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What We As Students Can Do To Save Our World

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The using up of the earth's natural resources and the destruction of our world is a universal concern. This concern should be passed on to the younger generations so as to modify or change behaviors that cause this rapid use or destruction. I would like to bring young people into contact with their environment to stimulate a desire to investigate and provide them with an understanding of the methods they can use to help save our planet and make it a better place to live. Recent changes in the amount of information being circulated having to do with the environment has been staggering. Teachers can no longer depend upon easy generalizations as in the past; ideas become obsolete almost as soon as they are presented. This is especially true concerning the environment

The first objective in doing this unit is to provide very basic information on the following topics: l. Air and its importance; 2. Water, its uses and importance, and 3. Natural resources, their uses and importance.

The second objective of this unit is to provide the student with basic information on air pollution, water pollution, the depletion and conservation of our natural resources.

The third objective of this unit is to provide the student with an opportunity to observe the world around him, ask questions, make hypotheses, and solve problems through "hands-on" educational experiences.

The fourth objective of this unit is to give the student an understanding that he has a duty to save our world through his actions.

AIR

Air is a mixture of gases, oxygen, nitrogen, carbon dioxide, argon and minimal amounts of a few other gases. The first three are necessary for living things. These gases are exchanged among reservoirs in a continuous cycle. Plants take in carbon dioxide in the food making process. Also during this process, they release oxygen into the atmosphere. Living things take in oxygen to break down the food they eat to produce energy. This happens in a continuous cycle. As we breathe, we remove some oxygen from the air. When we exhale, we add carbon dioxide to the air. You probably are asking yourself, why don't we use up the oxygen in the air. Green plants change carbon dioxide back into oxygen. This is called the oxygen-carbon dioxide cycle. Life cannot

exist without the oxygen we get from air.

AIR POLLUTION

When toxic or harmful substances are released into the atmosphere, they are called air pollutants. The main cause of air pollution is the burning of fuels. Coal and oil are needed to run our factories. Fuel oil is used to heat our homes. Gasoline is burned to make our automobiles run. Fuels are burned to help produce electricity. When these fuels are burned, they release smoke and other chemicals into the air. Sulfur gases are also released into the air. Some air pollution is caused by smoke from forest fires and volcanoes. This unwanted smoke and chemicals are pollutants. They make the air dirty. The most common pollutants are nitrogen oxides, sulfur oxides, ozone, and carbon monoxide. These pollutants cause numerous problems such as eye irritations, respiratory and breathing problems. Sulfur and nitrogen oxides, two of the chemicals released during the burning of fossil fuels, mix with the water in clouds and form strong acids. These acids then fall to the earth in various forms of precipitation such as rain, snow, sleet, hail or fog. This precipitation is called acid rain. This acid rain can destroy plant and animal life. It can also be harmful to buildings. These acids break down some types of building stone such as limestone and marble. Acid rain also kills trees and destroys crops. When it falls into lakes and streams, it kills fish and harms our drinking water. Remember, this acid rain is formed when the wind carries the chemicals that are released into the air, they become part of the water cycle.

WATER

All forms of precipitation are caused by the condensation of water vapor in the atmosphere.

All living things require water. It is for this reason that different regions throughout the world exhibit individual patterns of plant and animal growth. In areas where water is plentiful, there are dense forests and lots of animals. In dry regions, there is much less plant and animal life.

How do we get our water? Water travels from the earth to the atmosphere and back again to the earth. This is known as the water cycle. The heat of the sun causes water to evaporate from the surface of oceans, streams, lakes and glaciers. In gaseous form it is carried by air currents into the atmosphere. When the temperature drops, the water vapor condenses and falls to the earth as precipitation.

More than three-fourths of the earth’s surface is covered with water. Most of this water is in the oceans. Ocean water cannot be used for drinking, irrigation, or industrial processes because it is salt water.

Each person drinks about l.5 liters of water a day. People also use water to bathe, cook, and clean. It has been estimated that each person in the United States uses over 400 liters of water daily. Industry also uses billions of liters of water each day. Farmers also use billions of liters of water each day to irrigate farm land. The United States alone uses over 500 billion liters of water each day. Spread this out throughout the world and the use is magnified billions of times over.

The earth’s fresh water and ocean water are also important food sources for the world’s population. Water is a substance most people take for granted. The amount of water we use today will probably double within the

next 20 years. Remember a very important point, only about 3 percent of the earth's water is fresh water and most of this water is locked up in ice. In fact, only about l5 per cent of the earth's fresh water is available for use by living things, and living things cannot exist without water. Protein, the principal component of cellular material is 70 percent water. Most everything that diffuses into and out of a cell is dissolved in water. Thus, water is called the universal solvent. Because living things constantly need water, and water must be recycled.

Water Pollution

Whether we have enough usable water in the future depends on whether we keep pollutants or harmful substances out of the water. Many of our lakes and rivers were important sources of fresh water. But people used them as dumping grounds for wastes and sewage. This has caused them to become polluted. Polluted water is not safe for drinking, swimming, or bathing. Pollution also destroys many of the organisms that live in oceans, rivers, lakes and streams. Some of the pollutants are dissolved materials. Dissolved materials can come from sewage emptied into the water. Some pollutants are suspended particles. These particles can come from factories emptying wastes into the waters. Certain pollutants such as phosphates cause uncontrolled growth of green plants in lakes which may use up the oxygen in the water and cause fish to die. Many pesticides also end up in lakes and streams. As they build up they also cause harm to the water, fish, and other organisms in the water. Water pollution also occurs when heated water from factories is put into streams and lakes. This type of pollution is called thermal pollution. It is usually caused by power plants that use water to cool their generators, then return the water, only now it is warmer than before. Warm water holds less oxygen, thus limiting the number and kind of organisms it can hold.

Natural Resources

In this unit I have already discussed two of our more important natural resources, air and water. Along with air and water we have soil and forests. These resources are called renewable resources. They can, but not easily, be replaced after we use them. The air is used over and over again. The water cycle allows us to use water over and over again, although we are able to use less and less because of other factors. Forests are replanted after they are cut down, but not anywhere near the rate at which they are being cut. The soil can be helped along as fertilizers put chemicals back but not as quickly as erosion and depletion are taking their toll on soil. Because we can reuse theses resources, they are called renewable resources.

Some resources cannot be replaced after they are used. These resources are called non-renewable resources. Minerals are examples of non-renewable resources. After a mineral is removed, it is gone. It cannot be replaced by nature. Fuels such as coal, oil and natural gas are non-renewable resources. We are using these non-renewable resources much too quickly. People need these natural resources to survive. These fuels are the main sources of energy for industry, transportation and even our homes. As population increases, the need for these fossil fuels also increases proportionally, so it is imperative that we use them cautiously and conserve.

Activity 1

The objective of these activities is to formulate the concept that all living things need air to survive.

A. Humans

1. Sit quietly and relax.
2. Count the number of times you breathe in one minute. Count in and out as one breath.
3. The number of times you breathe in one minute is called your breathing rate. How many times did you breathe in one minute? ___
4. Compare your breathing rate with those of your classmates. How does your breathing rate compare with theirs?
5. What are you and your classmates taking into your body? ___
6. Stand up and run in place for one minute.
7. Sit down. Count the number of times you breathe in one minute.
8. How many times did you breathe in one minute after exercising? ___
9. Compare your breathing rate after exercising with those of your classmates.
10. What does your body need more of while exercising? ___

B. Other Living Organisms

Materials Needed for each group of 4 students.

2 test tubes
1 test tube rack
1 beaker with yeast mixture consisting of l50 grams of active dried yeast with an equal amount of granulated sugar.
1. Fill two test tubes l/2 full with warm water.
2. Add yeast mixture to one test tube. (The mixture contains living yeast plants plus something to help them grow.)
3. Add a few pebbles to the other test tube.
4. Shake both tubes gently. Wait a few minutes.
5. Which of the two test tubes contains something living ___ ?

6. What do you observe in the test tube containing yeast? ___
7. What do you observe in the test tube containing pebbles? ___
8. What do living yeast plants give off that pebbles do not? ___
9. What do living things give off that non-living things do not? ___

Activity 2 Worksheet

Activity:
Air Pollution Monitor

The number of particles I found in the center square was:

The number of particles I found in each of the three other squares was:

1) ___
2) ___
3) ___
When I used my hand lens to count the particles, the particles looked like pieces of:
These are some things my town/city could do to reduce the particle count in the air.
Add the number of particles from the 4 squares and divide by 4. The average number of particles per square was:

This is how weather might affect the results of this observation.

Air Pollution Chart

(Activity 2)

0 to l5 particles per square: Clean Air

16 to 29 particles per square: OK Air

30 to 43 particles per square: Not Too Bad Air

44 to 57 particles per square: Fair Air

58 to 7l particles per square: Not Too Good Air

72 to 85 particles per square: Not Good Air

86 to 99 particles per square: Polluted Air

100+ particles per square: Badly Polluted Air

Activity 2

Air Pollution Monitor
What You Want To Find Out (Purpose):
You want to find out how many solid particles there are in the air.
What You Need (Materials):
2-l/2” square piece of wax paper
pencil
ruler
1 of the pieces of foam board in your kit
petroleum jelly
tape
hand lens in your kit
What Do You Think Will Happen? (Hypothesis):
Will you find particles stuck to the air pollution monitor after your test period? Do you think you’ll find a lot of particles, or just a few?
Use the chart on the next page to find out about the particle count in the air.
What You Are Going to Do (Procedure):

1. Mark your wax paper into a grid of l/2 inch squares. Do this by making marks along each edge of the paper, l/2 inch apart, then connect the marks across the paper.
2. Attach the paper to the foam board with tape. Please be careful with the foam board, because you will need it for another activity later.
3. Smear the paper evenly with a thin coat of petroleum jelly.
4. Find a place outside where you can leave the air pollution monitor for a week. It should be a place where it won't be damaged. If you can, attach it to a string and hang it out of a window or from a tree branch.
5. At the end of a week, bring your pollution monitor inside and look at it with the hand lens. Observe the particles that are stuck to the petroleum jelly.
6. Choose the center square and count the number of particles that you see. Select three more squares and count the number of particles in each square.
7. Add the number of particles from the 4 squares and divide by 4. Compare this number to the pollution monitor chart on the next page.

Activity 3

The objective of these activities is to formulate the concept that all living things need water to survive.

Materials

2 beakers l00 ml or baby food jars will do

6 lima bean seeds ___ paper towels
5 pebbles l knife
masking tape l magnifying glass
balance scale

A. 1. Label both beakers with your name.

2. Find the mass of the 5 lima bean seeds.
3. Place the seeds in l beaker.
4. Find the mass of the 5 pebbles. ___
5. Place the pebbles in the second beaker.
6. Fill both beakers full with water. Store for one day.
7. Remove and dry the seeds with a paper towel.
8. What is the mass of the seeds? ___
9. What was the mass of the seeds at the start of the experiment? ___
10. What is the mass of the seeds now? ___

11. What happened to the mass of the seed? ___
12. What do you think caused this change? ___
13. What do you think got into the seeds? ___
14. Remove the pebbles from the beaker. Dry them.___
15. Find the mass of the dried pebbles. ___
16. What was the mass of the pebbles at the start of the experiment? ___
17. What is the mass of the pebbles now? ___
18. What happened to the mass of the pebbles? ___
19. What did the seeds do that the pebbles did not? ___
20. What did the seeds take in?___

B.

1. Open a new dry lima bean seed.
2. Open one of your soaked seeds.
3. Compare the dry and soaked seeds using a microscope.
4. Your soaked seed contains an embryo and a cotyledon. The embryo is an undeveloped plant. It will grow and change into a bean plant. The cotyledon stores food to help the plantstart growing. The radical will become the root. The hypocotyl will become the plant stem. The epicotyl will become the leaves. The seed coat protects the seed from drying out. When the seed gets enough water, the seed coat softens. It then softens and lets the embryo out.
5. What part of the seed stores food?___
6. What part of the seed will become a plant?___

7. How does the seed coat help the seed?___
8. What must seeds take into start their growth? ___
9. What must all living things take in to stay alive? ___

Activity 4

Diluting Pollution

Problem
How effective is dilution as a method of cleaning up polluted water?

Aim
In this investigation, you will observe that it takes a large amount of unpolluted water to clean up polluted water.

Materials
Each group of students will need some blue food coloring, tap water, an eyedropper, a graduated cylinder, a test-tube rack, a stirring rod, a test tube, a small beaker or baby-food jar, and a large beaker or jar.

Procedure

1. Using the graduated cylinder, measure 20 milliliters of tap water. Pour the water into a test tube and add one drop of food coloring. Stir. The food coloring represents a form of pollution such as sewage, pesticides, or some other unwanted chemicals.
2. Using the graduated cylinder, measure l0 milliliters of the “polluted” water from the test tube. Pour it into a small beaker. Set the small beaker aside. Add l0 milliliters of tap water to the test tube. Hold the tube against a sheet of white paper and look at the color of the water. Describe the color.
3. Repeat step 2 three times. What color is the water in the test tube now? Have you cleaned the water by dilution? Explain.
4. Look at the water in the small beaker. There should be 40 milliliters of polluted water in the small beaker. Measure 20 milliliters of the water from the small beaker. Pour it into the large beaker. Add 20 milliliters of tap water to the small beaker. Describe the color of the polluted water in the small beaker.
5. Repeat step 4 three times. What color is the water in the small beaker now?
6. How much polluted water is in the large beaker? Does diluting polluted water appear to be an

effective way of solving the pollution problem? Explain. How do cities avoid polluting rivers with sewage? How is water treated to make it clean enough for drinking?

Activity 5

The objective is to formulate the concept that water pollution disrupts the environment. How can we help nature clean up water pollution?

Materials for each group of 4 students.
1 test tube of muddy water
1 stopper
1 test tube clean
1 test tube rack
1 funnel prepared with paper and gravel
1. Obtain the test tube of muddy water.
2. Hold your finger over the seal. Shake the tube.
3. Place your tube in the rack. Do not touch it for 5 minutes.
4. What do you see after 5 minutes?___
5. The mud represents solid waste. What happened to the mud? ___
6. This method of purifying water is called sedimentation.
7. Why wouldn't you drink the relatively clear water at the top of the test tube? ___
8. Shake your test tube again. Pour the contents of the tube over the funnel with the gravel and paper in it, into a clean test tube.
9. Observe the collected water.
10. Where are most of the pollutants now? ___
11. Why wouldn't you drink the clear water passing through the filter? ___
12. What is this way of getting rid of water pollution called? ___

13. What can water pollution upset?

Natural Resources—Conservation

The reasonable use of the earth's natural resources, water, soil, wildlife, forests and minerals, is a major goal of conservation. Conservation is the preservation and maintenance of the environment to meet human needs for production while insuring that proper consideration is also given to aesthetics and recreation. An effective conservation program results in a continuous production and supply of native plants and animals, and the continued availability of critical mineral resources. Timber, fuels, ores, and other resources are being depleted at such a rapid rate that the need to conserve them has become crucial. We all have to prevent the waste of natural resources to maintain a high quality environment and to preserve the natural heritage for future generations.

Natural resources are a vital part of sustaining life, and conservation measures are a vital part of sustaining human life. Conservation measures are designed to control, manage and preserve them so that they can be used and appreciated to the fullest. Fresh water habitats must be kept clean for drinking and for recreation activities. Soils must be kept fertile, without the accumulation of toxic chemicals from pesticides or herbicides, to provide fruits and vegetables. Forests must be managed in a manner that can provide not only lumber and pulpwood for paper products, but also homes for wild life. The use of oil, coal and minerals important for an industrial society must be carefully monitored to be certain that the supply does not dwindle too rapidly. The proper conservation of these natural resources is of key concern in maintaining the balance of nature in a world with a large population. The abuses of the past and even the present have emphasized the need for the wise use of natural resources. Conservation groups have promoted corrective legislation and instituted legal proceedings against violators. People have been made increasingly aware that their continued existence depends on these efforts to stop environmental deterioration.

Individuals have no right to destroy nature's wealth for profit. The logging company that cuts down too many trees without replanting for the future; the industrial plant that fouls a river or pollutes the air with its wastes; the farmer who neglects his own farm and so damages his neighbors land, are injuring the whole community. The camper whose carelessness starts a forest fire; the automobile driver who wastes gasoline; the picnickers who litter the landscape with their garbage; are all abusing natural resources.

Stringent laws to stop the waste and destruction of natural resources must be supported and enforced. Conservation is everyone's responsibility. It is one method we as students can use to save our world.

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