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**Earth and Space Science  
Monday  
1/30/2017**

How do observations of ships at sea provide evidence of Earth's shape?

We all know that the Earth is round- its a sphere.

How do you know it is round?

People didn't always know that the Earth was round. They had to figure it out from evidence.

How did people more than 2,000 years ago (14 centuries before Columbus) figure out that the Earth was round?



Lets take a look at 2 different models of Earth

In what ways do they look similar, and in what ways do they look different?

What do you think are some ways that we can test whether the Earth is flat or round?

\*taking care of your globe

## Latitude and Longitude:



- Find the lines that run around the globe. These are lines of Latitude. The longest one is the Equator, in the middle of the globe.
- The other lines of latitude are described in terms of their distances north or south of the equator. Its measured in degrees. It is 90 degrees to either pole from the equator.
- Find the lines that run from the North Pole to the South Pole. These are lines of longitude.
- Lines of longitude extend from pole to pole. Each line is measured in degrees, with the starting one running through Greenwich, England at the site of the royal observatory. AKA the prime meridian. On the opposite side (180 degrees) is the International Date Line.

1. Locate 0,0 on the globe. What is there?

2. Find the site of Eratosthene's historical observation in Egypt, near where the Nile River crosses the tropic of Cancer. What is the latitude and longitude?

3. What is the global location of Richmond, CA?

Focus Question:


How do observations of ships at sea provide evidence of Earth's shape?

It is not possible to observe real ships sailing to and from port, so you might want to set up a simulation in which a tiny model ship sails across the flat and round Earth models.

In a moment, you'll receive a straw and some tape.

Make sure you watch the procedures up at the front of the room! We will use what we make today in a lab tomorrow.

1. place the tape on one end of your straw, and fold it like a flag.
2. carefully draw the outline of a ship onto the tape
3. very carefully cut out the ship, making sure that it stays connected to the straw.

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**Earth and Space Science  
Tuesday  
1/31/2017**



**DONT FORGET!!!!!!**

Our field trip to the Chabot Space Center is tomorrow!

Remember to bring a small bag with extra layers and a sack lunch!

How do observations of ships at sea provide evidence of Earth's shape?

In a moment, I will pass out a ship to each group, as well as a map and a globe.

1) Select a starting port, and an ending port that you want your ship to sail to.

2) Make sure your eyes are as close to the starting point as is comfortable. You might want your partner to hold the globe or the map as you move the ship. Then trade, so that they have a chance too.

3) Document your observations on Notebook Sheet 5 in your notebook.

Lets talk about your observations.



For centuries, ships sailed the open seas, carrying materials and goods, such as metals, food, and household products, from port to port. Merchants on shore waiting for the next delivery from sea would often observe the arriving ship rise out of the sea, first the topsail, then the mainsail, and finally the deck and hull. The same observers would report that the ship sailing from port seemed to sink into the sea, disappearing below the surface until just the topsail was visible. They might well have wondered why this happened.

The sailors on board the ship also logged interesting reports. Sailors always kept constant lookout in all directions and from all locations on a ship at sea, watching for dangers and for land. Interestingly enough, it was always the sailor in the crow's nest near the top of the mast who first sighted land. Sailors on deck would stare in vain for their first glimpse of land. It would be several minutes before land would come into view for the crew on deck. Why did the lookout in the crow's nest always see land first?

In your science notebook, answer the focus question:

How do observations of ships at sea provide evidence of Earth's shape?

Make sure to put your globe back in the bag.

Have one person from your group bring your supplies up to the front of the room.





Each time the ship sails away or returns to port, you are in a position to make observations, either on the ship, on the land, or out in space looking at the whole scene. Your position of observation is your point of view.

What happens when you change your point of view?

What is the horizon?

What is line of sight?

How is the horizon different for the flat Earth and the round Earth?

Take a few minutes to fill out Notebook sheet 6 - Response for Investigation 2.

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**Earth and Space Science**  
**Thursday**  
**2/2/2017**

On a sheet of paper, write in as much detail as possible:

1. One thing that you learned at the Chabot Space Center that you didn't know before
2. One thing that you saw at the Space Center that you already knew
3. What your favorite part of the fieldtrip was.

Please use complete sentences and grammar, and write at least 3 full paragraphs.

If you can, include an illustration!

As promised...



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**Earth and Space Science**  
**Friday**  
**2/3/2017**

The position of the planet from the sun is super important. It creates a lot of the things that makes Earth successful at sustaining life...lets take a closer look at it!

What causes seasons?

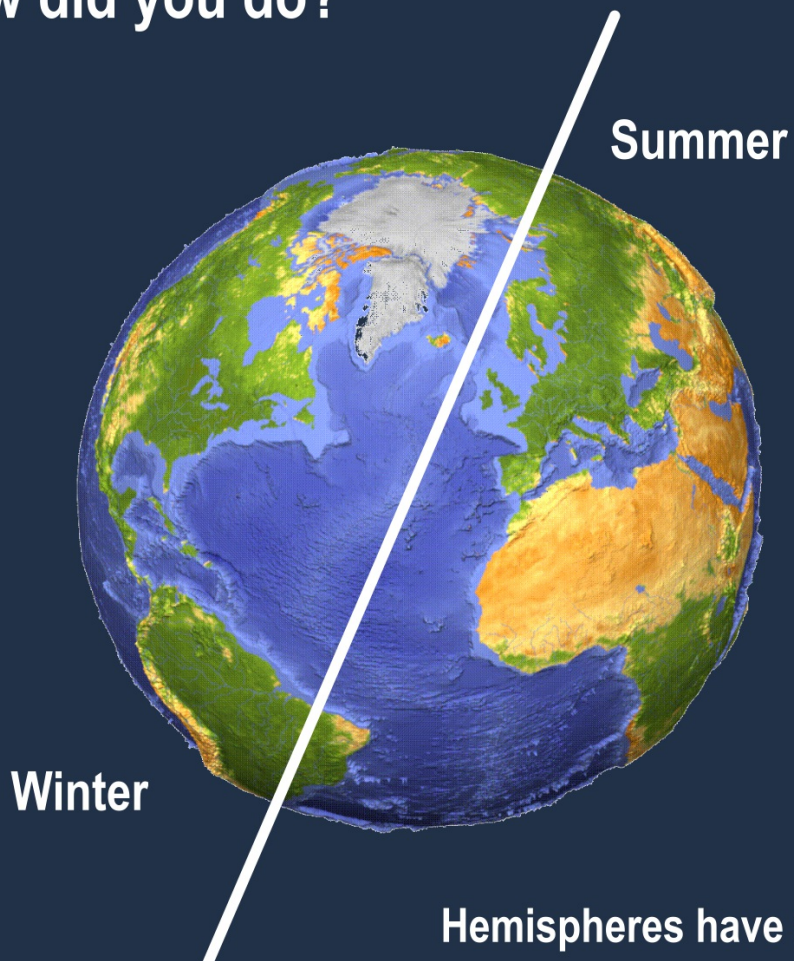




**Tilt - The earth is tilted. We use an imaginary axis through the earth in the correct angle - 23 degrees to show the tilt. Can you draw it?**



How did you do?

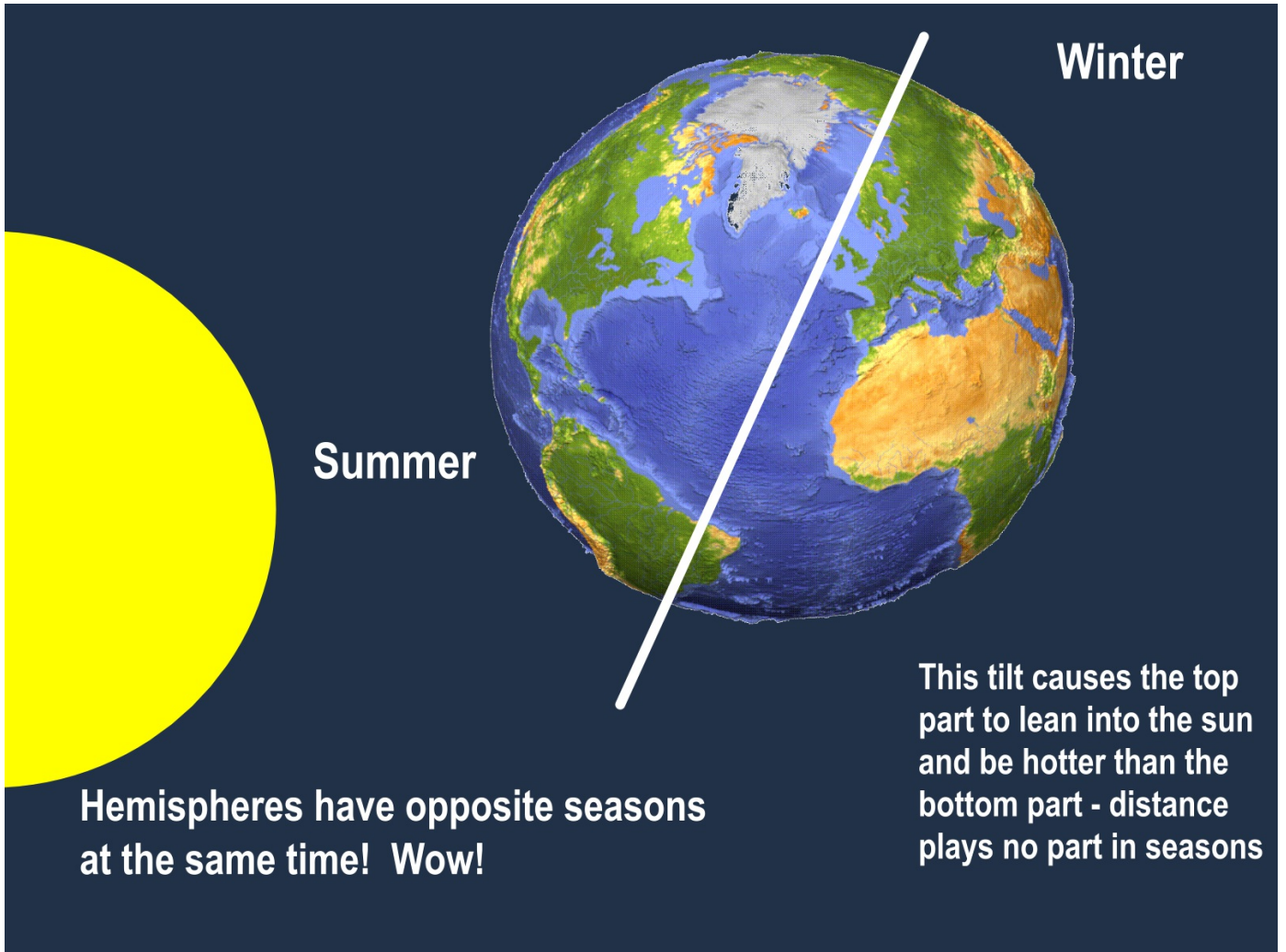


Summer

Winter

This tilt causes the top part to lean into the sun and be hotter than the bottom part

Hemispheres have opposite seasons



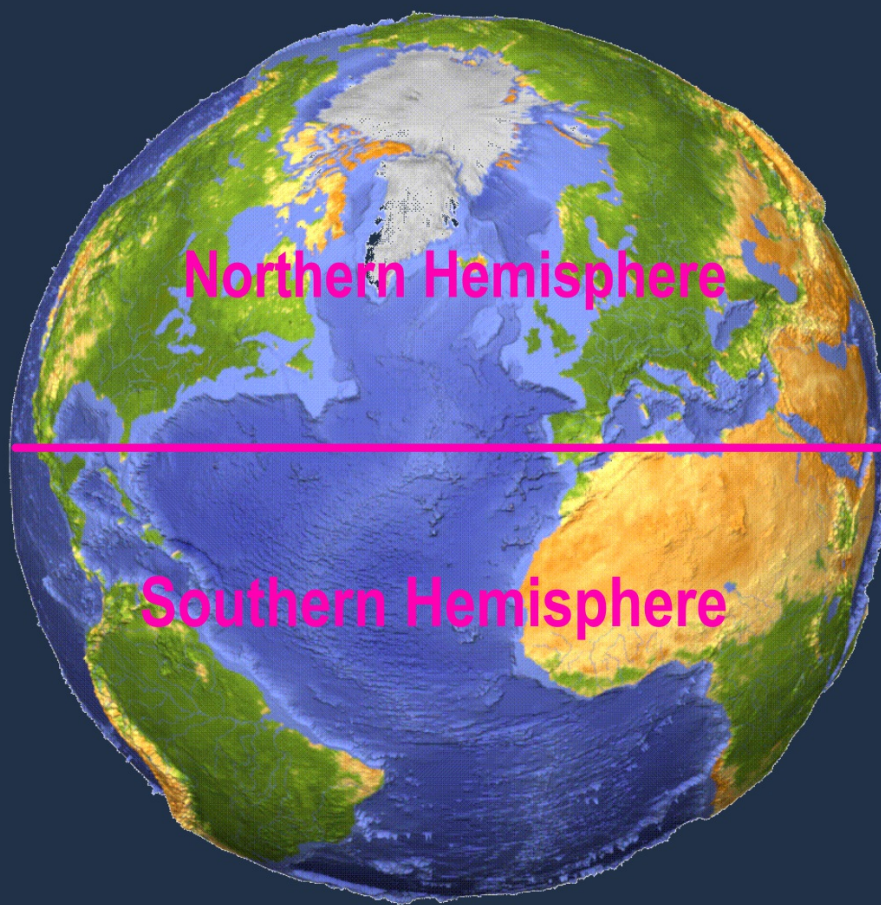
**Summer**

**Winter**

**Hemispheres have opposite seasons at the same time! Wow!**

**This tilt causes the top part to lean into the sun and be hotter than the bottom part - distance plays no part in seasons**



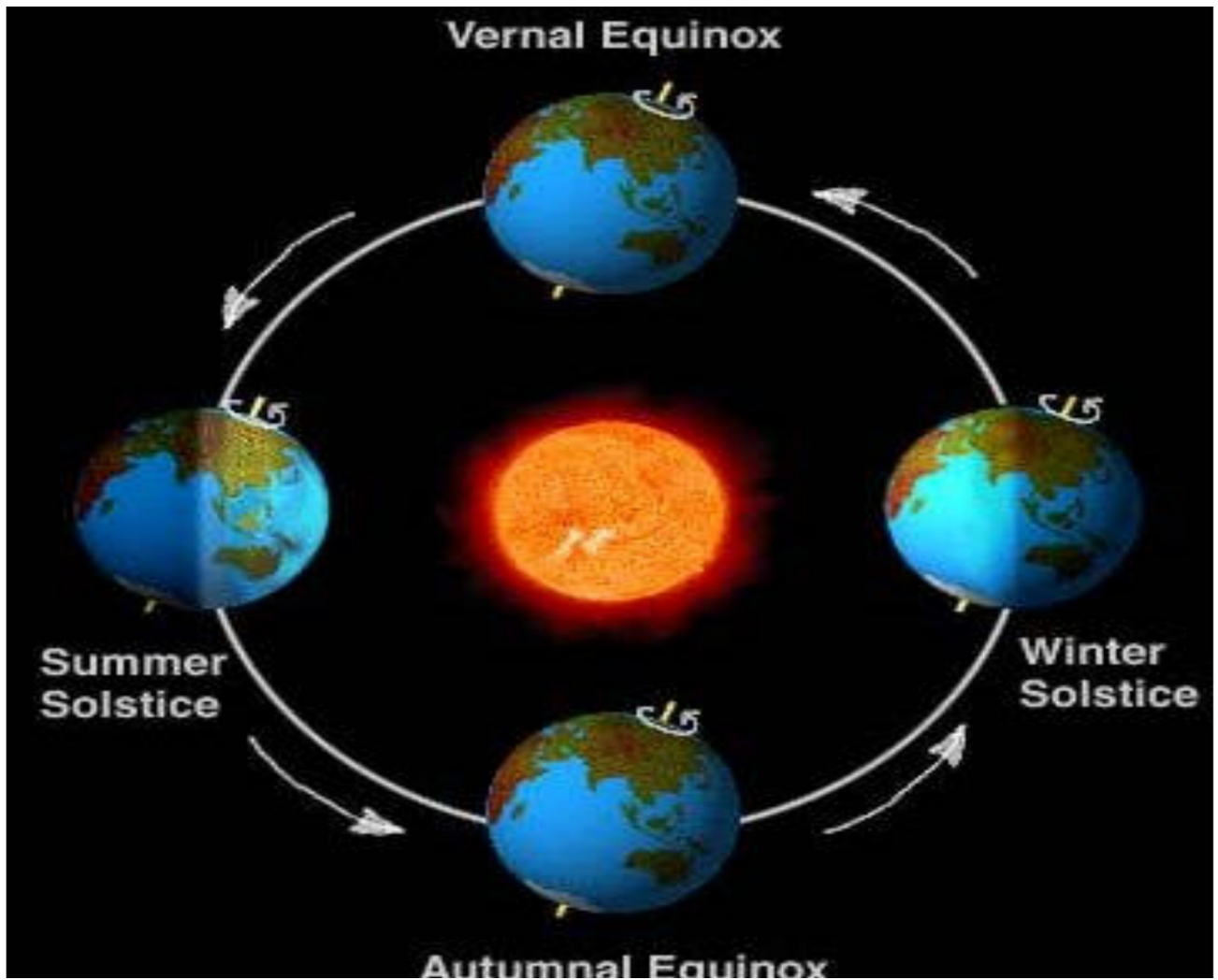


Northern Hemisphere

Southern Hemisphere

**It takes 365 days to  
travel or revolve  
around the sun to  
change seasons from  
summer to winter**







24 hours for earth to make one complete spin or "rotate" on this axis. This causes DAY and Night

Appears to rise from east and set in the west

Rotates  
WEST TO  
EAST



I am sure you have noticed that the length of the day changes throughout the year. For instance, the summer solstice is the longest day of the year, and the winter solstice is the shortest day of the year.

How do you think that the Earth's position determines the length of the day?