I. **Lesson 2:**

A. A. EVAPORATION ACTIVITY

1. 1. Materials (for groups of 2-3 students)
    a) small dishes or jar lids (2 per group)
    b) tablespoons (1 per group)
    c) Water
    d) light source (sun or lamp/light) (1 per group)
    e) plastic wrap and or lids to cover dishes

B. 2. Discussion questions

1. a. Prior to the activity
    a) Where does the water go after it forms puddles on the pavement?
    b) Where does the water go from the clothes you put in the dryer?
    c) Ask students to predict what will happen to the water if it is left out overnight in an uncovered dish.
    d) Ask students what will happen if the dishes were covered.
2. b. After the activity
    a) Have students, on a sheet of paper answer these questions with a partner.
    b) Which dish evaporated faster?
    c) Where did the water go?
    d) How did the water evaporate?
3. c. Explain to the students that the process of water "going" into the air is called evaporation. Have students discuss with their partner what happens to water after it evaporates. Write some other examples of evaporation.
4. 3. Procedures
    a) Divide the class into pairs. Have each pair of students get two dishes. Put one tablespoon of water in each dish. Place one dish in the sunlight, or if the sun isn't shining, place the dish under a light source. Let students decide if they want to cover their dishes or leave them uncovered. Place the other dish in the shade. Have each pair of students observe and record what happens to the water.

II. **Lesson 3:**

A. B. CONDENSATION ACTIVITIES

1. 1. Materials (for groups of 2-3 students)
    a) A clean, clear 2 liter plastic bottle for every 3 students
    b) A box of wood matches for every 3 students
    c) A thermometer for every bottle (available at fish stores)
    d) An eye dropper or other container for water

B. 2. Discussion questions

1. a. Prior to the activities
    a) What makes air warm? What happens to warm air?

b) What makes air cold? What happens to cold air?
c) What are clouds? How are clouds made?
d) What 3 things are necessary to form clouds?
e) What is fog?

2. b. After the activities
    a) Have students answer this question in writing: In your own words explain what we did in these two activities. What do you know about the relationship between air temperature, air pressure, condensation, and the formation of clouds?

C. 3. Procedures
1. It is recommended that these activities be carried out over two class sessions. The first session is part 1 and second session is part 2.
2. **Session 1:** Temperature changes in a closed pop bottle
    a) Tell students that they will work in groups of 3.
    b) Each group will have:
        (1) 1 clear plastic bottle with cap
        (2) 1 temperature strip
        (3) 1 strip of tape
        (4) 1 Box of Matches
        (5) 1 paper on which to record their data
    c) The first step :
        (1) Tape the temperature strip into the bottle so that you can read it. Then screw the bottle cap on tightly. Lay the bottle on its side so you can easily read the temperature strip.
        (2) Read and record the temperature of the air inside the bottle. Then use both hands to squeeze the bottle as hard as you can. After about 1 minute read the strip. Then stop squeezing and read the temperature strip after about 1 minute.
        (3) What happened the temperature when you squeezed the bottle.
        (4) What happened to the temperature when you stopped squeezing the bottle?
3. **Session 2:** Making a cloud-in-a-bottle
    a) Open the bottle and pour in a few drops of water. Screw the bottle cap on tightly. Swirl the water around the inside of the bottle so that most of the inside of the bottle is wet. Squeeze the bottle and observe the temperature again. What happened?
    b) Lay the bottle on it's side, open the bottle, and push down to flatten the bottle to about 1/2 it's normal size. Have someone light a match, blow it out, and put the match into the bottle while it is still smoldering. Quickly release the sides of the bottle and put the

cap on tightly. Now squeeze the bottle as before very tightly for about 1 minute. Quickly let it pop open.

c) What happens? Hopefully, you should be able to see a cloud. In this experiment you saw water molecules condense into a cloud in the bottle. When you squeezed the bottle the air pressure in the bottle increased which raised the temperature. The warmer air caused the water in the bottle to evaporate (it became water vapor) and you could not see it. When you let the bottle pop out the air pressure in the bottle was lowered and so was the temperature. This caused the water molecules to condense into a cloud

III. <u>Lesson 4:</u>

A. C. Precipitation Activity

1. 1. Materials
    a) A heat source to boil water
    b) A pot in which to boil water
    c) A Pyrex or other container with a handle
    d) Ice cubes
    e) A pie pan or other container

B. 2. Discussion questions

1. a. Prior to the activity
    a) What is rain? How does rain happen? What is snow? How does snow happen? What is hail? Ask students immediately before activity What do you think will happen to the bowl of ice, to the steam, to the bottom of the bowl?
    b) Tell the students they need to focus on these questions during the activity. What do you see happening on the bottom of the bowl? What do you see happening in the pie tin? How does the water get on the bowl? Are the water drops on the side of the bowl the same size? Why? Which drops are falling from the bowl? Why? Which drops look like rain? Which drops look like a cloud? How are the big drops formed?
2. b. After the activity On a sheet of paper answer these questions with a partner. What did you see happening on the bottom of the bowl? What do you see happening in the pie tin? How did the water get on the bowl? Were the water drops on the side of the bowl the same size? Why? Which drops were falling from the bowl? Why? Which drops looked like rain? Which drops looked like a cloud? How were the big drops formed?
    a) Explain that the small misty drops which have condensed onto the side of the bowl of ice represent a cloud. The winds in a cloud blow the small drops around so that they collide with one another. During these collisions, some drops will combine with others making bigger and bigger drops. When the drops become so large

that the upward motion of the air cannot keep them in the sky, the drops fall as precipitation. If the temperature is cold enough the drops will freeze as crystals, making snow. If the drops get together first and then freeze the precipitation will be hail.

C. 3. Procedures Set up this activity where students can gather around you and see what happens to the pot with ice in it and to the moisture that drips from the pot into the pie tin. Place a pot of water on the heat source until it comes to a boil. Fill the Pyrex pot with ice. Once the water is boiling, hold the bowl of ice over the steam. Place the pie tin so that the water which drips from the bottom of the bowl will collect in the tin. Continue to hold the pot of ice over the boiling water until all the students have had a clear view of what is happening on the surface of the pot with the ice.

D. D. WHERE DOES THE WATER GO WHEN IT HITS THE EARTH?
   1. . Paper and a writing tool
   2. 2. Discussion questions What kinds of precipitation are there? What happens to precipitation when it reaches the ground? How can water be stored?
   3. 3. Activity Make a list of all the places that water goes once it reaches the ground. Divide students into groups and have them make sketches or drawings as well as written descriptions of what happens to the water when it lands in these places. Have a class sharing and discussion about the answers generated.

E. E. SOIL MOISTURE AND RUNOFF
   1. 1. Materials for every 2 students
      a) About 100 ml (half cup) of each of a variety of soils
      b) A funnel
      c) Filter paper disks folded into cones, one for each soil type
      d) A graduated cylinder (or a teaspoon)
      e) A jar of water
      f) A tray or other container which will catch water
   2. 2. Discussion questions
      a) a. Prior to the activity
         (1) From where does ground water come?
         (2) What causes streams and rivers?
         (3) Do different types of soil hold different quantities of water?
         (4) Explain that the funnel is used to 'channel' the water once the soil has absorbed all it can hold.
      b) b. After the activity
         (1) On a sheet of paper answer these questions with a partner. How did you know the soil was saturated?
         (2) What happened to the water once the soil was saturated?
         (3) Where does water go after it runs to a stream? (List at least 2 possibilities.)

3. 3. Procedures
    a) Every 2 students will put a cone of filter paper in a funnel. Place 100 ml (about 1/2 cup) of dry soil in the funnel and tamp the soil gently. Pour 5 ml (about one teaspoon) of water onto the soil every 30 seconds until water appears at the bottom of the funnel. Repeat the experiment with the other soils and a new filter cone. Have students describe what process happens between the water and land to form streams.

IV. <u>Lesson 5:</u>

A. F. THE WHOLE WATER CYCLE

1. 1. Materials for terrarium activity
    a) Potting soil
    b) A package of seeds e.g. marigold or pea
    c) Container for pouring water.
    d) A plastic container e.g. small like you can get at the grocery for salad. (Check with your local water department they may have the materials for a terrarium they will give you.)
2. 2. Discussion questions
    a) a. Prior to building the terrarium
    b) How do all of the parts of the water cycle fit together?
    c) What would happen if one part was left out?
    d) b. After building the terrarium
    e) Observe what happens to the water in this closed container and help the students observe and describe the different parts of the water cycle they see in the terrarium.
    f) Keep track of your observations in a science journal. Each day look for the following things:
    g) What is the seed doing?
    h) On which parts of the terrarium do you see water?
    i) What new is happening in your terrarium today?

3.Procedures

I. Review the water cycle boogie and then have the students do it. Explain that each student will get to build or have their own terrarium to observe the water cycle. Provide each student with a small plastic container which can be covered tightly with either a clear lid or plastic wrap. Have each student put soil in the bottom, put a plant seed in the soil, and lightly water the soil. Cover the terrarium with the lid or plastic wrap and place in a location where it can get sunshine

http://www-k12.atmos.washington.edu/k12/pilot/water_cycle/teacherpage.html