ACTIVITY 1: TECHNOLOGICAL USE

Directions:
Think about all the instruments described in the video as you answer the following questions.

1. Discuss as a group why having multiple instruments that provide similar information might be useful in providing clear directions for navigators on the ship. Write down the key points here:

2. Describe a situation when the following instruments are needed.


Magnetic Compass


Gyrocompass


Engine Order Telegraph

ACTIVITY 2: BUILD A SEXTANT

Background: For centuries, sailors hugged the coast as a reliable way to get from one point to the next. One of the earliest forms of seagoing navigation was to keep sight of land. Sailing ships had tall masts so that navigators could track the land from a further distance. The Earth is round and the ground curves out from under our view. The furthest we can see before this happens is called the *horizon*.

Warm-up: *How far is the Horizon? (5 min)*

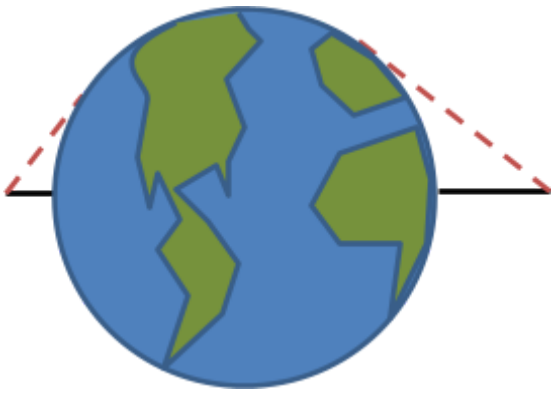
The distance to the horizon changes depending on how high up the observation is being made.

Use math to calculate the distance to the horizon based on their height above the ground.

Observation One:
Black line height above surface: 50ft

Red line shows how far the observer can see.

Horizon appears closer to the observer



Observation Two:
Black line height above surface: 100ft

Red line shows how far the observer can see.

Horizon appears further to the observer

Example:

Ron is 6 feet tall. Ron is standing on the beach looking out towards the water. How many miles away is the horizon for Ron?

To get the answer, first multiple Ron's height by 1.5

$$6 \times 1.5 = 9$$

Take your new answer and get its square root.

$$\sqrt{9} = 3$$

The square root is the number of miles Ron can see to the horizon. Ron can see 3 miles to the horizon.

Directions for Sextant (10 min): A sextant is a device that helps the observer spot and measure an object in the sky in degrees relative to the horizon. Follow these instructions to build and test your own sextant. You need the following materials:

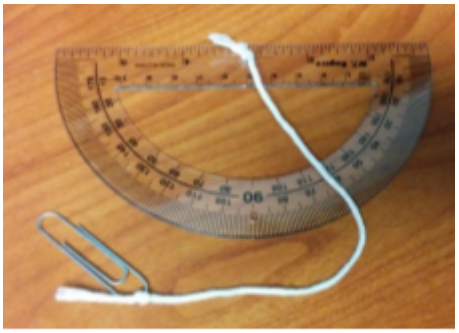
- Protractor, index card, string, paperclip, tape, pencil, North Star cutout

Step One: Roll an index card length-wise around a pencil. Tape the index card so it does not unravel. Remove the pencil. This will be the sextant's lens.

Step SEQ Figure * ARABIC 1

Step SEQ Figure * ARABIC 2

Step Two: Tie one end of your string around a paperclip. This will weigh down the string for more accurate measurements.



Step SEQ Figure * ARABIC 3

Step Three: Tie the other end of the string to the hole in the middle of the protractor.

Step SEQ Figure * ARABIC 4

Step Four: Tape the rolled index card to the flat side of the protractor.

Hold the protractor up to an object inside. Sight that object through the index card lens. Have a second student spot where the string falls on the protractor. Record that number.

Take the recorded number and subtract it from 90 degrees.

90 Degrees – Recorded Number = Latitude

The final number is how many degrees an object is above the horizon. Now let's translate this to celestial navigation!

Test Your Sextant! (15 min)

North Star