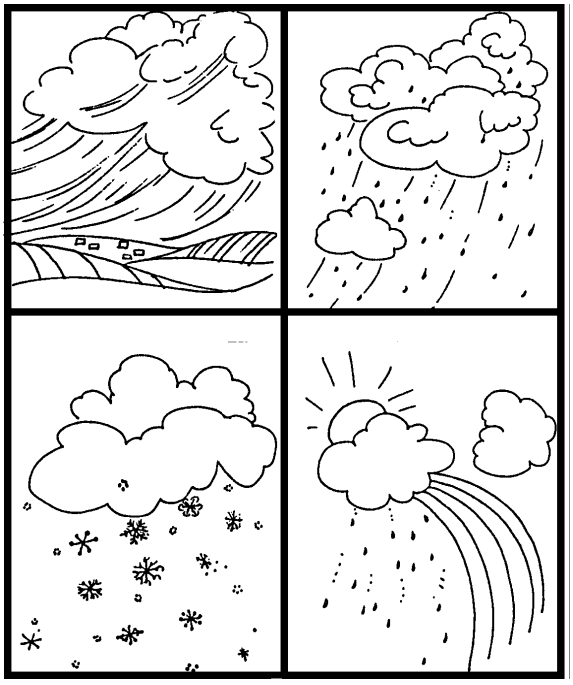
Water Cycle

The Earth's Gift

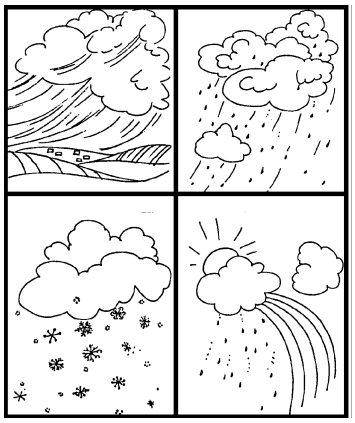
THIRD GRADE

OCEANS



1 WEEK
LESSON PLANS AND
ACTIVITIES

WATER CYCLE
OVERVIEW OF THIRD GRADE



WATER

WEEK 1.
PRE: *Comparing the different components of the water cycle.*
LAB: *Contrasting water with hydrogen peroxide.*
POST: *Investigating a water molecule.*

OCEANS

WEEK 2.
PRE: *Discovering an ion.*
LAB: *Exploring why salts dissolve in water.*
POST: *Comparing bodies of salt and fresh water.*

ATMOSPHERE

WEEK 3.
PRE: *Comparing the atmosphere, hydrosphere, and lithosphere.*
LAB: *Exploring atmospheric pressure.*
POST: *Contrasting the atmospheric gases.*

WEATHER

WEEK 4.
PRE: *Discovering how water condenses from air.*
LAB: *Experimenting with precipitation, and evaporation.*
POST: *Investigating the dew point.*

WATER CYCLE - OCEANS (3)

PRE LAB

Students use a worksheet to learn about an ion.

OBJECTIVES:

1. Comparing water's states of matter.
2. Discovering an ion.

VOCABULARY:

covalent bond
dissolve
fresh water
ion
ionic bond
salt water
solvent

MATERIALS:

worksheet

BACKGROUND:

Water is a transparent, odorless, tasteless liquid. It illustrates 3 states of matter in the form of ice, steam, and water. The form it takes depends on the temperature. At low temperatures, the molecules do not move around as much and form a crystalline structure that is rigid, and a little larger structure in the liquid state, and very open in the gaseous state.

Water has a very large heat capacity, meaning that it can absorb a great deal of heat without becoming extremely hot. This fact makes the ocean a large reservoir of heat, that greatly affects the overall weather and climate patterns of the world.

The students should remember from last week, that the hydrogen and oxygen "bond" together, or "hold hands." The bond is very strong and is called a covalent bond. Because the bond is so strong, water is considered a universal solvent, since many things dissolve in it. Water is a special type of covalent bond called a hydrogen bond. Salts on the other hand hold hands very weakly and break up very easily in water. This is called an ionic bond.

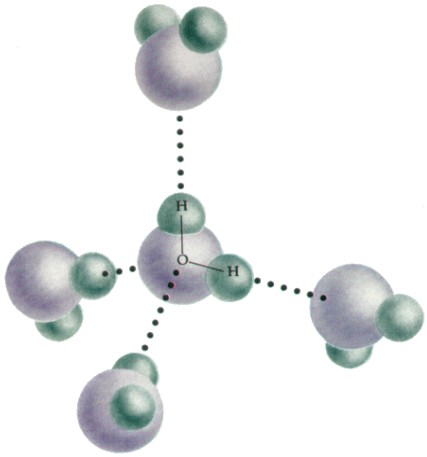
The break up of salts in water causes the water to have the ions of that salt. For instance, table salt is sodium chloride (NaCl). When it is dissolved in water it turns into a positive ion of sodium (Na^+) and a negative ion of chlorine (Cl^-). Dissolving does not mean that the compound breaks into its elements. If that was the case, sodium, the element is reactive with water and chlorine is a deadly gas. It is important to use the

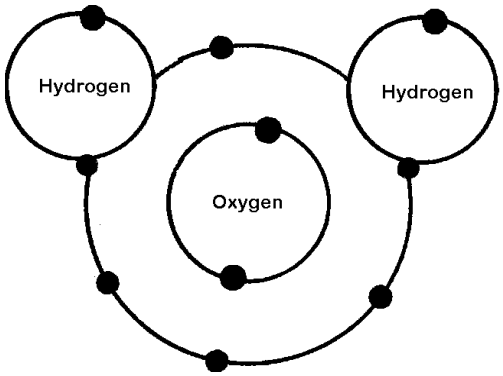
correct terms early in a student's education, so they don't get confused later on.

PROCEDURE:

1. Introduce the term ionic and covalent bonding as a way that different compounds are held together. Ionic bonds are not as strong as covalent. On the worksheet have students write a sentence that covalent is a strong bond and ionic is weak or not as strong. You might want them to think of a "poetic" way of writing it. "Water is held together by very strong glue." "Salts are weak, so they break apart easy."

2. On the worksheet have them draw a water molecule after you go over the water molecule pictured below.





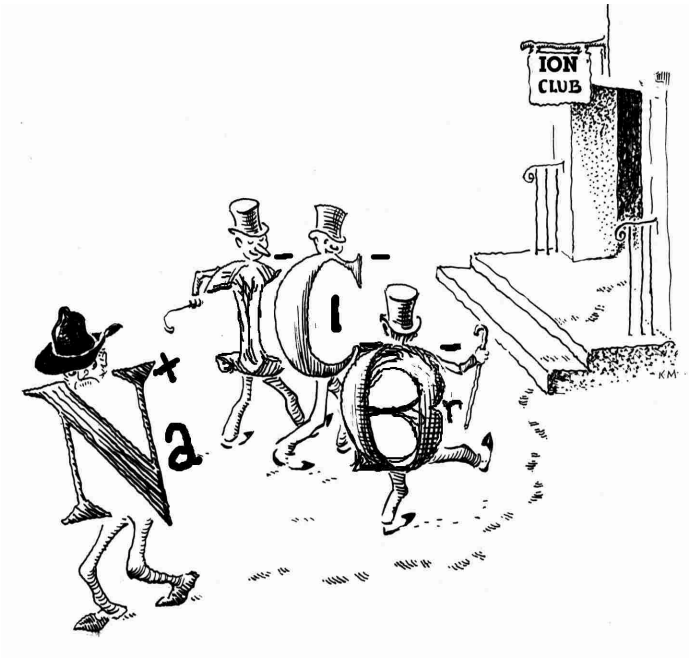
3. In the second picture it shows the different ions moving around freely into the "Ion Club." So imagine the club as the water molecule which the different compounds break up into ions and move around. If the club goes away, the ions would go back together to form the characteristics of their compound. So sodium chloride or table salt would become cubic and white again without the water. This is a silly example, but it is important to show them what an ion is. Have the students write a sentence of their interpretation of the "Ion Club."

WATER CYCLE - OCEANS (3)

Draw a picture of a water molecule.

COVALENT BOND
3.

IONIC BOND



WATER CYCLE - OCEANS (3)

LAB

Students compare dissolution in warm and cold water

OBJECTIVES:

1. Discovering substances that dissolve in water.
2. Exploring why salts dissolve more effectively in warm water.

VOCABULARY:

covalent
dissolve
ionic
solvent

MATERIALS:

beaker
measuring spoons
1 stirrer (per student group)
salt, sand, sugar, baking soda, epsom, salt, mud or other items that dissolve in water

BACKGROUND:

Water is an excellent solvent because it forms very strong bonds (covalent). Substances with weak bonds (mainly ionic) usually dissolve into the stronger substances or solvents. Dissolution is not a chemical change.

However, not all substances will dissolve in water. Salts will dissolve, the covalent bond of water "rips" the ionic bonds of the salts. Sand will not dissolve in water because the "bond" of water is not strong enough to dissolve the sand. However, some strong acids can dissolve sand.

Dissolution will proceed faster in warmer water, because it has more room for the molecules of the salt to “fit” between the molecules of water.

PROCEDURE:

1. Ask students if a body of salt water were to evaporate, would anything be left. If the students debate over this you might want to set out a dish of salt water and a dish of fresh water and have them observe what happens when the water evaporates.

2. In this lab, the students will measure all the correct amounts and follow the lab sheet. Have them describe what happens when they mix the materials. Once the students

record their findings on one item, have them clean out the dish and proceed to the next item. Do not dispose of the sand and mud in the sink. You may want to save the sand and dry it out, to be used again.

3. Students may ask you why the oceans aren't sweet. The oceans are not sweet because sugar does not dissolve as fast as salt and does not stay dissolved. Sugar has strong bonds (covalent) whereby salts have weak bonds(ionic). Also, salts are much more abundant in the rocks. Have you ever tasted a sweet rock?

WATER CYCLE - OCEANS (3)

PROBLEM: Why are the oceans salty?
PREDICTION: _____
PROCEDURE:

MATERIALS: salt, sand, sugar, baking soda, epsom salt, mud, measuring spoons, beakers, warm water

In a beaker measure 100 ml of water. Then stir in1 ml of one item, first in cold water than warm. Record what happens in the data chart below. Then dispose of the materials as instructed by your teacher.

	COLD	WARM
salt		
sand		
sugar		
baking soda		
epsom salt		
mud		

CONCLUSION: What substances dissolved the fastest?

_____

Can you figure out why the ocean is salty and not sweet?

_____

WATER CYCLE - OCEANS (3)

POST LAB

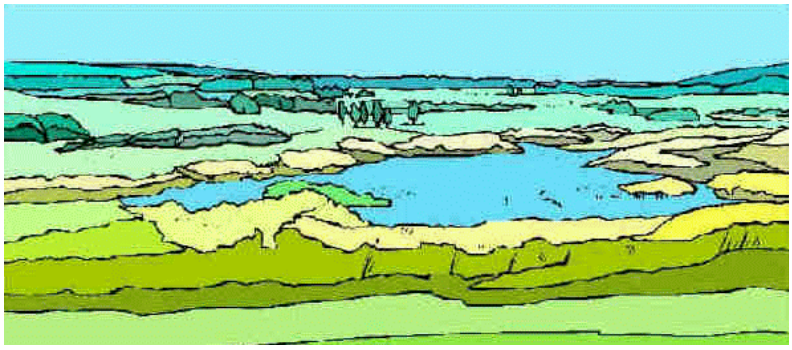
Students use a globe and worksheet to find fresh and salt water sources.

OBJECTIVES:

1. Distinguishing bodies of salt and fresh water.
2. Comparing bodies of salt and fresh water.

VOCABULARY:

lake
marine
ocean
sea



MATERIALS:

Hydrographic globe
Inflatable world globes
worksheet

BACKGROUND:

A globe or atlas shows fresh and salt water masses as being the same. However, one infers that the large bodies of water are usually salty while the smaller bodies of water are usually fresh.

Point out that not all salt water is the same. The amount of salt is measured by its salinity which is measured by parts per million of that salt in water. For instance normal salinity of the major oceans is around 35-36 o/oo (read parts per million), but some bodies of water like Great Salt Lake in Utah has a salinity much higher than seawater. You may want to discuss with students where there may be more salinity than others. In places where evaporation is high there is a higher salinity. If there is a lot of precipitation the salinity would be less because rain water is fresh water. In waters where there are icebergs, the salinity would be higher because the icebergs are fresh water and the salt gets concentrated. But if the icebergs melt, it adds fresh water and the salinity goes down. The oceans are a complicated place!

PROCEDURE:

1. You might want to make a list of the bodies of water that are fresh and salty. You should introduce the term "marine" which is the correct way of referring to salty water. Salt water examples include Pacific Ocean, Indian Ocean, Great Salt Lake, Salton Sea in southern California, and Mediterranean Sea to name a few. Fresh water examples include

the Great Lakes, Lake Tahoe, Mississippi River, and local reservoirs. Potential fresh water is tied up in icebergs, ice sheets, and glaciers. Antarctica is a large source of fresh water.

2. Students can color the different parts of the globes and label the different parts. You might want them to use a lighter blue for fresh water. So, for instance around Antarctica (D) you might want another shade of blue that is between fresh and normal salinity. This would also hold true for the Arctic Ocean (C). Since there are polar caps there, you might suggest that student color it gray to represent ice sheets.

3. Main areas students should identify is the following: (A) Africa, Eurasia, Indian Ocean, Atlantic Ocean, Caspian Sea (salt), Black Sea (salt), Red Sea (salt), Mediterranean Sea (salt); (B) Atlantic Ocean, Pacific Ocean, South American, North America, Great Lakes (fresh); (C) Arctic Ocean, ice caps (fresh), Eurasia, North America, Pacific Ocean, Atlantic Ocean; (D) Antarctica, ice sheets (fresh), Indian Ocean, Atlantic Ocean, Pacific Ocean.

WATER CYCLE - OCEANS (3)