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Exploring Our Oceans

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INTRODUCTION

Oceans seem to evoke an emotional response in most adults and youngsters. All kinds of people are drawn to seashores around the world. These bodies of water have influenced, for many, their way of life, their thinking, their art, their science.

The ocean represents the last frontier on earth. It is promising, challenging and mysterious. The applications of its many promising benefits may be realized only if continued support is given on a national and international level. Where better to start than with our children!

This unit was written for fifth grade, though the information may be adapted for most any grade. When I began writing about the vast subject of the ocean, I tried to write a little about everything; the physical, chemical, geological and biological ocean. With the specifications and time restraints, I found that I had to leave out more than I wanted to. The decisions on what to include seemed endless! Professor Smith advised me to " . . . get down to the basics," which is what I have done. I have decided to concentrate this unit on the ocean water—the physical, chemical and geological oceans.

Children learn primarily through three basic modalities: auditory (hearing), visual (seeing), and kinesthetic (feeling, doing,—what we call the hands-on approach), and a combination of any or all three of those methods. All of these methods are included in this unit as well as verbal discussion and critical thinking.

My objectives are: 1. The students will increase their understanding of the oceans. 2. The students will continue to develop their thinking skills. To meet these objectives I used a question and answer format. As with any activity that calls for verbal responses, it is important to use questions that encourage analyzing, synthesizing, and inferring instead of answering with a Yes and No. A discovery / inquiry approach can enrich development in any academic area. We need to encourage the children to investigate, communicate, question and verify.

Why include thinking skills as an objective? Because students have to be able to communicate and to apply reasoning in everyday life.Thinking is a skill that can be improved by continuously and deliberately making the effort to do so. We need to use problem-solving skills and to keep our minds open to new information. These are the ideas I use with my students: * Learn to see the whole picture—Consider what is happening and look at the surroundings. *Be flexible with your thinking—Brainstorm as many solutions, answers, etc. as you can. Try a new approach . Write down your ideas so that you may refer to them. Talk to other people who are trying to solve the same problem. *Practice making decisions—The more you do, the easier it gets. Observe the situation carefully . *Be open to change—Keep a positive attitude toward changes. *Compare—When solving a problem that is difficult, write down all of the aspects (positive and negative) . Compare the columns. Then, Think and Act. I have included some technical information and illustrations for the teacher only. Illustrations to be used for the students, experiments and other integrated activities are also included, and so noted. There is an Experiment Form which you will find at the end of the unit for you to copy for the students to fill out at the completion of their experiments. The bibliography at the end of the unit includes books for the teacher, and the students, and a brief listing of some of the commercial VCR tapes that are available for rental or purchase.

The unit can be introduced in a variety of ways, all intended to whet the student's imagination and create excitement. One idea is to create a hands-on display of shells from around the world. This display could include corals, sponges, several types of starfish and a buoy. Have one bulletin board hold a blue fishnet (over blue paper) on which is hung various rubber whales, dolphins, porpoise, sea horses, lobsters, crabs, even a sting-ray. Another bulletin board might house a giant mural showing ocean life. A third bulletin board could display posters, magazine and newspaper articles, bulletins from Mystic Aquarium, the New England Aquarium, and the Maritime Center. The shelf or table directly in front of these boards should hold 20-30 books and magazines on all topics that are related to the oceans. Have these non-fiction books (from picture books on a grade 1 level to books on a high school level) include How To Draw books, Ranger Rick magazines, National Geographics, oceanography books, shell identifying books, Time-Life books, etc.. Throughout the unit, don't overlook video tapes from the Jacques Cousteau series, and the National Geographic Ocean series.

You might want to begin by asking the students several questions like, what are the 5 oceans? Use your classroom maps and globes to locate them while they are being named, and to explain how they are joined. What are some of the things people use from the ocean? What do you think a deep-sea diver might see in the ocean? Why do people need to study the ocean? Why are the oceans important to us and to all life?

As culminating activities, visit the Mystic Aquarium or the Norwalk Maritime Center, and/or the New England Aquarium in Boston.

Some ideas to connect this unit to other subjects are: have the students outline the information; write research papers (some ideas are included as activities in the unit); research careers in oceanography; use the vocabulary words as spelling words; learn what equipment is used to perform various tasks; investigate the robotics being used to explore the oceans; have the students draw (or give them the outline of) the world map and label the continents and the oceans; have small groups work with plaster of paris to make maps of the world labeling the continents and the oceans; make up math word problems using information on the oceans; have the students do independent reading in non-fiction, fiction and biographies and give oral reports instead of wrtitten ones; let this unit be a prelude to learning about life in the oceans; allow the students to conduct some of the experiments in this unit by themselves, working in small groups.

If you make learning fun, then the students will want to learn. Science should not be taught as a separate subject: the students read, write, listen, observe, illustrate, experience and communicate while doing. Students will practice and apply their skills in a meaningful context. Consequently, they will learn and retain more.

BACKGROUND

There is no other planet in the entire solar system like Earth. It holds nearly all the liquid water in our solar system! It is this water that allowed life to come into being and spread throughout our planet. These unique oceans exist because the planet's surface temperature is in the range in which water remains liquid. The temperature range, 0° C to 100° C, occurs rarely in our universe; matter tends to be frozen solids or hot gases.

By looking at a map or globe, one can see that all the oceans are interconnected, and are divided by the continents. The northern parts of the Atlantic and Pacific Oceans which go around the North Pole, form the Arctic Ocean. The southern parts of the Atlantic, Pacific and the Indian Oceans extend around the Antarctic Continent and form the Antarctic Ocean. These five great oceans cover approximately 70% of the surface of the earth.

Many scientists believe that the oceans holds the key to how the earth was formed. One important factor is related to erosion, and the other to the difference in the crust of the earth under land to under the ocean.

Throughout the years, land areas on earth have been changed and worn away by the forces of erosion. If the ocean floor is not as affected by erosion from the wind and water, then it may be closer to its original state. This then, will allow studies to confirm or correct our knowledge of how the earth was formed.

The crust of the earth is thinner under the floor of the ocean than under land areas. It is thought that it would be easier to reach the layer beneath the crust, the mantle, through the ocean floor, though as of this time it is still impossible. This will allow scientists to learn more then they now know about the earth and its origin.

(figure available in print form)

LESSON PLAN I

Where did the water in the ocean come from?

Objectives:

1. The students will be able to explain the water cycle process.
2. The students will be able to demonstrate and explain evaporation and condensation.

Materials:

Enough of the following for students to work in pairs;

Clear colored jars or bottles with a small neck

Ice cubes

Hot water

An overhead transparency of the following page, The Water Cycle. Be sure to color the drawing in after you've made the copy.

Sufficient copies of the Water Cycle Flow Chart

The Experiment Form

Procedure:

Scientists believe that while some water was originally on earth, more came from water vapor in the atmosphere, and from water in rocks that was released during the earth's formation. Rainwater was released from clouds in the atmosphere (what we refer to as part of the water cycle). As the earth cooled, more water came up from volcanoes, hot springs, and other sources. Gradually our oceans were filled.

Show the overhead transparency on the following page titled, The Water Cycle. Go over the four steps with the students. If the students have no questions at the end of the explanation, shut the overhead off and give each student a copy of the hand out on the following page, A Water Cycle Flow Chart. Read the directions to them and have them fill it in correctly. Directions: The steps that are on the Flow Chart are listed out of order. You are to rewrite them on the chart in the correct order. After allowing sufficient time, correct the flow charts together if you do not wish to collect them.

Explain to the students the experiment they are about to do will (should) allow them to see evaporation and condensation.Have them work in groups of two, and remind them to record their observations on the Experiment Form.

Directions:

1. Place a small amount of hot water in the bottle or jar.

2. Place an ice cube over the top of the bottle (in the neck) so it won't fall in.

3. Write down your observations.

Follow Up:

Discuss and explain what happened. Explanation: After the ice cube was on the jar a while, they should have been able to see a cloud near the top of the bottle. Water vapor was in the bottle because the warm water inside was evaporating. Water vapor is warm and the air near the ice cube is cool. When the water vapor meets the cool air near the ice cube, it starts to condense. It changes back to tiny droplets of water. The water droplets make the cloud that you see. If the water droplets get big enough, some of them might fall to the bottom of the bottle.

Closure:

Ask, how might our experiment be like what happens with rain? Students should know that not all experiments work all the time. If this experiment does not give you a cloud, try to find out why not. (NOTE: This experiment does not always work, but that is also a valuable lesson.)

ACTIVITY:

Ask the students to come up with a simple experiment that shows evaporation and condensation. (NOTE: It could simply be a glass of water set out on the table. The students should measure the water first, and again in a few days to show evaporation.) Allow them to work in small groups or independently. An experiment form must be filled out. Results could be shared orally with their peers.

Why is the ocean blue?

The ocean often looks blue because of the sun's shining on the tiny particles suspended in the water. Along the shores of some areas the water looks green because of the blue water being mixed with the yellow pigments present in floating plants.

Is it light or dark in the ocean?

The upper part of the ocean has a lot of light. The deeper you go in the ocean, there is less light. The sunlight goes down approximately 2000 feet (about 600 meters). However, the scientists who went to the deepest part in the ocean aboard the Trieste, a , bathyscaphe, reported a little sunlight as far down as 3280 feet (1000 meters).

ACTIVITY:

Have the students look up information about bathyscaphes and the Trieste, and write a brief report.

How warm or cold is the ocean?

We have learned that the sun lights up the upper part of the ocean. The sun also does something else to the water; it warms the water, or makes its temperature rise.Since the sun does not reach the deep ocean water, that water is colder, and has a lower temperature than the surface water.

The temperature of ocean water near the surface may also be different at different places. For example, near the equator the ocean water is warmer than in the ocean near the North Pole.

The temperature of water changes more slowly than the temperature of air or land. It takes the sun a longer amount of time to warm the ocean than it does to warm the air or land. The ocean also takes longer to cool off once it is warm.

ACTIVITY:

Have the students make a graph with the following information titled Ocean Temperatures at Different Depths. Write the information on the chalk board. At the surface zone, at a depth of 30-200 meters (100-650 feet), the average temperature is 18° C (64° F). In the next zone, the zone of decreasing temperatures, at a depth of 200 meters to 900 meters (3000 feet), the average temperature is 18° C to 0° C (32° F). The last zone, the zone of uniform temperature, at a depth of 900 meters to the ocean floor, has an average temperature of 0° C .

Which ocean is the largest?

The largest ocean is the Pacific Ocean. Covering between 63-65 million square miles, this huge body of water is larger than the land area of all seven continents combined. At its widest point it is about 11,000 miles across. The waters of the Pacific Ocean touch the shores of five continents and more than 10,000 islands.

How deep is the ocean? How do we know?

The average depth of the oceans is about five times the average elevation of the land. In general, the continents stand about three miles above the ocean floor. In 1962, a depth of 35,800 feet was recorded in the deepest-known part of the ocean, the Mindanao Trench (also called the Marianas Trench) east of the Philippine Islands. If the world's highest mountain, Mount Everest (29,141 feet) were to be placed into this trench, it would be covered by over a mile and a quarter of water!

People found they could measure the ocean depth by using echoes. Sound waves were sent into the ocean from a ship. The sound waves hit the ocean bottom and bounced back to the ship, where people kept track of the number of seconds it took for the sound to bounce back. This helped to determine how deep the ocean was at that point. Measuring the ocean depth in this way is called sounding.

What does the ocean floor look like?

By sounding, people were able to get an idea of what the ocean floor looked like. For example, they would know that the ocean floor was sloping down in part of the ocean. These measurements were recorded on a chart as the ship moved in the ocean.

The ocean floor is divided into three main parts. The continental shelf is the gently-sloping, underwater area which is really an extension of a continent. Continental shelves usually end at depths of 600 feet or less. At this point the ocean floor drops sharply. The bottom may drop 1-2 miles (3-4 km) or as much as 4-5 miles (6-8 km).This is known as the continental slope. The slope ends at the bottom of the ocean, in the part of the floor called the basin.

Gigantic mountain ridges are in the ocean basins. These ridges, when put together, can make up mountain ranges up to 40,000 miles long.

Volcanoes also rise from the ocean floor. Some break the surface of the ocean and form islands. For example, the Hawaiian Islands are the peaks of volcanic cones.

The deepest parts of the ocean, trenches, are cracks in the ocean basin. Seven Grand Canyons could be piled up on the top of each other in many of the trenches without reaching the surface of the water.

Many people think of the ocean as huge holes filled in with water. But the floor of the ocean is probably the true surface of the earth and the continents like islands extending above the ocean. The ocean bottom is made up largely of a rock called basalt. The continents lie on a base of granite, that is lighter then basalt. Scientists think of the continents as if they float on the heavier basalt rocks.

As the land is worn away and deposited in the ocean, there is a gradual change in weight balance. The continents become lighter while the ocean floor is weighed down. Land area rises and the ocean basin settles. A balance is maintained.

The drawing on the following page is for teachers reference only. Scientists have not 'sliced' through the earth, and drawings of this type, while used visually to explain the ocean floor, are conceptual rather than actual.

What is in the sediment on the ocean floor?

The ocean floor is mostly made up of soil and rocks washed into the ocean by rivers, streams, winds, and waves; ash and lava from volcanoes; and the remains of marine organisms. The ocean currents, wind, and ice transport these materials.

Most of the ocean's sediments (such as sand, mud, and clay) come from the land, leaving the thickest deposits in the waters near land. These are generally coarse while those in the deep ocean are generally finer.

The deep ocean floor has relatively little sediment of land origin. The water circulation enriches certain top layers so that biological production is unusually high. Micro-organisms live and die in great numbers, and their remains fall to the ocean floor to form carpets of sediment.This sediment usually found in very deep water is called ooze. All these remains are usually the size of mud and sand. The ecology of these sediments can reveal the earth's recent history.

Volcanoes also may form deposits on the ocean floor. For example, if the volcano forms an island, volcanic rock may be broken down by waves into particles of boulder, gravel, sand, mud sand, or mud (the ash from the volcano may settle on the ocean bottom as mud).

How salty is the ocean?

The amount of salt in the world's oceans vary between 33 to 37 parts per thousand. The Atlantic Ocean is the saltiest, with the Pacific Ocean the next saltiest, and the Arctic and Antarctic the least salty. The most salty water is found in waters where there is a minimum of rainfall or river runoff, and high evaporation. Water is the least salty where large quantities of freshwater are supplied by melting ice, rivers, or excessive rainfall.

The sea is slowly but constantly increasing its salt content. Scientists believe that life began in the oceans with, perhaps, the earliest living things, noncellular creatures, surrounded by ocean water. They received their food and oxygen directly from the ocean .

(figure available in print form)

As time passed, plants and animals became more complex and developed an internal fluid which was very similar to seawater. Scientists believe this fluid had remained almost the same during the years, 1% salt. The ocean is more than three times as salty. Using these facts led to the conclusion that the salt content in the ocean is increasing.

ACTIVITY / EXPERIMENT :

How do we know that the ocean water contains salt? #1

Materials:

Salt, Teaspoon, Goggles, 2 pans, Distilled water, Measuring cup, Potholder, 1 Hot plate

Directions:

1. Pour about 1/2 cup (120 ml) of distilled water into one pan. Mix in 2 teaspoons (10 grams) of salt.
2. Pour the same amount of distilled water into the other pan.
3. Heat each pan on the hot plate until all the water evaporates. CAUTION: WEAR GOGGLES; if the

salt gets too hot, it may splatter.Also use caution when using the hot plate.

4. Make observations and fill in the experiment form.

Follow up:

See follow up for option #2.

OR #2

Materials:

Pie pan, 2 Cups ocean or water from the Sound (Or to make your own salt water, mix 2 tsp. of salt with 2 C water)

Directions:

1. Pour the 2 cups of water into the pan.

2. Place the pan in a warm, dry place.

3. Allow the water to evaporate over the next few days.

4. Make observations. Fill in the Experiment Form.

Follow Up :

Have a class discussion by sharing the answers on the experiment form or by asking questions. When you finished your experiment was there anything left in the pans? What do you think it is? Do you think the method you used would be a good one for separating any other minerals from the ocean (or the Long Island Sound) water? Why or why not?

[TEACHER NOTE: When water evaporates, salt is left in the pans.]

What causes tides?

Tides are the regular rise and fall of the waters of the ocean. Tides are caused by many forces, but the most important is the gravitational attraction of the moon. The next important force is the gravitational attraction of the sun.

As the earth rotates, one of two bulges of water forms in the ocean on the part of the earth facing toward the moon. This tide is caused by the gravitational pull of the moon. This bulge moves westward around the earth as the earth rotates. At the same time, another bulge forms in the ocean on the part of the earth facing away from the moon. This other tide is caused by the weakness of the gravitational force that the moon exerts of that part of the earth. On the part of the earth away from the moon, the earth itself is pulled toward the moon more than the water is pulled (centrifugal force). This greater attraction on the solid part of the earth tends to create a bulge of water (a tide) on the side of the earth opposite the moon.

From the highest point on each of the two bulges, the water level slopes down ward to low points halfway between the two highest points. The low points result from the water being pulled away from those areas between the part of the earth facing the moon and the part facing away from the moon. The high points are high tides, while the low points are low tides.

LESSON PLAN II

What is the motion of ocean waves?

Objectives:

The students will be able to explain and to demonstrate the movement of ocean waves.

Materials:

Small rectangular pan, Cork stopper

Optional Objects: Pencil; Water, SpoonLeaf; Piece of sponge; etc.

Procedure:

If you place a cork bobber on the surface, it bobs up and down as a wave passes (unless caught in a current!). If you watch carefully you would see that the cork is lifted up by the first slope of the wave. It is carried forward to the top, or crest, of the wave, and then slides down the rear slope. In actuality the cork may have only moved an inch or two.

When a wave comes near the shore, the motion changes. The bottom of the wave touches bottom, slowing it down. The crest is not slowed down, but continues to move at nearly the same rate, and finally, spills over. After a wave spills over, smaller waves may be formed. The same processes take place in the smaller waves.

Do the following experiment to show how waves travel over water.

Directions:

1. Fill the pan with water.
2. Place the cork carefully on the top of the water. Wait until the cork stops moving.
3. Gently but steadily hit the top of the water at one end of the pan with the spoon until waves are made.
4. Make observations and fill in the Experiment Form.

Follow Up:

Some questions to use in a class discussion are —What happened to the cork? Did the cork move across the water with the wave? What does this seem to show about the movement of water in a wave? What happened to the different objects?

Additional Activity: Ocean waves always wash against the shore. In what ways do you think waves can change the shape of the shoreline over the years? Write at least two ways in your paper.

LESSON PLAN III

What causes ocean currents?

Objectives:

The students will be able to explain and to demonstrate ocean currents.

Materials:

Large rectangular pan, Pencil shavings or Cheerios, Water, World Map, Fan, Food coloring, Colored ice cubes

Procedure:

Explain to the students that ocean currents are produced and maintained by the rotation of the earth, the winds, and differences in water density. In addition, the depth of the water, location of the land,the underwater topography all affect the ocean's circulation.The stress of wind blowing across the ocean causes the surface layer of water to move. This motion then causes the underneath layer to move. But the internal friction with the water decreases with the depth.This current is called a wind current.

Do a simple demonstration with the students. Put the water in the pan, and turn the fan on (facing the water). Have the students observe how the air blowing over and on the water puts frictional stress on the water surface.Ask what is happening to the water that was motionless before? (The water is circulating around the pan.) Drop some of the shavings onto the circulating water and observe what is happening. Use dialogue with the students instead of having them write their observations. If you choose to do this using food coloring, DO NOT USE MORE THAN 1-2 DROPS OF THE FOOD COLORING, or the coloring will spread before you can follow it.

Have the students return to their seats, pull down the world map, and continue explaining about the cause of water currents while pointing out locations. Ocean water near the equator is warmer then ocean water near the North and South Poles. Warm water is lighter than cold water, so warm water rises to the surface. When this happens in the ocean, cold water moves in under the warm water. In the ocean, the warm water becomes a current that flows along the surface. It moves toward the cooler water ahead of it.

As the warm water moves away from the equator, it meets cooler air and it loses some heat to the cooler air. The ocean water in this current becomes cold and gets heavy. Being heavy, it sinks deep into the ocean and moves along under the surface current. This deeper cold water current flows in the opposite direction from the surface current. It flows back toward the equator. A current of water flowing in this way forms a huge wheel of water in the ocean.

Have the students observe the following experiment, writing their observations on the Experiment Form.

Direction:

1. Using warm water, place the water in the large pan.

2. Place some colored ice cubes at one end.

3. Place Cheerios on top. Observe what is happening.

The children will see the Cheerios move toward the ice cubes as the cubes melt. Ask what happened to the water around the ice? Why? What happened to the Cheerios?

Closure:

Another cause of movement in the ocean is the different amounts of salt in the water. Because the water that has more salt is heavier than the water with less salt, it will sink in the ocean. As it does this other water moves in over the top. This gives rise to a current.

Ask the students to list the causes for water currents. (Wind stress, heating and cooling of the water, salt in the water, water depth and the location of the land.)

LESSON PLAN IV

What is water pressure?

Objective:

The students will be able to discuss and to demonstrate water pressure .

Materials:

Experiment #1: 1 Balloon, Water, Large pan

Experiment #2: 2 Milk cartons, Large pan, Ruler, Masking tape, Water, Small Nail

Procedure:

Explain to the students that the first experiment will show the force called water pressure. Hold the balloon over the large pan and fill it with water.Have the students write down their observations. Ask what happened to the balloon? (It got larger.) Ask why? (The weight of the water acts as a force pushing on the inside of the balloon.)

If the water in the balloon can force out the sides of the balloon, imagine how much the weight of the water on the top of the ocean can push on the things in it. The deeper one goes in the ocean the greater the pressure.

People who work or dive deep in the ocean where the pressure is great have to return to the ocean surface slowly. If they do not, the sudden change in the pressure can hurt their body.

In our second experiment, we will find out if we can show that water pressure changes with depth.

Directions:

1. Using the small nail, make a hole in one side of the milk carton 1 inch (3cm) from the bottom. Make a second hole with the nail 2 inches (5 cm) above the first hole. Make a third hole 2 inches (5cm) above the second hole.
2. Cover the holes with masking tape.
3. Place the milk carton in the large pan.
4. Fill the milk carton with water
5. Quickly remove the masking tape.
6. Have the students make observations on the Experiment Form. Have a follow up discussion about the experiment. Include the following questions: How did the water flow from each hole? Were the 3 streams of water alike? Why or why not? Suppose the three nail holes were made at the same level, but on different sides of the milk carton. What would you expect the water flow to be like? Have a student (or yourself) do this as another experiment, using the second milk carton.

Closure:

From what we have observed, what could we define water pressure as? (The force of the water in the ocean, pushing down on what is in the ocean.) Is water pressure near the surface of the ocean greater than or less than water pressure deep in the ocean? (Less than.)

Why and how did people get into diving?

Knowing what the ocean floor looked like was not enough for people who wanted to know more about the oceans. They knew that somehow they had to go down into the ocean. At first people tried diving into the ocean, but they couldn't go very deep in the water. They could not stay in the water for a very long time, either. This was because they couldn't breathe under water. Also, the ocean water in most parts of the world is too cold for people.

After a time, some ways were discovered that made it possible to go down into the ocean. By carrying tanks of gas on their backs for breathing under water, and wearing special suits to protect them from the cold, divers could go down over 440 feet. They saw that the ocean was still alive with both plants and animals at that level.

Later, with better suits and helmets that covered their face and head, other divers went even deeper in the ocean. These divers had to wear a suit with a long line fastened to a platform from which air was pumped to them. Even with these improvements, divers were still not able to reach the deepest parts of the oceans.

Thanks to the invention of SCUBA (Self-Contained Underwater Breathing Apparaatus) diving gear by French engineers and perfected by Jacques Cousteau and Emile Gagnan, we humans now have a freedom to scoot through the water in any direction! You can swim to the surface, or dive to the ocean floor without coming to the surface for air.

ACTIVITIES:

1. What are the people called who live and work under water for weeks at a time? (ANSWER-Aquanauts) How can they live and work in under -water stations placed on the ocean floor as far down as 600 feet (180 meters)? Look in reference books to find out.
2. Deep sea divers must come up to the surface of the oceans slowly to avoid getting the bends, a crippling pain in their joints. Find out why this happens to divers who rise quickly from deep in the ocean. HINT: look under the heading “Bends” in the reference books.

What substances are in the ocean waters?

Many minerals of great value are found in the ocean waters other than sodium chloride, salt. The most valuable mineral taken today is magnesium. It is used making metal and in photography. It is also used in medicine that helps to settle stomachs and in Epsom Salts (used to soothe swollen or sprained joints).

Another mineral is bromine. This is added to gasoline to help cars’ engines run more smoothly. There are also small amounts of gold and silver.

There are many gases dissolved in the ocean, such as oxygen, carbon dioxide and hydrogen to name a few. Marine animals and plants use oxygen in respiration. Carbon dioxide is used by marine plants in making food.

Materials get into the ocean because large amounts are dumped by the rivers from the continents. The land is worn down by the action of running water and other pro-cesses of erosion. The materials are bought to the ocean dissolved in the water. Other substances have come from rocks in the sea itself.

Along with chemicals in solution in the water, there are many chemicals lying on the sea floors of all the oceans, in lumps. One of these rock-like nodules is manganese. This metal is not the only one occurring in this form. There is also copper, nickel and cobalt.

Also, an important and common resource of the ocean is sand and gravel. Because much of it is found near land, it can be dredged up in huge amounts and used in building roads and buildings.

Why should we protect our oceans?

Just imagine if there were no oceans on Earth. What would life be like?

When you think about a world without oceans, you realize how many things you depend on that come from the ocean—from beneath the waves. As a source of food, the oceans provide us with a variety of plants and animals that form an important part of the daily diets of people in many parts of the world. Shellfish, tuna, shark, swordfish, salmon, and edible seaweed are just a few of these foods.

Oil and gas that come from the oceans give us fuel to drive our cars and heat our homes. Even some of the medicines that help to cure us when we are ill come from marine plants and animals.

Because the ocean is so huge, it has an important effect on the weather of most places on the earth. Without the ocean, the days would be warmer and the nights would be cooler than they are now. In fact, the ocean can even affect the climate, or the kind of weather, a place has over many years.

The rewards we receive from the oceans will no longer be available to us if we neglect our responsibilities to nature. Just as we rely on the ocean to provide us with things that are necessary to our survival, oceans survival depends upon human awareness of, and protection from, pollution and activities that harm valuable, endangered marine life.

Experiment Form

(figure available in print form)

A WATER CYCLE FLOW CHART

* Water forms a gas called water vapor. The water vapor then rises to form clouds.
* Evaporation occurs when the sun warms the water and some of it changes into a gas. . * After the water condenses, it falls back to earth in various forms of precipitation; snow if it’s cold, rain if it’s warm.
*Some of this precipitation is absorbed into the ground and the rest flows into streams, lakes and oceans.
1. EVAPORATION: When the sun warms the water. some of it is changed into a gas.
2. CONDENSATION: The gas produced when evaporation takes place is called water vapor. It rises and forms clouds.
3. PRECIPITATION: When the water condenses it falls back to earth in various forms of precipitation. If it is cold, it snows. If it is warm, it will rain.
4. RECYCLED: Some precipitation is absorbed into the ground. The rest falls into streams, lakes,and oceans.

VCR FILMS

Cousteau, Jacques. The Ocean Series. The Cousteau Video Library: Distributed by Time-Life Video.

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