SEA LAB ~ MARINE SCIENCE EDUCATION CENTER
New Bedford Public Schools
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The Water Cycle

Concept: The water cycle is the continuous process of water evaporating, becoming cooled and condensing, and then returning to the earth in the form of precipitation

Objective: To become familiar with the processes of the water cycle through a unified arts approach

Background Knowledge:

Water in the oceans covers about 71% of the earth's surface. It must also be remembered that a great deal of water is present in a solid state in the form of ice at the poles. Water vapor is present in our atmosphere. Because of its great abundance on the earth's surface, water is an important weather factor. Heat energy from the sun warms the surface of our planet. Water molecules at the surface of bodies of water absorb heat and, with increased energy, may escape into the air as water vapor. This transformation of a liquid to a gas is called evaporation. The water vapor near the earth's surface is also warmed, and the absorbed energy causes the speeding up of the molecules. The molecules move up and away from the evaporation surface. The water vapor molecules rise into the air and cone into contact with areas of low pressure. The air expands and becomes cooler. Air may also be cooled by heat loss due to radiation. The water molecules collect and form minute droplets. This transition of a gas into a liquid is termed condensation. If the condensation occurs around tiny dust particles above the earth's surface, a cloud is formed. If the droplets collect and form larger particles, the air currents no longer support them, and they fall to the earth. This falling moisture is known as precipitation. The form is dependent upon the temperature. Moisture that falls to the earth may run off the surface or soak into the ground. Much of it becomes part of streams, which flow into larger bodies of water from which evaporation takes place. Plants and animals utilize water, but also give off water vapor to the air – plant water vapor is known as transpiration. Water molecules may thus be involved in evaporation, condensation, precipitation and run-off in a continuous cycle.

Water Cycle Vocabulary:

- Sun — Heat from the sun warms water from oceans, lakes, rivers, and streams
- Evaporation — Heated water turns into vapor and rises
- Transpiration — Plants and trees take in water through their roots – some of it passes out through the pores in their leaves and evaporates into the air
- Condensation — When water vapor rises and cools, it become water droplets

- Clouds — Clouds are made of water droplets and ice crystals, depending on the temperature
- Precipitation — When water droplets collide and merge, rain, sleet, or hail falls
- Surface Run-off — Water that does not soak into soil moves toward oceans, lakes, rivers, and streams
- Infiltration — When water falls to Earth as precipitation, it soaks into the soil

Correlation to MA Science Frameworks:

Earth and Space Science

- Explain what makes up the weather in a particular place and time – recognize when to use a thermometer, barometer, rain gauge, and anemometer in weather situations - ESS 6
- Distinguish among the various forms of precipitation – rain, snow, sleet, and hail – ESS7
- Differentiate between weather and climate ESS 9
- Describe how water on earth cycles exists in different forms and in different locations, including underground and in the atmosphere – ESS 10
- Give examples how the cycling of water, both in and out of the atmosphere, has an effect on climate – water cycle – ESS 11

Physical Science

- Compare and contrast solids, liquids, and gases based on the basic properties of each of these states of matter – PS 2
- Describe how water can be changed from one state to another by adding or taking away heat – PS 3

Materials:

- 2 clear to liter soda bottles (plastic)– clean and dry
- potting soil
- 1 small leafy plant – approximately 3 to 4 inches high – preferably without flowers – you may purchase these plants at Home Depot/Lowe's
- scissors
- scotch tape (wide)

Procedure:

- Cut the top 3 inches off of one bottle (dome)
- Cut the bottom 4 to 5 inches off of the second bottle (base)
- Add 2 to 3 inches of potting soil in the base
- Plant a small plant into the potting soil
- Add 1- 2 capfuls of fresh water to the potted plant (soda bottle base)
- Turn the dome bottle over and into the base bottle – a capsule should result
- Tape the edges of the bottles together
- Place in sunlight

Observation:

- Evaporation (transpiration from the plant), condensation, precipitation will be visible in the sealed bottle; the water cycle process will be continuous.