

Sample Lesson – Teacher

OCEANS MODULE

Day Five

I. Objectives

1. TLW become aware of the composition of ocean water.
2. TLW use a model to investigate how salinity affects the density of ocean waters.
3. TLW become familiar with the scientific vocabulary: salinity and density.

II. TEKS/TAKS

TEKS – 4.1; 4.2A-D; 4.3A, C, D; 4.4A; 4.5; 4.6A
4.7B; 3.6

TAKS Obj. – 1, 3 & 4

III. Materials

Computer, weather calendar and hurricane charts; textbook readings (if any) on composition of ocean water (Harcourt pp. D36-37); and student science notebooks

Websites for teacher background: www.utdallas.edu/~pujana/oceans/why.html (discusses why oceans are salty) and www.onr.navy.mil/focus/ocean/water/default.htm (discusses ocean density); <http://grasse.obs-azur.fr/cerga/gmc/kids/cd/pdfus/Circul.pdf> (discusses ocean circulation, salinity and ocean density)

Website to use with students:

<http://merlin.alfred.edu/muller/FormerPhysWorld/PhysWorld/Project1/OceanSalt.html> , (discusses why the ocean is salty)

Student Lab - Lab sheets, test tube, large, clear, glass beaker or quart size, glass jar, salt, water, small spoon, food coloring and goggles

IV. Procedures

1. Prior to the day of the lesson, prepare lab materials and boxes.
2. At the beginning of the lesson each day, have the “meteorologist” find the day’s weather on the website, record it on the calendar, and report to the class.
3. If there is hurricane activity, plot the coordinates on the weather chart.
4. As a motivating activity, ask students to share experiences they have had swimming at the beach.
5. Then ask them:
 - a. From your experience, what do you know about ocean water that makes it different from the water in rivers, streams and most lakes?” (Ocean water is salty and rivers, streams and most lakes have fresh water.)
 - b. If all the fresh water rivers and streams flow into the oceans, how do you think the water in the oceans got to be so salty?
6. Explain to students that in the next two days they will be doing a few lab investigations that explore how salt and temperature affect the ocean waters.

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7. Before reading or going to the websites, write the vocabulary words on the board and have students copy them in their notebooks. Explain to students that they will be investigating these concepts and will be able to complete the definitions at the beginning of tomorrow's lesson. (Vocabulary words: salinity, density, molecules).
8. If there are textbook pages about the composition of ocean water, read those at this time.
9. Then, go to the website
<http://merlin.alfred.edu/muller/FormerPhysWorld/PhysWorld/Project1/OceanSalt.html>

Teacher note: Read or paraphrase the information in the first 4 sections and section 6 about why the ocean is salty. This website gives a definition of Salinity as the amount of salt present in water. It describes the average salinity of seawater as $\frac{3}{4}$ teaspoon salt to 1 cup water. It also explains (Section 6) why the oceans don't become too salty.

10. Tell them they are going to investigate how salt affects water. (They will look at a relationship between fresh and salty water.)
11. Pass out the lab sheets to cooperative groups and discuss the procedures.
12. Direct groups to complete the steps of the investigation. Remind them to use safety precautions while they are handling the glassware.
13. Hold a discussion on the findings of the investigation by the cooperative groups.
Teacher note: Students should have observed that the salty water sunk to the bottom of the container, spread out forming a layer along the bottom and stayed there. The reason is that the salty water was heavier. It had greater density because the salt molecules filled in between the water molecules. There was more matter in a given space.

Over time as salt is added to the ocean by the runoff from rivers and streams, the salinity of the ocean increases. However, this happens very slowly and the salinity of the ocean remains somewhat constant. This is because new minerals are constantly being formed at the bottom of the ocean using these salts.

Since salt water is heavier than fresh water, the saltier the water the heavier (more dense) it becomes. The saltiest layer of the ocean is at the bottom and the least salty layer is at the surface.

Ask students to recall the lab they did on the water cycle. When the water evaporated it did not take any contaminants with it. The same thing happens over the ocean. When the water evaporates from the ocean, all the salts remain.

14. Have students complete the conclusion section of their lab sheets and share some of the responses.
15. As a bridging activity to tomorrow's lesson, students will discuss and record definitions of the vocabulary words, salinity and density.

V. Evaluation

1. Teacher observation
2. Student work