Grade Level: 6-8

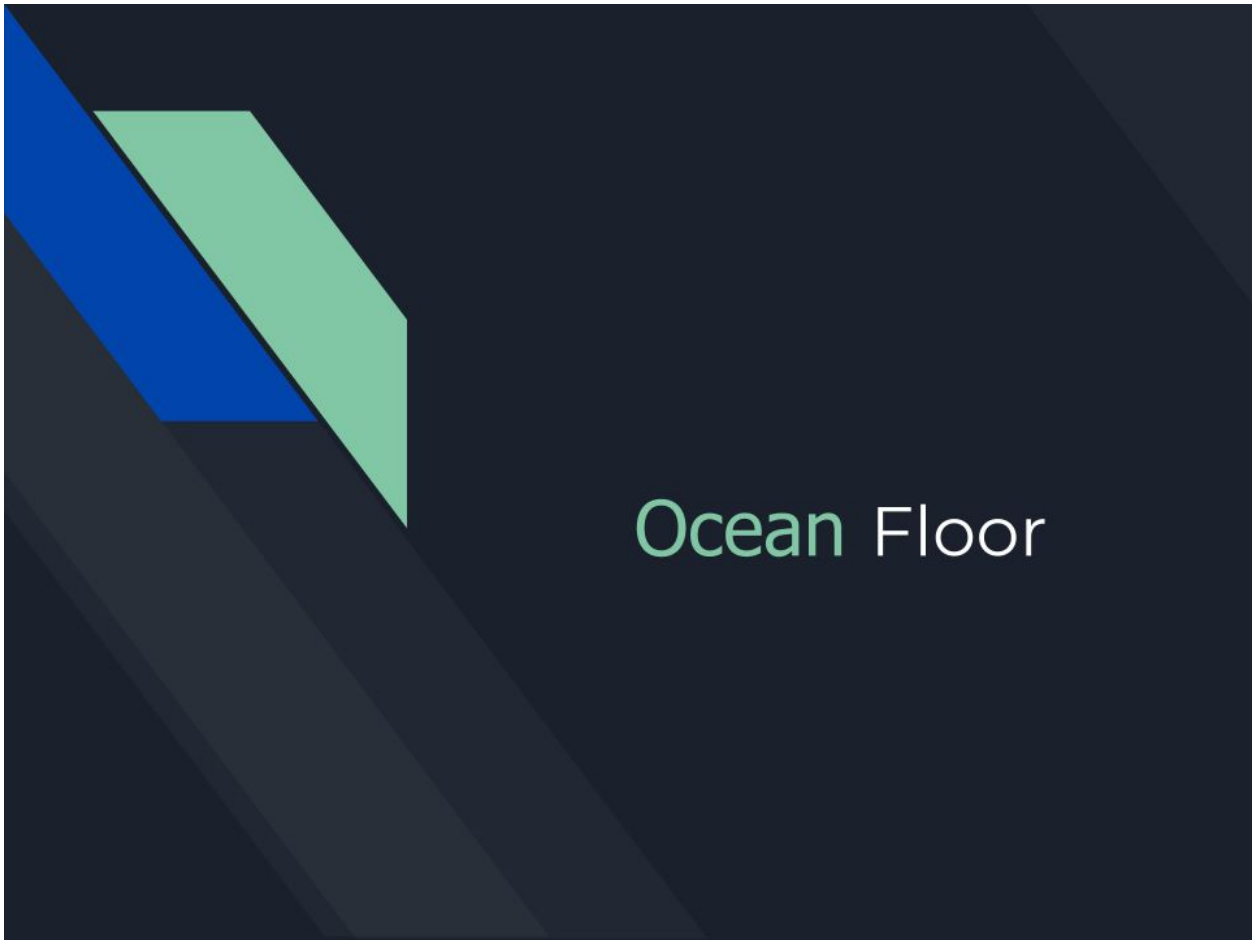
Topic of Focus: Ocean Floor Mapping

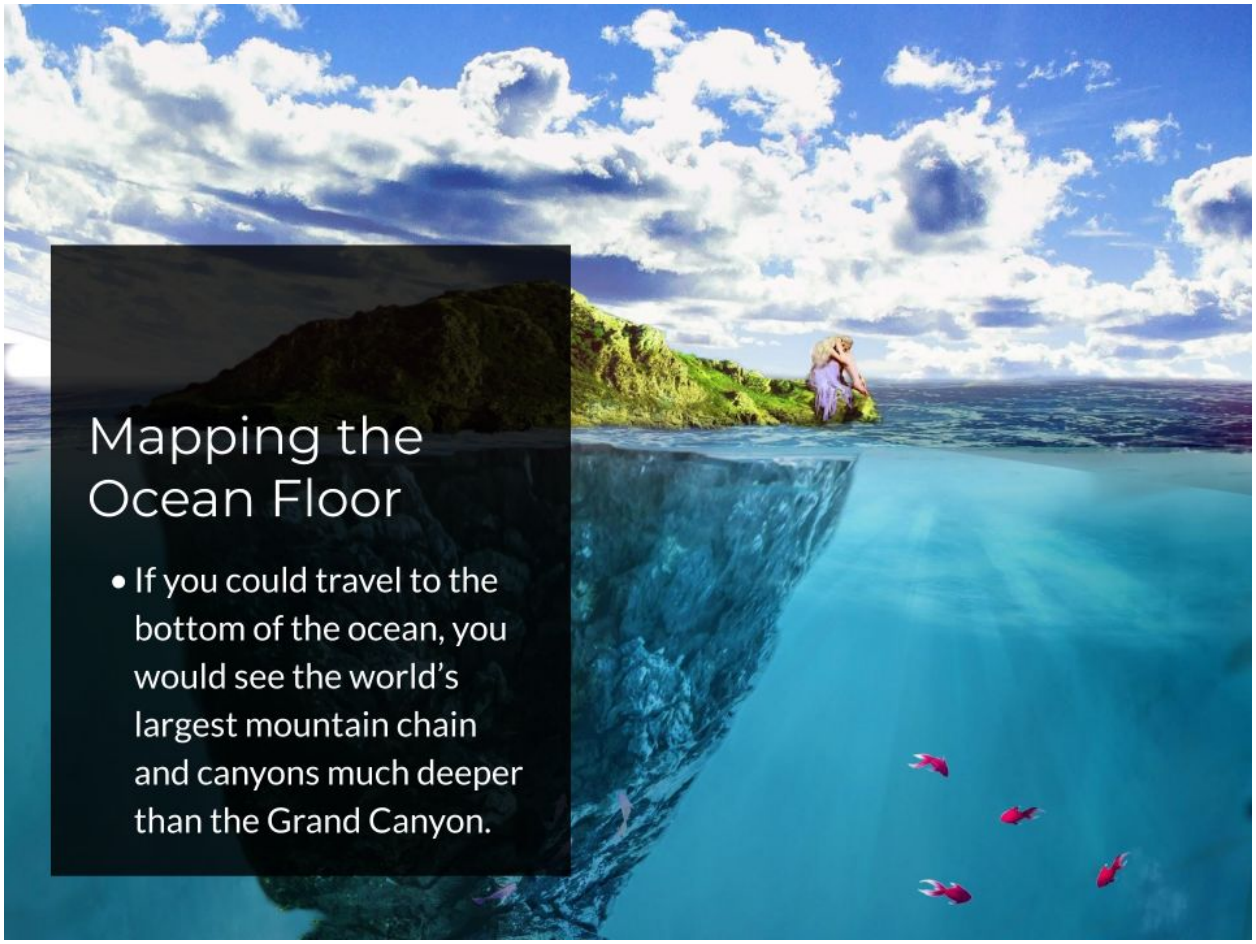
Standards Addressed:
NGSS Earth Science
MS-ESS2-1
MS-ESS2-2

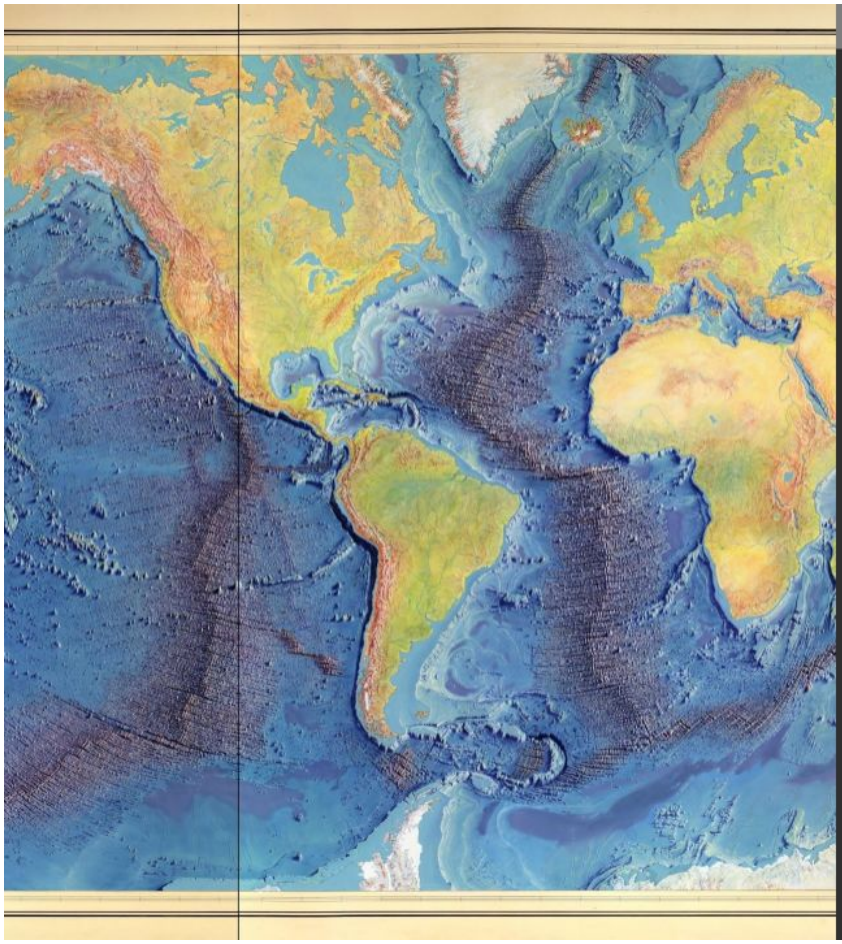
Objective:

- Students will show an understanding of how scientists map the ocean floor through sonor technology.
- Students will be able to show an understanding of an informational text about sea floor mapping by completing a graphic organizer.
- Students will be able to graph points representing the Mid-Atlantic Ridge to show the relationship between longitude and ocean depth.
- Students will express their understanding through review questions.

1. Teacher will begin with slide presentation:


Ocean Floor


Mapping the Ocean Floor
• If you could travel to the bottom of the ocean, you would see the world's largest mountain chain and canyons much deeper than the Grand Canyon.

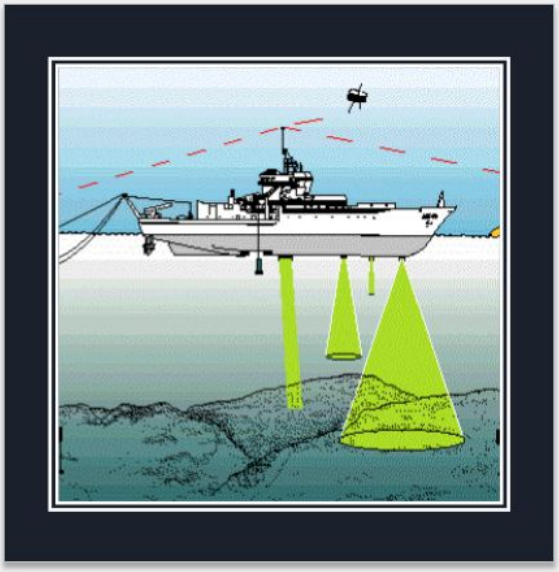


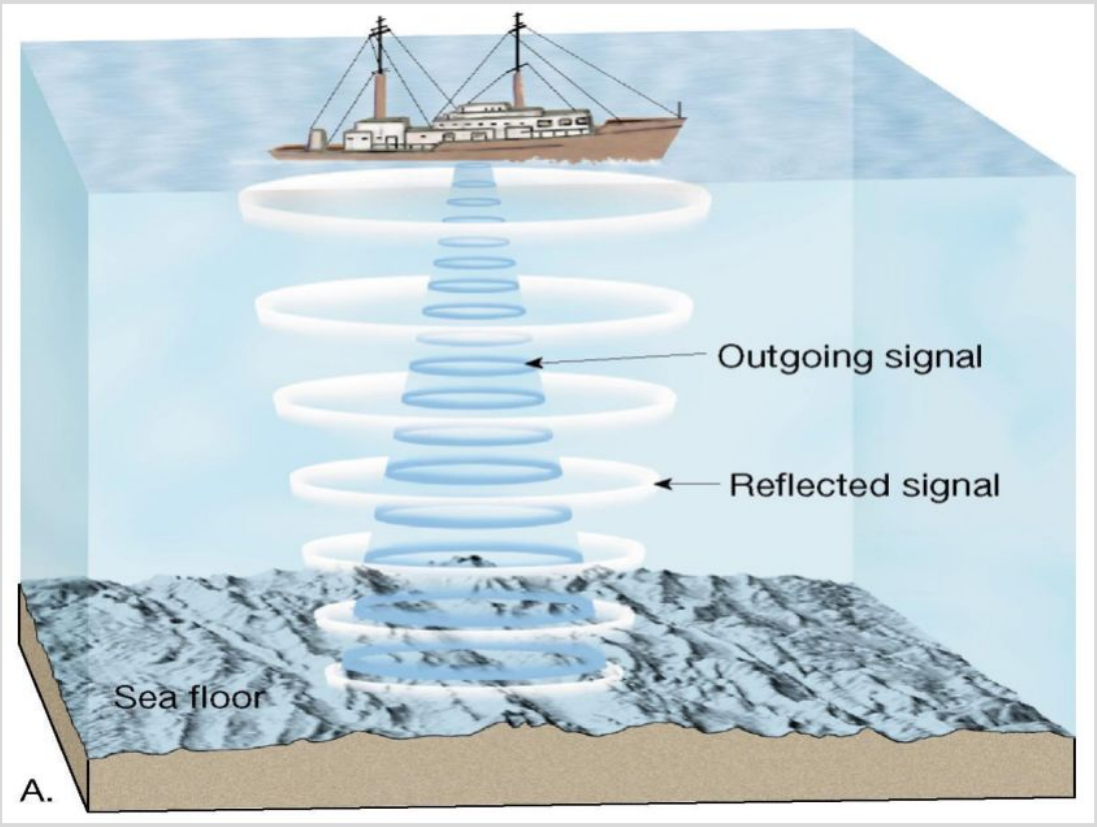
Mapping the Ocean Floor

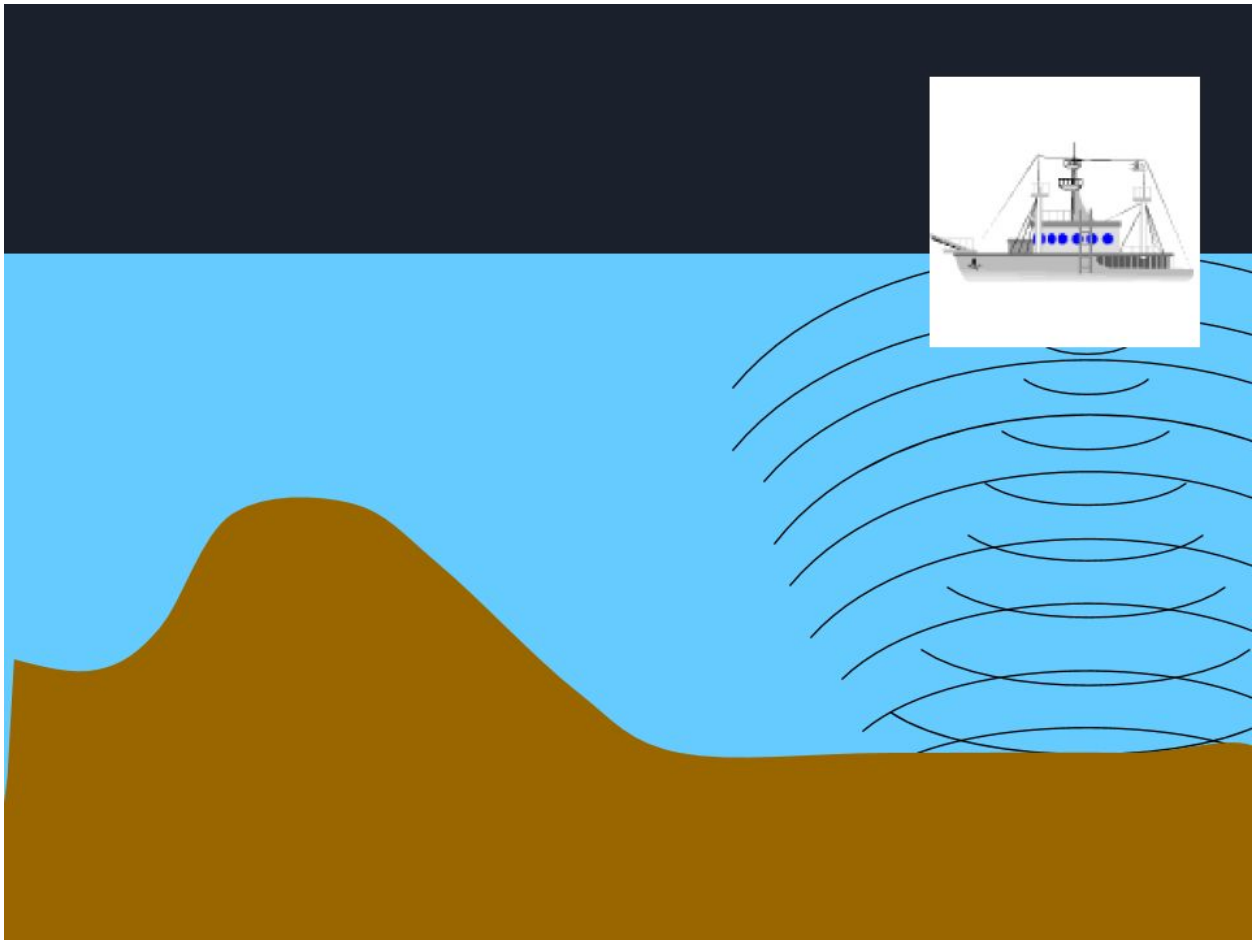
- How can the ocean floor be mapped?

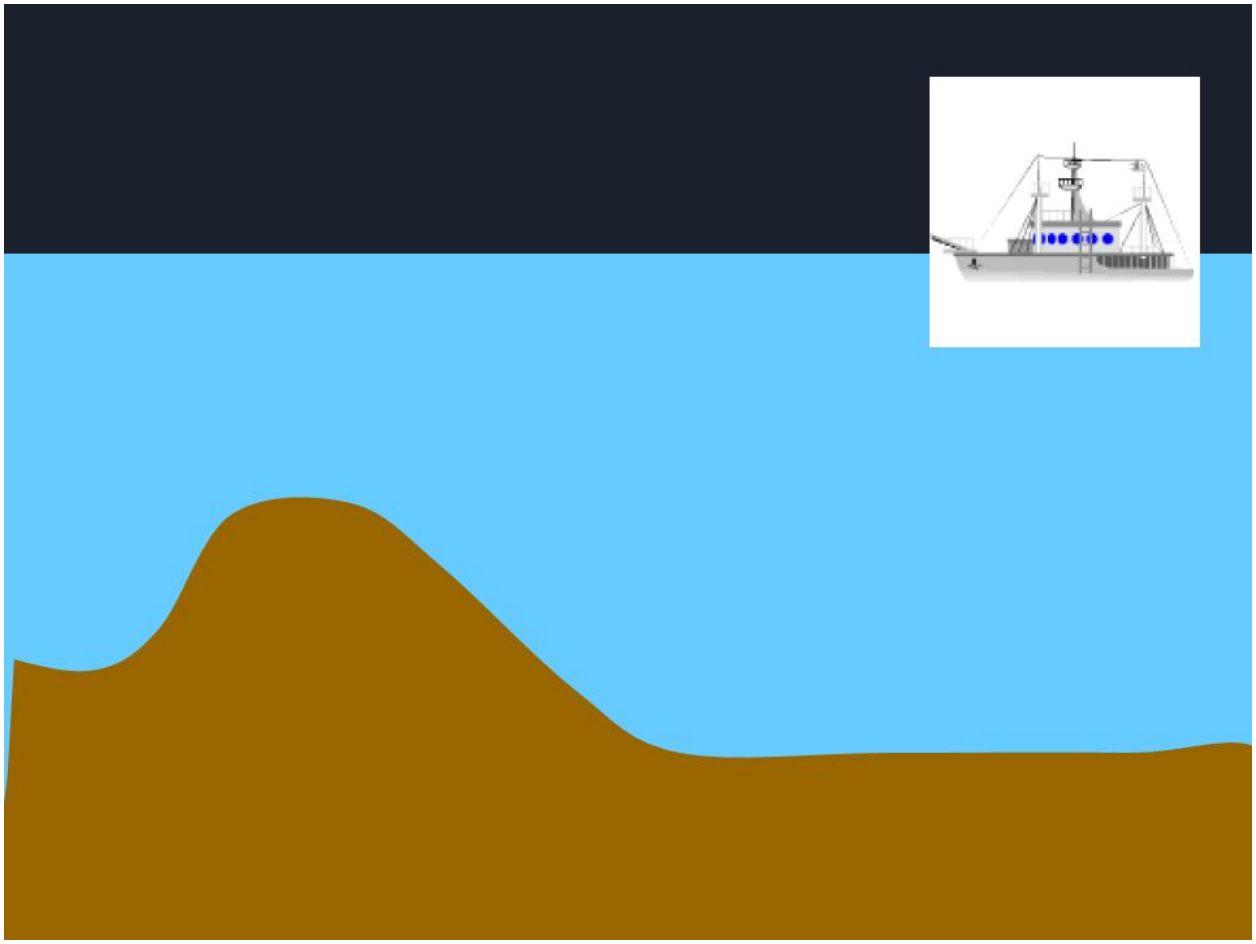
Revealing the Ocean Floor

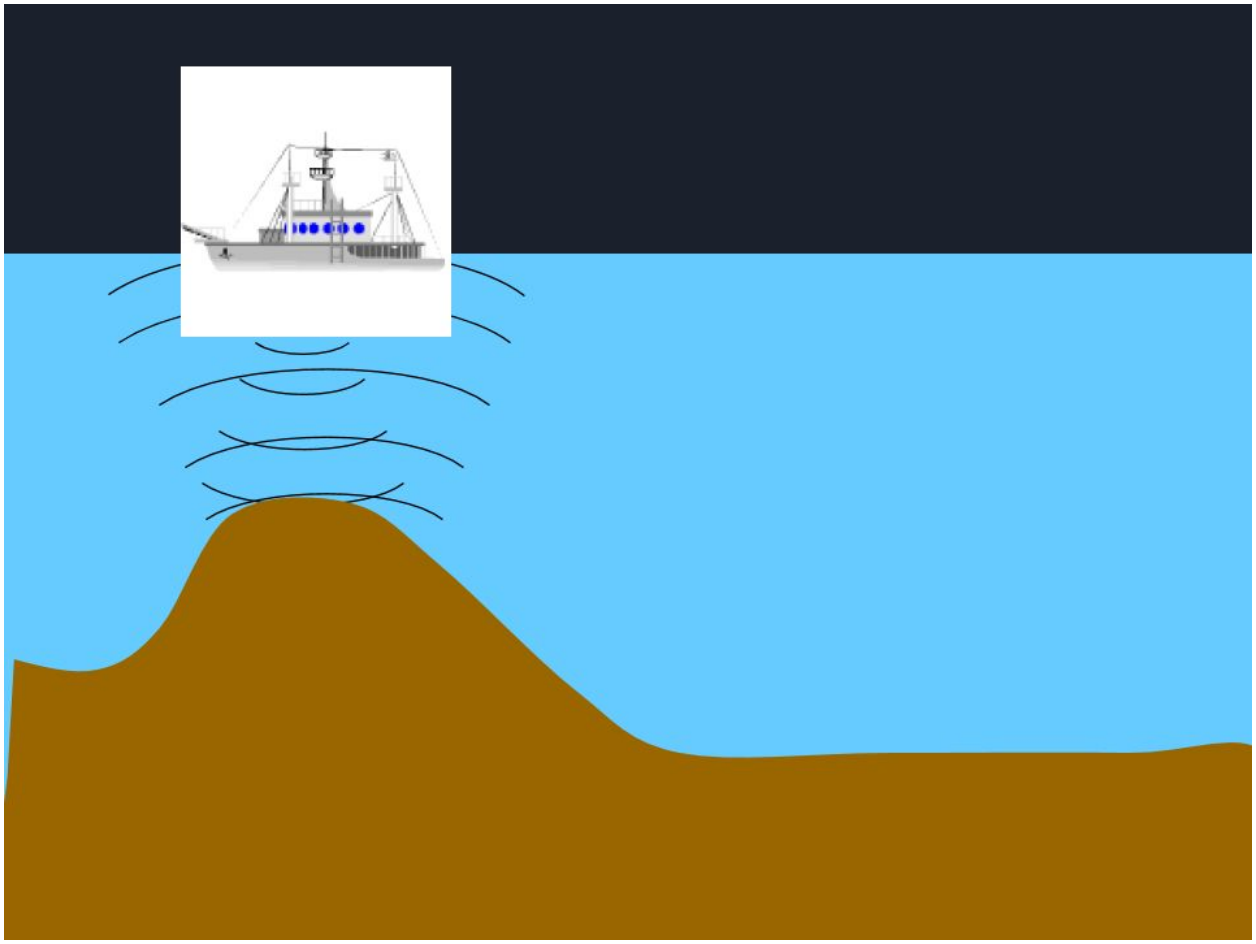
- *Sonar* (stands for Sound Navigation and Ranging)
  - Invented in the 1920s
  - Primary instrument for measuring depth
  - Reflects sound from ocean floor

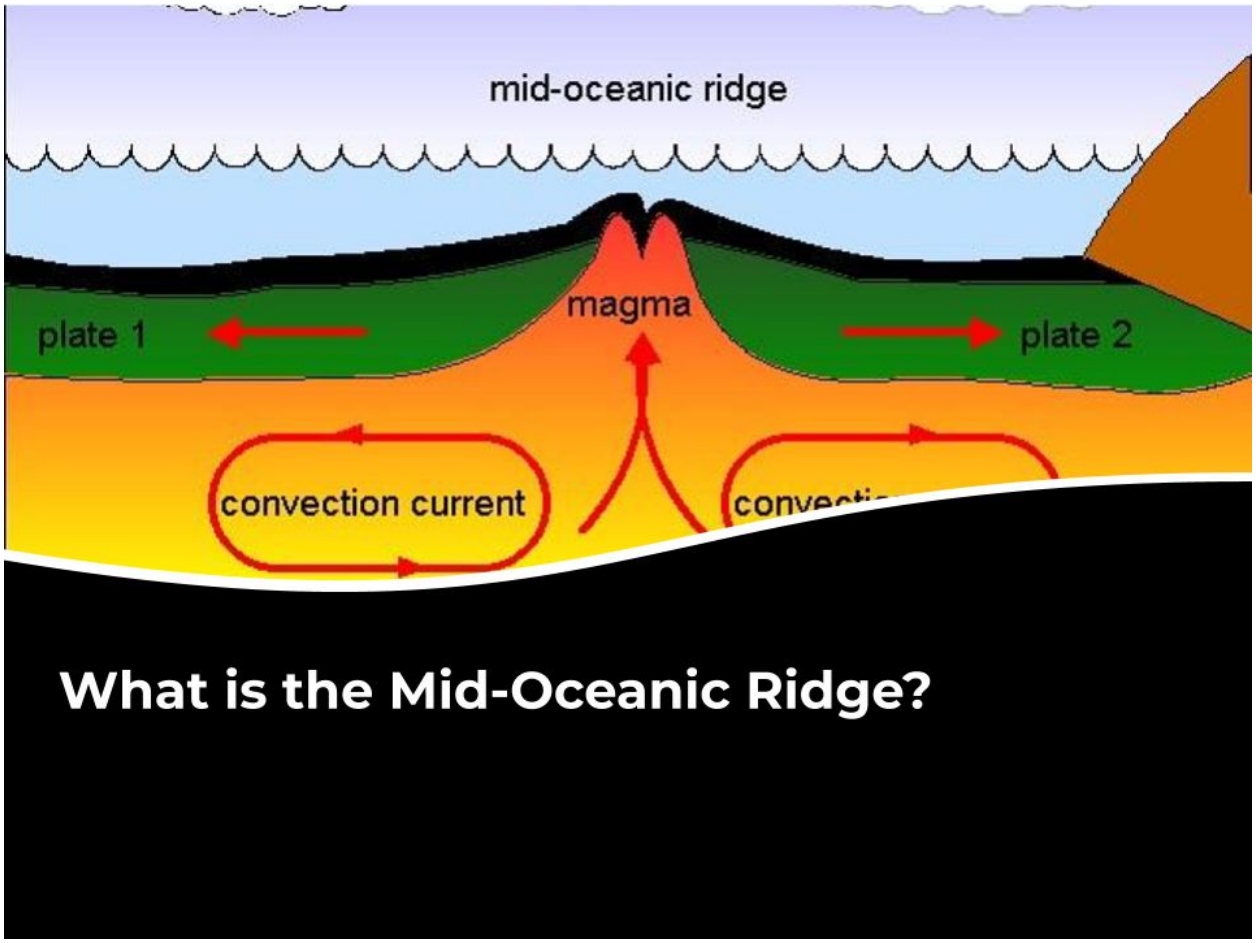



Outgoing signal
Reflected signal
Sea floor
A.



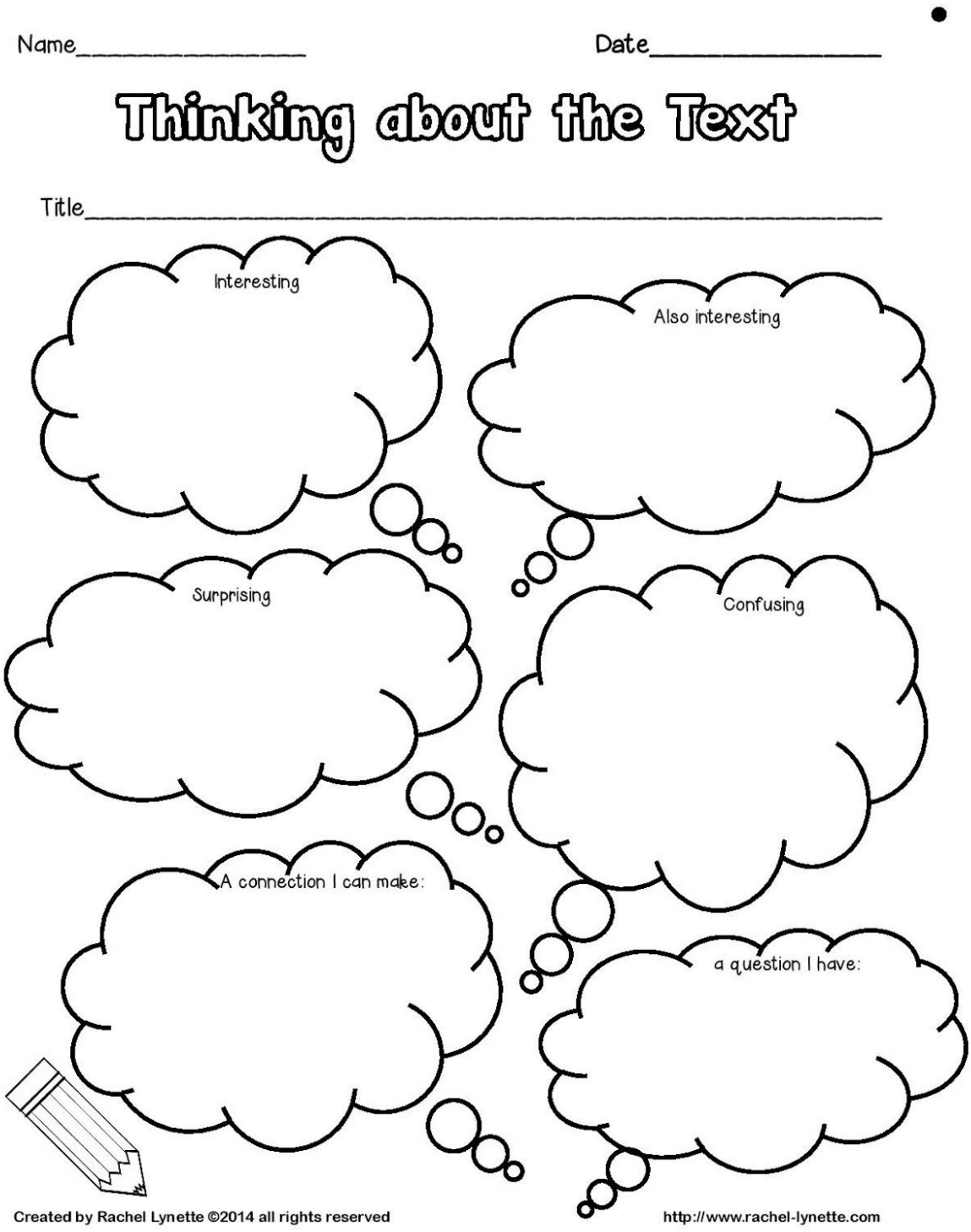






2. The students will first read this article on Sea Floor Mapping from the NOAA. They will also complete the graphic organizer provided.

https://oceanexplorer.noaa.gov/explorations/lewis_clark01/background/seafloormapping/seafloormapping.html



3. Student skills will be assessed by completing the worksheet provided.

Charting the Ocean Floor

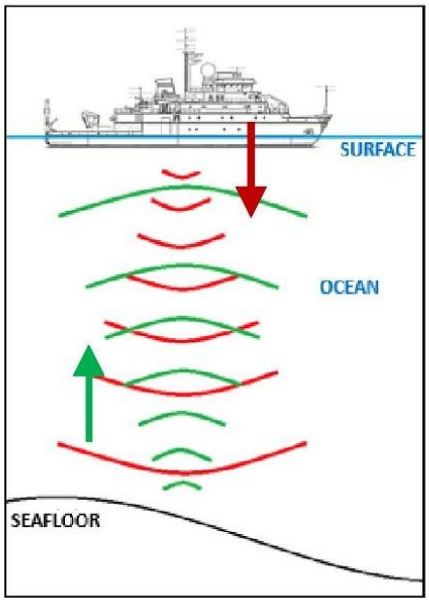
Name_____

How do scientists know how deep the ocean is?

Long ago, the depth of the ocean bottom was measured by sending down a rope with equally spaced marks on it. The number of marks that had gone into the water was then counted. This wasn't very accurate, but it did provide some idea of ocean depth.

Now the most common way to measure the ocean depth is by using sonar technology (sound navigation and ranging) mounted on ships. These instruments send a sound wave from the surface of the water down to the bottom of the ocean, where it then bounces back to the ship. Scientists measure the time that it takes for the sound wave to be transmitted down to the ocean floor and back to the surface. Because we know the speed of a sound wave when it is travelling in water, we can use this information (the time it takes for the sound wave to get to the ocean floor and back) to calculate the depth of the ocean floor at different locations.

Below is depth data for the Atlantic Ocean that was generated by sonar technology. Follow the directions on the back to chart this data to make a profile of the depth of the Atlantic Ocean.



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By examining the depth of different areas of the ocean, we will map the Mid-Atlantic Ridge and other features the ocean floor.

Longitude (°W)	Ocean Depth (m)
64	0
60	90
55	131
50	71
48	3511
45	4023
40	3804
35	4170
33	3438
30	3072
28	1755
27	2194
25	3145
20	4243
15	4609
10	4975
5	4316
4	145
1	0

Directions:

1. On the graph provided, plot the Longitude and Depth data points you were given. (This graph is a little different than you may be used to because the *higher* numbers actually mean a *lower* depth. So, notice that the y-axis numbers go towards the bottom of the graph as the values get higher.)
2. When you have plotted all of the data points, connect the dots to make a line.
3. Draw a thick blue line at the top of the ocean (0 meters) to symbolize the ocean surface.
4. Shade the Earth brown and the ocean water blue. (Everything below the line you plotted will be shaded brown and above the line to the ocean surface will be shaded blue.)
5. Label the continental slopes (there are two), Mid-Atlantic Ridge, the deepest trench, and the North American continental shelf.
6. Label the continental areas either Europe or North America.
7. Answer the questions below.

Seafloor Spreading Review Questions:

1. What are the approximate longitude**s** of the **oldest** part of the Earth's crust shown in the diagram?

2. What is the approximate longitude of the **newest** part of the Earth's crust shown in the diagram?

3. The Mid-Atlantic ridge occurs at the plate boundary between two of Earth's crustal plates. Which boundary type is it?

4. The ocean floor sinks beneath a deep-ocean trench and back into the mantle in a process known as

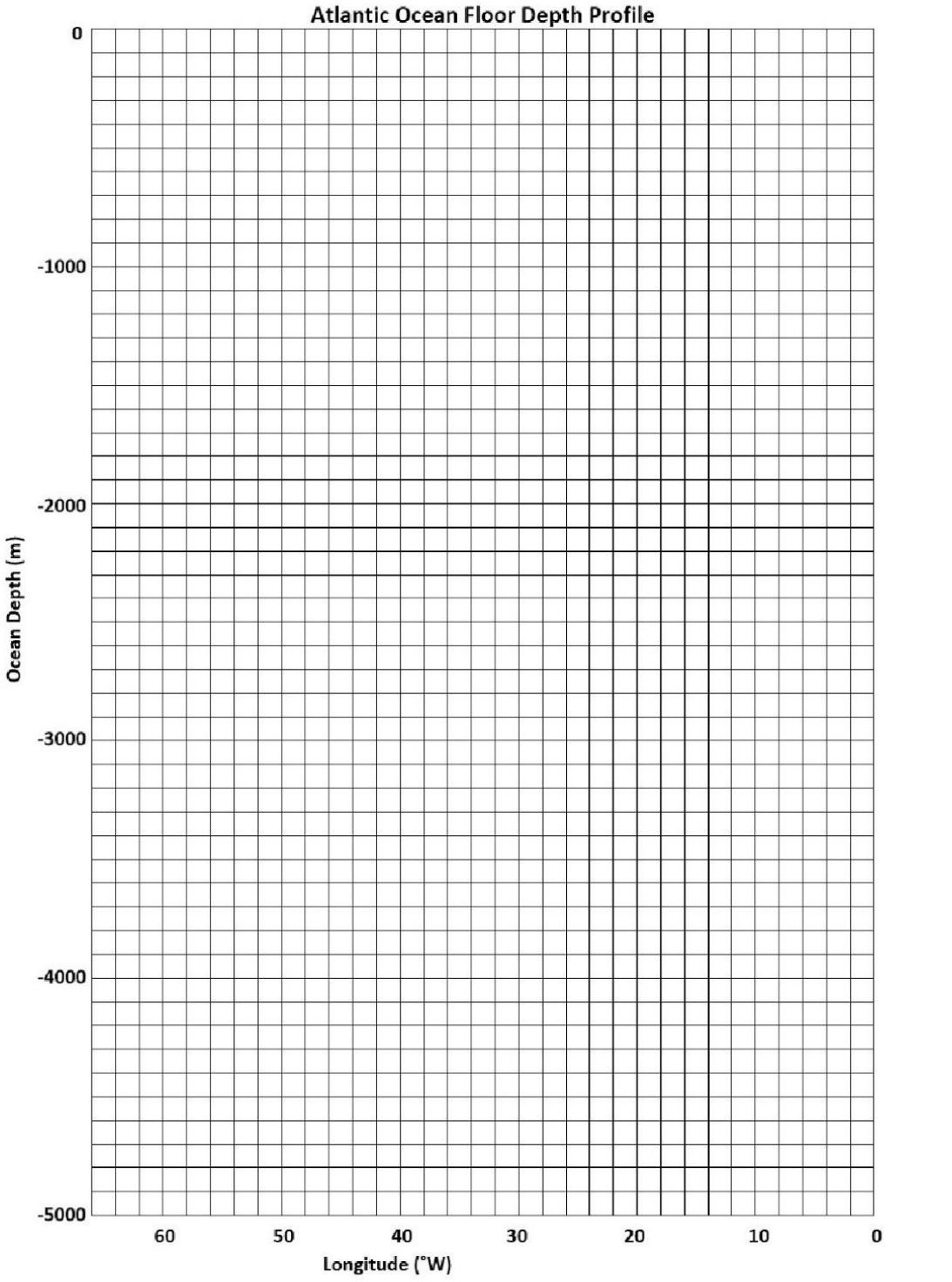
   _____.

5. The process of _____ continually adds new crust to the ocean floor along both sides of a mid-ocean ridge.

6. Use your knowledge of plate tectonics to describe how the Mid-Atlantic Ridge was formed.

7. What is the relationship between the age of the rocks on the ocean floor and their distance from the mid-ocean ridge?

8. Name two pieces of **evidence** that seafloor spreading and continental drift occur.



References:

Charting the ocean floor [Class Handout]. (2018). Flying Colors Schools.

Lynette, R. (2014). Thinking about text. [Class Handout].