

Ocean Explorers: Scene 1

It was the last day of school and all the students were ready to leave as soon as the last bell rang. RRRRIINNNGGG. There it was. All the students filed out of the school and began talking about what they were going to do for the summer.

Monica: Hey, John. What are you doing this summer?

John: Not sure. Probably hanging out, playing basketball. Why, what are you doing?

Monica: [Monica hands a poster to John] Well, I saw this flyer hanging up in the hallway and I think it would be a lot of fun to do. Check it out.

WANTED: OCEAN EXPLORERS



The Office of Ocean Exploration is seeking new teams of scientists and explorers to assist in deep sea exploration of the ocean floor. Teams are being sent out to find new possible mining locations along the Mid-Ocean Ridge and the Pacific coast. Interested individuals should report to Ocean Training on XXX, XX 200X.

John: That sounds cool. I learned about the Mid-Ocean Ridge in my class last year. Isn't it in the Atlantic Ocean?

John is in 7th grade and had Earth Science the previous year when he was in 6th grade.

Monica: I don't know. We haven't talked about that. Why would they be mining in the ocean? What's down there? And isn't mining destructive? I read an article in the Canadian Press that says mining in the ocean will cause a lot of damage.

John: Not a clue about mining for minerals and what it may do to the ocean, but I know that there are some really cool animals – squids, worms, and this awesome fish, the Fangtooth!

John really enjoyed learning about the different species that lived in the ocean.

Monica: The Fangtooth? I wanna see that! Think that we would see it if we went on the ocean trip?

John: Not sure, there isn't any light down there...

Monica: [*nervously*] How far down is it?

She isn't so sure about being somewhere that is completely dark.

John: I don't remember. But you know that it isn't flat down there, don't you? It's kinda like on land, there are all sorts of hills, valleys, and mountains, but that isn't what they are called. I'm sure that the Exploration Team would have some sort of lights on so that they wouldn't run into things. Otherwise, how do they know where they are? If we go to the training they would probably tell us all about it.

Monica: You are probably right. I am still a little worried about how mining may hurt the animals down there, but I suppose if we go to the training we can ask them about it.

Monica and John agree to go to the Ocean Training the next day.

Box chart: Scene 1

<p>Facts I read that...</p>	<p>Questions/Learning Issues I wonder/want to ask or I need to look up/learn more</p>
<p>Vocabulary Words I need to look up...</p>	<p>Action Plan How will I get my information</p>

Ocean Explorers: Scene 2

John and Monica arrived at Ocean Training, excited to learn about what they would be doing on the exploration. The head trainer of the Office of Ocean Exploration was there to welcome everyone and tell them about what they would be doing during training.

Markus Narkus: Hello everybody! I am Marcus Narkus and I will be guiding your training over the next several days. I hope everyone is excited and ready to begin learning about the mission. First, are there any questions before we get started?

No one raises their hand, so Marcus continues.

Markus Narkus: Well then, since we have no questions, let's get started! First, you may know how we determine depth and the corresponding shape of the ocean floor. We use sonar to do this by producing pulses of sound and time how long it takes for the sound to return. You will now practice doing this, something similar to what we do on explorations to determine where we are in the ocean. Please refer to your data sheet to complete the exercise.

Plotting the Ocean Floor

One of the places we are interested in exploring is the Mid-Ocean Ridge which can be found in the Atlantic Ocean. So, a ship set sail from Nova Scotia in Canada to Soulac, France, taking sonar measurements along the way. Below are the depth measurements that were taken.

1. Label the horizontal axis **Longitude** and mark from 65° W to 0° from left to right.
2. Label the vertical axis **Depth** and mark 0 meters at the top and -5000 meters at the bottom
3. Plot these depths on your graph.

Ocean Depth Sonar Data	
Longitude	Ocean depth (m)
64° W	0
60° W	-91
55° W	-132
50° W	-73
48° W	-3512
45° W	-4024
40° W	-3805
35° W	-4171
33° W	-3439
30° W	-3073
28° W	-1756
27° W	-2195
25° W	-3146
20° W	-4244
15° W	-4610
10° W	-4976
05° W	-4317
04° W	-146
01° W	0

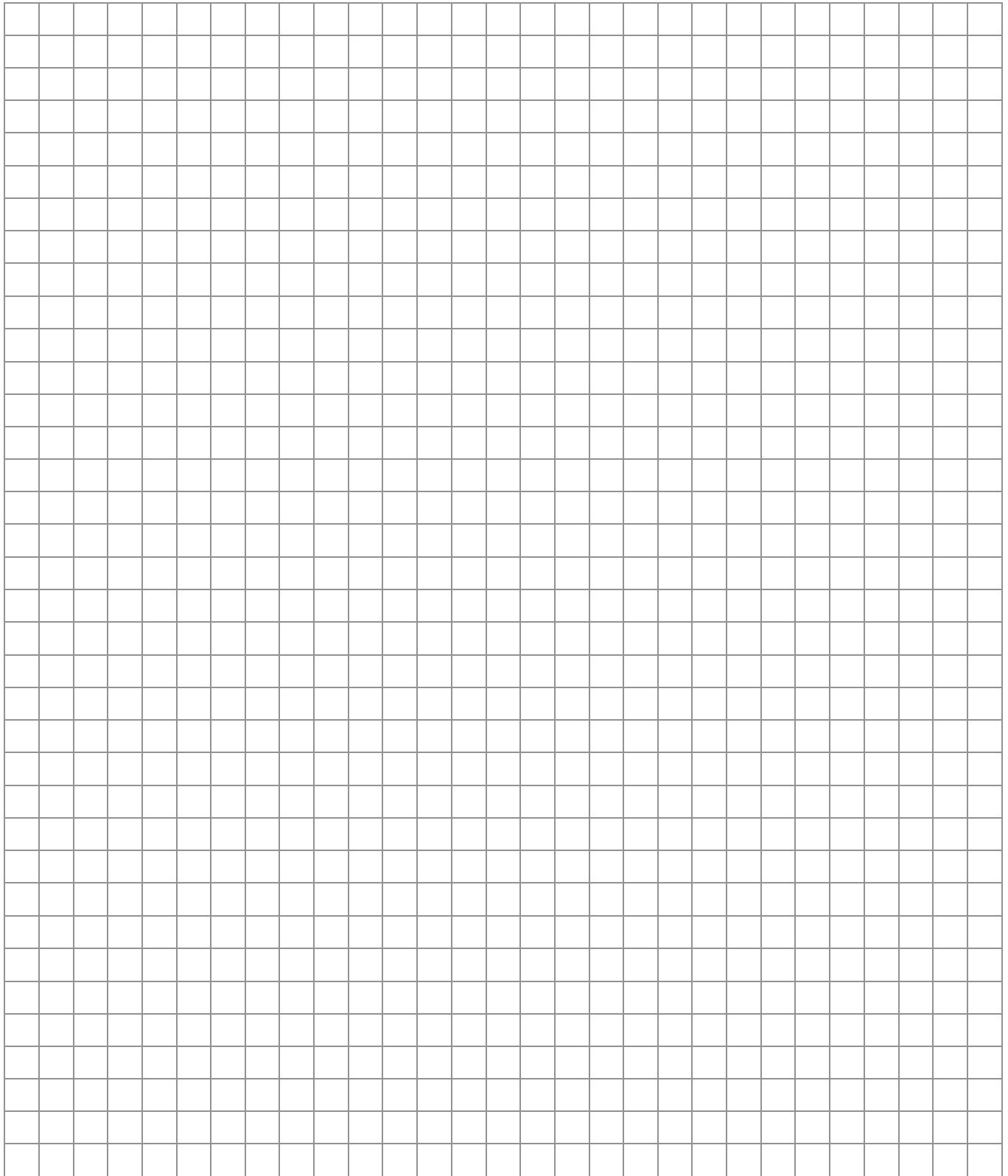
Next, label the following features:
continental shelf
continental slope
abyssal plain
mid-ocean ridge
where you may find hydrothermal vents

What feature is indicated at 10° W? _____

Is there algae found at the depth at 20°W? _____ Why or why not? _____

Ocean Explorers

Jennifer J. Pokorny & Yasmine M. McKenzie



Ocean Explorers: Scene 3

Monica: It has been a long week, hasn't it?

John: Sure has. We learned so much about what is in the ocean, and now I am ready to go and see it myself!

John was excited to set out on an exploration.

Monica: I know, the class has been really cool, but I am still unsure about the mining. Did you notice that they didn't really talk about that at all? They just told us that you can find some minerals around by the hydrothermal vents.

John: Don't you think that we need to start looking in the ocean for resources? We have used so much of the land and the ocean is *huge*. Some places have found gold, copper, silver and zinc. These are things that everyone keeps needing.

Monica: I'm not so sure about that. For instance, why do we need more gold? It's just material items, like these earrings, that people could learn to live without.

John: Well, that isn't necessarily true. We use these minerals for many other things than just rings and necklaces. Plus, it is easier to mine in the ocean than on the land. On land we need to create mines and dig into the earth to get the minerals. In the ocean it is easier because they don't need to remove all of that. It probably makes it safer as well.

Monica: Perhaps, but the mining will still be disruptive to the animals living in the ocean. When they mine, small particles are released that are harmful to filter-feeding organisms in the area.

Monica loved animals and didn't like to think about them being killed and pushed out of their habitat.

Group Presentations

Your group presentations should demonstrate what you learned in the case. It should also be interesting to the audience while still including accurate information. Each group is limited to 10 minutes maximum. Below are the possible presentation products:

1. Skit: John and Monica

Continue John and Monica's discussion about the pros and cons of mining in the ocean

2. Presentation 1: Conservation International

You are a group of environmentalists from Conservation International, concerned about mining in the ocean. Create a PowerPoint presentation to the U.S. government with a convincing argument as to why there should not be mining in the ocean.

3. Presentation 2: Nautilus Minerals

You are a group of miners from Nautilus Minerals that wants to continue mining exploration. Create a PowerPoint presentation to the U.S. government with a convincing argument as to why mining should continue in the ocean off Papua New Guinea.

4. Presentation 3: Tourism Board of Papua New Guinea

You are a group from the tourism board of Papua New Guinea. Tourism is an important aspect of Papua New Guinea's economy and any destruction of the ocean environment in the area may reduce the number of tourists, severely impacting the national economy.

Brainstorming chart

Our product is: _____

Our group members are: _____

Advantages of mining

Disadvantages of mining

Resources:

Textbook:

Joseph D. Exline, J. M. Pasachoff, B. B. Simons, C. G. & Vogel, T. R. Wellnitz. (2002) *Earth Science*.
Nedham, MA: Prentice Hall, pgs 457-465, 476-484.

Webpages:

Conservation International (2009). Protecting oceans. Retrieved August 19, 2009 from
<http://www.conservation.org/learn/oceans/Pages/overview.aspx>

Feldman, G.C. (1995). *How deep can they go?* Retrieved August 19, 2009 from
http://seawifs.gsfc.nasa.gov/OCEAN_PLANET/HTML/oceanography_how_deep.html

National Oceanic and Atmospheric Administration (2009). The office of ocean exploration and
research. Retrieved August 19, 2009 from <http://explore.noaa.gov/>

Nautilus Minerals (2009). Nautilus minerals homepage. Retrieved August 19, 2009 from
<http://www.nautilusminerals.com/s/Home.asp>

Papua New Guinea Promotion Authority (2009). Papua New Guinea. Retrieved August 19, 2009 from
<http://www.pngtourism.org.pg/>

PBS (2009). *Savage seas*. Retrieved August 19, 2009 from <http://www.pbs.org/wnet/savage seas/>

Sea and Sky (2009). *The sea*. Retrieved August 19, 2009 from <http://www.seasky.org/sea.html>

University of Delaware College of Marine Studies. (2002). *Mission to the abyss*. Retrieved August 19,
2009 from <http://www.ocean.udel.edu/extreme2002>

Ocean Explorers

Jennifer J. Pokorny & Yasmine M. McKenzie

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

Self/Peer Evaluation

Individual

Name _____

Period _____

Scale 1-10 (1 = low, 10 = high)

1. I participated in the group _____
2. I completed my portion of the assignment _____
3. I listened to my group members suggestions _____
4. I learned information about ocean geography _____

Group

Answer questions 1-3 for each of your group members

Scale 1-10 (1 = low, 10 = high)

Name	Score Q1 – Participation	Score Q2 – Complete assignment	Score Q3 – Listen to suggestions

How would you rate this activity overall _____

Would you like to do another activity like this again _____

Grading Rubric:

Categories	Score	1	2	3	4
Box chart complete		1 section complete with 1-2 statements in the section	2-3 sections complete with 1-3 statements in each section	All sections complete with 2-3 statements in each section	All sections complete with 4-5 statements in each section
Completed graph		No points plotted, no features labeled, no questions answered	Plot some points, label 2-3 features,	Plot some points, label 3-4 features, partially answer questions	Plot all points, label all features, fully answer the questions
Brainstorming		Identify fewer than 3 advantages or disadvantages	Identify at least 3 advantages or disadvantages	Identify 4 advantages or disadvantages	Identify more than 4 advantages or disadvantages to mining in the ocean
Group presentation / Product		Produce is not accurate	Accurate product but does not address the issue	Accurate presentation that addresses the issue	Original, accurate, and interesting presentation
References used		Include less than 2 resources, no evals for websites	Include least 2-3 resources of questionable quality, missing evals for websites	Include 2-3 high quality resources including evals for websites	Include at least 4 high quality resources including evals for websites
Group participation		Self/peer and facilitator evaluation with average score of 1-2	Self/peer and facilitator evaluation with average score of 3-4	Self/peer and facilitator evaluation with average score of 5-7	Self/peer and facilitator evaluation with an average score of 8-10