			historic framework of the Bronze and Iron Age Mediterranean featuring Phoenicians, Greeks, and the voyage of Pytheas to the Arctic Circle.
Navigation Through the Ages	The Kamal	Celestial Navigation with the Stars	The kamal is a simple tool to measure the angular height of stars, and thus the latitude. It was invented by Arab sailors in the 9 th century. The students will build their own kamal and use it in the same way as the Arab navigators
Navigation Through the Ages	The Viking Sun Compass	Celestial Navigation with the Sun	The Vikings dominated seafaring in Northern Europe for centuries. This unit features the tools they may have used, in particular the sun compass. The students learn the concept of its usage. This package also explores the nature of the Vikings e.g. by telling a story.
Navigation Through the Ages	Britannia Rule The Waves	Finding the longitude	Navigating across the oceans has been a dangerous adventure until the 18 th century. This activity tells the story of the invention of the first marine timekeeper which allowed the sailors for the first time to determine their longitude with high accuracy. The students follow in the footsteps of Captain Cook, how successfully tested the concept.
Navigation Through the Ages	Where on Earth am I?	GPS basics Satellite navigation	Modern navigational tools receive their time information from satellites. In this activity, the students simulate how a GPS receiver works and how it manages to locate their position.



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