Dnina ("name" in Nyanja, Bantu language of Malawi) _____

Ocean Structure Virtual Lab: ocean floor characteristics

I. Background: Earth's highest mountains, deepest valleys, and flattest plains are found not on land but under the ocean. Beyond ocean shorelines, the continents extend outward. They slope first gradually and then steeply down to the ocean floor. Beyond the slope lie trenches, valleys, plains, and ridges of the ocean basin.

These features are formed by tectonic plate movements occurring on the ocean floor. Where tectonic plates diverge (split apart), new crusts form underwater mountain ranges. Where tectonic plates converge (come together), old ocean crust descends into trenches and is destroyed.

The features of ocean basins affect organisms that live in the oceans. Ninety percent of marine life occurs in the upper zone of the ocean. This is because plants and algae, the first links in the marine food chain, need sunlight to survive. Light intensity is measured by the extinction coefficient, which is the ratio between the light intensity at a given depth and light intensity at the surface.

In addition to sunlight, marine organisms also need nutrients, which are abundant near the edges of the continents and in places where currents bring nutrient-laden water to the sunlit surface. Continents are eroded by wind, waves, and rivers. Rivers carry sediment containing nutrient minerals to the ocean, where wave action and currents wash it farther out to sea. In deep water, below the sunlit surface and beyond the continental margins, most marine life depends on food falling from above, since photosynthesis cannot take place without light.

In this Virtual Lab you will use an oceanographic research vessels submersible to explore the characteristics of the ocean and its floor. You will gather light-intensity and temperature data at various ocean depths. You will identify ocean floor features and learn about organisms found at different ocean depths.

Objectives:
• Describe the structure of the ocean floor.
• Describe light intensity and temperature characteristics at different ocean depths.

II. Procedure:
Link to lab: http://www.glencoe.com/sites/common_assets/science/virtual_labs/ES18/ES18.html
1. Click the reset button until your diagram matches the one on the Lab Sheet. Examine the ocean floor. Read the Reference Information about ocean floor structures.

2. Identify each ocean floor structure by dragging a Structure Label to the corresponding number near the structure. Some labels may be used more than once. (Note: The ocean profile diagrams are not drawn to scale.)

3. After you have identified all the structures, click the **Check Labels button**. If the structures are identified incorrectly, their labels are highlighted yellow. Re-examine the structure and the reference information. To replace the incorrect labels, simply drag the replacement label to the spot needing correcting. Then press the Check Labels button again. Repeat this until all labels are correctly placed.
4. Label the diagram on your Lab Sheet with the correct name of each location.

5. Move the ship to location A, click the Ocean Depth arrow and select first depth listed (20 meters). The submersibles camera takes a picture of an organism seen at that depth. **Click the Hear button** to listen to the description. **Fill in the data** table with the Temperature, Light Intensity, and a brief summary of the description provided.

6. Select a different depth and collect more oceanographic data. Complete all depths for that location. (Duplicate summaries do not need to be listed- Those boxes are filled in with gray. If no summary or

organism information is provided “N/A” is filled in for not available.) Be sure to fill in all other required information.
7. Drag the research vessel to location B and repeat steps 5-6.
8. Repeat steps 5-7 until all locations, A-H have been completed.
9. Complete the follow-up questions.

III. Reference Information on Ocean Floor Features

Continental Shelf
Every continent is surrounded by shallow, submerged zone called the continental shelf, which is a seaward continuation of the coastal plain. On North America’s Atlantic and Gulf coasts, the continental shelf extends 100 to 350 km into sea. But on the Pacific Coast, where mountains are close to the shore, the shelf is only 10 to 30 km wide. The ocean covering the shelf varies from a few centimeters to 150 meters deep. Because of the nutrient-rich environment and sufficient light intensity, marine organisms are found in abundance in this region.

Continental Slope
The continental slope is very steep and extends from the continental shelf all the way down to the ocean floor, 4500 meters below the water surface.

Abyssal Plain
At the bottom of the continental slope, the ocean floor begins to level out, due to the deposits of sediments that have fallen down the continental slope. The bottom of the ocean is known as the abyss. Here, vast flattened areas, called abyssal plains can be seen. Abyssal plains occur between 4000-6000 meters below the surface of the ocean.

Ocean Ridge
In areas of Earth’s oceans where plate boundaries occur, ocean ridges can be observed. Ocean ridges are underwater mountain ranges that are formed by volcanic eruptions and upwelling of molten lave through cracks in the ocean floor. The Mid-Atlantic Ridge is the best known of the ridges. Scientists have discovered that it is growing larger by about 2.5 centimeters per year.

Ocean Trench
At the crustal plate boundaries, deep trenches can sometimes be seen. A trench is a long, narrow, steep-sided depression in the ocean floor where one crustal plate is forced beneath another. Most of Earth’s trenches are found in the Pacific Ocean. The Marianas Trench, the deepest place in the Pacific Ocean is 11,000 meters deep.

Hydrothermal Vent
Hydrothermal vents are found near crustal plate boundaries about 6000 meters below the surface of water. These vents are cracks in the ocean floor from which extremely hot, mineral-rich water gushes. The hot water produced by the vents promotes bacterial growth. Extraordinary animals such as tube worms, giant clams, and deep-sea shrimp crown around these vents and rely on the microbes for food.

IV. Follow-up Questions.

1. Which structures on the ocean floor are equivalent to mountains on land?

2. What structures seemed to have the most organisms near it?

3. At location F, the temperature did not change between 1800 meters and 6000 meters. Explain why this occurred.

Ship Location	Ocean Depth (m)	Temp (°C)	Light Intensity (%)	Marine Organism(s)	Description of organism or ocean floor
A	20				
A	40				
A	150				
B	20				
B	40				
B	150				
B	180				
B	750				
B	850				
B	900				

Ship Location	Ocean Depth (m)	Temperature (°C)	Light Intensity (%)	Marine Organisms	Description of organism or ocean floor
C	20			N/A	N/A
C	40			N/A	N/A
C	150			N/A	N/A
C	180			N/A	N/A
C	750			N/A	N/A
C	850			N/A	N/A
C	900				
C	4500				
D	40			N/A	N/A
D	150			N/A	N/A
D	180			N/A	N/A
D	750			N/A	N/A
D	850			N/A	N/A
D	900			N/A	N/A

Ship Location	Ocean Depth (m)	Temperature (°C)	Light Intensity (%)	Marine Organisms	Description of organism or ocean floor
D	4500				
D	11000				
E	150			N/A	N/A
E	180			N/A	N/A
E	750			N/A	N/A
E	850			N/A	N/A
E	900				
E	1800				
F	150			N/A	N/A
F	180			N/A	N/A
F	750			N/A	N/A

Ship Location	Ocean Depth (m)	Temperature (°C)	Light Intensity (%)	Marine Organisms	Description of organism or ocean floor
F	850			N/A	N/A
F	900				
F	1800				
F	6000				
G	20			N/A	N/A
G	40			N/A	N/A
G	150			N/A	N/A
G	180			N/A	N/A
G	750			N/A	N/A
G	850			N/A	N/A
G	900				
G	4500				
H	20				
H	40				
H	150				

Name_____Date_____ Hour_____ Table _____

Lab Sheet: Fill in the diagram rectangles with the correct names for each location.