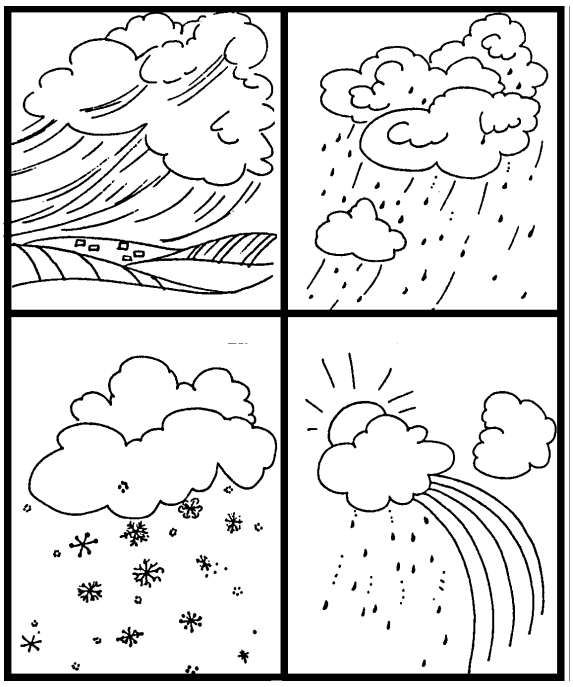
Water Cycle

The Earth's Gift

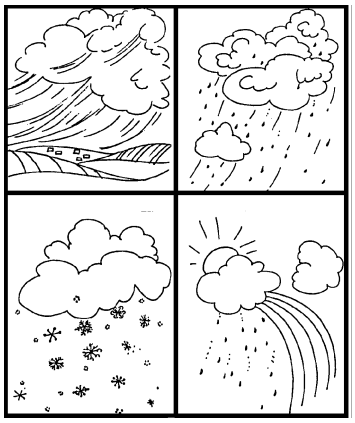
THIRD GRADE

ATMOSPHERE



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 - ATMOSPHERE (3)

PRE LAB

Students analyze the “spheres” of the Earth.

OBJECTIVES:

1. Comparing the atmosphere, hydrosphere, and lithosphere.
2. Contrasting the components of the "spheres."

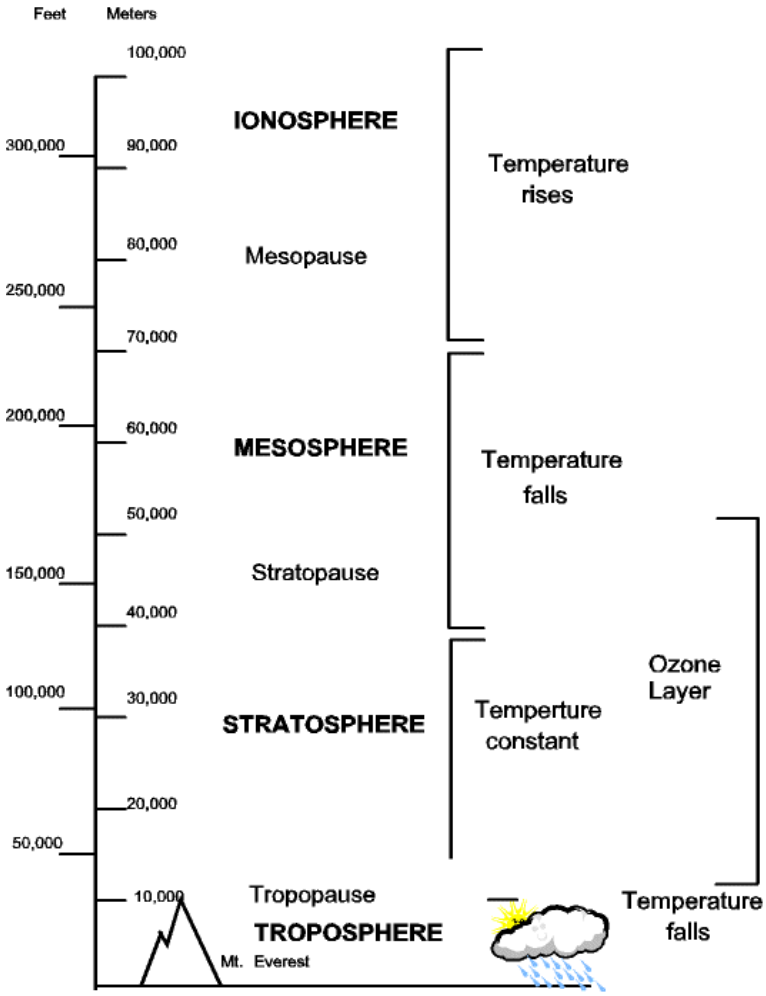
VOCABULARY:

atmosphere
hydrosphere
lithosphere

MATERIALS:

crayons
worksheet

BACKGROUND:



The “sphere” in lithosphere, atmosphere, and hydrosphere means envelop. The atmosphere, therefore, consists of gases that envelop the Earth. The hydrosphere defines the water that covers 71% of the Earth's surface. The lithosphere refers to the rocks of the Earth’s surface and upper mantle, or the depth of the plates. The atmosphere, hydrosphere, and lithosphere interact with each other to make our planet liveable. Without any one of them, we could not survive as a planet.

The atmosphere is layered. The layer we live in is called the troposphere where we have wind, clouds, and all of our weather. Within the troposphere the right mixture of oxygen with nitrogen, carbon dioxide, and other rare gases allows organisms to survive. As you go higher in the atmosphere, the mixture of the gases changes. The temperature also changes.

The layer above the troposphere is called the stratosphere and is about 32 km thick. The upper part of the stratosphere is called the ozone layer. Ozone is a form of oxygen

that help protect the surface of the Earth from the Sun's ultraviolet rays. Ozone is not the same form as the oxygen we breathe.

The next layer is called the Mesosphere which is colder than the stratosphere. This is followed by the Ionosphere where the temperature rises.

The amount of air also varies in each of the layers. Close to the Earth the air is concentrated and under pressure, while at about 35,000 meters (115,000 feet) the weight of the air is just one one-hundredth of the surface value. In other words, if you were in an airplane that high, you could not breathe if you were outside of the plane.

PROCEDURE:

1. Discuss with students the terms atmosphere, hydrosphere, and lithosphere. Use as many examples as you can.

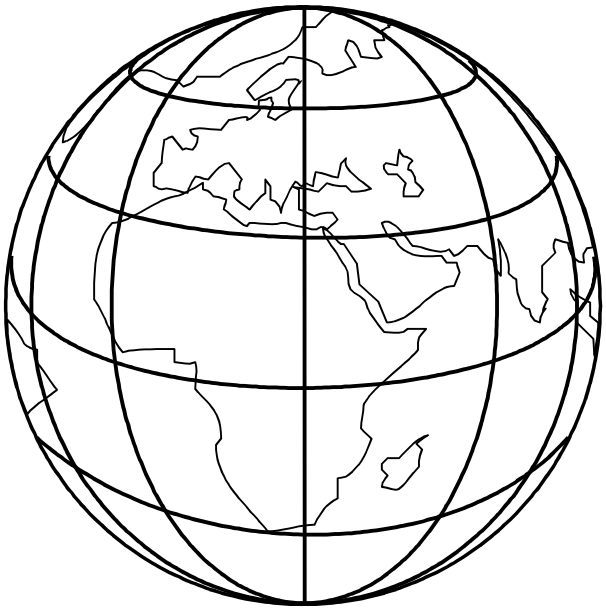
This diagram is a guideline of some of the points you should go over.

	COMPOSITION	IMPORTANCE
ATMOSPHERE	gases including water vapor	oxygen is one of the gases, which is needed by most organisms
HYDROSPHERE	water, including salt and fresh	without water living things could not survive, transportation
LITHOSPHERE	rocks	needed to make soil provides materials for manufacturing

2. Provide students with worksheet and have them color the different spheres and define each of the sphere on the worksheet.

WATER CYCLE - ATMOSPHERE (3)

LABEL THE HYDROSPHERE, LITHOSPHERE, AND ATMOSPHERE. COLOR. MAKE A LEGEND.



	COMPOSITION	IMPORTANCE
ATMOSPHERE		
HYDROSPHERE		
LITHOSPHERE		

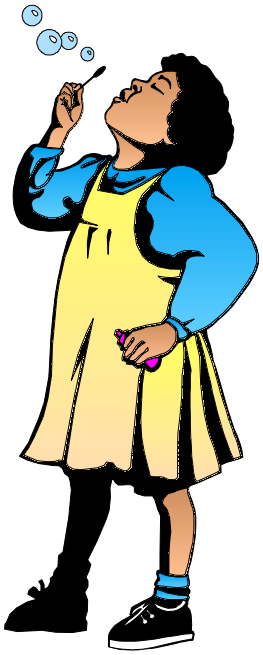
WATER CYCLE - ATMOSPHERE (3)

LAB

Students experiment with bubbles.

OBJECTIVES:

1. Exploring atmospheric pressure.
2. Experimenting with bubbles and atmospheric pressure.



VOCABULARY:

atmospheric pressure

MATERIALS:

stiff wire or coat hangers
soap mixture
handboiler
Tour of bubbles
bubble trumpet

BACKGROUND:

Atmospheric pressure refers to the weight of the air exerting a force or pressure on an object. All things, living and non-living, are subjected to this pressure. Students do not usually think of themselves as being on the surface of the Earth with tons and tons of air on them. They assume that they could not possibly be able to walk around with such pressures placed upon them.

An instrument called a barometer measures the atmospheric pressure. An analog to a barometer is a handboiler or love meter. Let one of the students hold the meter in their hand. The class should observe what happens and try to figure out what causes the liquid to boil. Many will assume that the heat of the hand boils the liquid, but it doesn't. The liquid inside the glass chamber is usually methyl alcohol or another liquid that has a low vaporization rate. The heat of the hand starts to vaporize the liquid, that in turn changes the pressure inside the chamber and forces the liquid up. The air in the chamber then is forced up after the liquid is up and it appears like it is boiling.

Air has weight and hence creates pressure. The weight pulls down on us and creates a pressure. The pressure is equal in all directions. In this activity the students will use different bubble makers to discover that the reason bubbles are spheres, is because the pressure acts on their surface equally, forming a sphere. In space where is there is not air pressure, the pressure is still equal so you will still get spherical bubbles.

PROCEDURE:

1. Use the Tour of Bubbles to watch the bubbles move upward. Notice at the beginning of the bubble, they are more oblate (flattened). As the bubble moves upward it becomes spherical. This is because the pressure is equal when it is spherical and unequal when it is oblate.

2. Use the bubble trumpet or other bubble makers to have children look at the shape of the bubbles that leave the trumpet.

3. Give groups of students 4 pieces of stiff wire (no more than 10 cm long). Direct them to make a shape of a circle, triangle, and square. The fourth shape can be one of their choice.

4. Students should do 4 trials of each wand and record their information. Scientific experiments always need more than one experiment to prove something. All the bubbles should be spherical.

5. Students should test their bubble makers using bubble solution. Below are some solutions that you can use. Note: Dawn (or other soap with high glycerine content) can be substituted for glycerine.

SIMPLE SOLUTIONS:
1. Mix 1 part soap to 1 part glycerine to 6 parts distilled water
2. Put 3 or 4 tablespoons of soap powder or soap flakes into four cups of hot water. Let the mixture stand for 3 days and then stir in a large spoonful of sugar

OTHER SOLUTIONS THAT YOU MAY WANT TO TRY:

3.
3 PARTS WATER
1 PART KARO SYRUP
1 PART GLYCERINE
2 ML SALT

4.
3 PARTS WATER
1 PART DETERGENT
1 PART GLYCERINE
2 ML SALT

BUBBLE MAKERS

An instrument that makes bubbles can be just about any size. The smaller the bubble maker the thinner the wire can be. If you are making a large bubble maker stiff wire (like a clothes hanger) is required. If you are using a clothes hanger, you might have to wrap twine around the wire to help the solution adhere to the wire. Clothes hangers usually have a coating on it that makes it hard for the solution to adhere. Dip your bubble makers into the soap mixture and blow through it very gently. The skin will stretch and eventually a bubble will break free. A twist in the wrist will insure that the bubble will go free.

MATERIALS: clothes hanger or other stiff wire, twine

WATER CYCLE - ATMOSPHERE (3)

PROBLEM: What shapes do bubbles take?

PREDICTION: _____

PROCEDURE:

MATERIALS: different shapes of bubble makers (triangle, square, round, trumpet)

1. Construct a triangle, square, and round wire bubble maker, then make a shape of your choice.
2. Using the bubble makers blow some bubbles and record your results.
3. Draw the type of bubbles in data chart below.

TRIAL NO.	TRIANGLE	CIRCLE	SQUARE	
1				
2				
3				
4				

CONCLUSION: What shape do the bubbles take? Why?

_____

WATER CYCLE - ATMOSPHERE (3)

POST LAB

Students use a worksheet to compare atmospheric gases.

OBJECTIVES:

1. Exploring the main ingredients of air.
2. Contrasting the atmospheric gases.

VOCABULARY:

argon
carbon dioxide
helium
hydrogen
nitrogen
oxygen

MATERIALS:

worksheet

BACKGROUND:

Air consists of gases in different proportions depending on how high you are in the atmosphere. It was a very difficult process to determine what air is composed of. Joseph Priestly in the 1770's showed that air contained something that living organisms needed to survive. He called it “phlogistons.” In the 1780's French chemist Antoine Lavoisier determined that air contained a gas, which he called oxygen. He also found out that air contained two other gases - nitrogen and carbon dioxide.

Later, air was chemically found to be about 21% oxygen, 78% nitrogen, and 1% carbon dioxide and other gases. However, it wasn’t until the 19th century that researchers discovered that the atmosphere changed with height. James Glaisher and Robert Cowell risked their lives in balloons to find out about the atmosphere. By 1902, unmanned balloons charted and defined the extent of the troposphere.

PROCEDURE:

1. This exercise shows two different areas in the atmosphere and the students must decide where they belong. You may want to give them a clue, that one of the elements is essential to humans, so it must be closer to the earth.

2. Also ask them, if they were traveling in an airplane would there be more oxygen up there or down on the ground. Would they be able to breathe outside the airplane? You

may have to discuss with students that there is oxygen in the airplane that is brought from the ground. If they are climbing a tall mountain, would they have trouble breathing? Yes, because the air has different proportions of the different gases, and oxygen becomes depleted.

3. Give students the worksheet. Go through the activities on the worksheet with students.

ANSWERS:
Nitrogen = N;
Oxygen = O;
Argon = Ar;
Carbon Dioxide = CO_2;
Hydrogen = H;
Helium = He.

What composition of air do you think is found below 72 km? A
What composition of air do you think is found above 800 km? B
Why? B has lighter gases; organisms need oxygen so it should be on the bottom.

WATER CYCLE - ATMOSPHERE (3) POST

MAIN INGREDIENTS OF AIR

1. Use a periodic table to find the symbols for each of the gases in air. List the ingredients and write the symbol below.

_____
_____
_____
_____

2. Which composition of air do you think is found below 72 km?

_____

Above 800 km? _____

Why? _____