

Terrific Terrariums

Dear Presenter,

This activity is 20 to 25 minute HANDS-ON lab presentation with approximately 24 ten year olds. You must do this activity at home BEFORE you attempt to lead the activity during the water festival.

As each new group of students arrive, introduce yourself, and let the teacher know this is a hands-on lab activity and you will need assistance from him/her. If you do not ask for assistance, the teacher will assume that YOU are the expert and they are the observer. Plan when you will ask the teacher for assistance. Do not hesitate to call the teacher by name and get him/her involved.

As each session begins, introduce yourself to the students. “Good morning, my name is.....and I work for.., I am a, or simply I am happy to be here today.” Then introduce the topic of the presentation. Each step of this presentation is explained in this packet. These are recommended guidelines and do not have to be followed exactly word for word. However, you may present this material just as written. Feel free to personalize the presentation to suit you.

Thank you for volunteering to present “Terrific Terrariums.” Have fun, enjoy yourself and we hope you will consider volunteering again next year.

Big Sioux Water Festival

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BACKGROUND

Background information is provided as a basic overview with both general and specific information. Share this information with the students throughout the activity.

Water is vital to all life as we know it. Water is the most common and most precious substance on earth. It covers approximately 70% of the earth's surface and for this reason earth is often called the water planet.

The three primary locations of earth's water are the surface (99.3%) under the ground (.62%) and the atmosphere (less than 1%) Salt water makes up 97.2% of the water on earth. Salt water is not useful for human consumption. Approximately 2% of the earth's water is trapped in the icecaps and glaciers. Water in solid form is not easily accessible. Only .66% is easily accessible fresh water.

Water on earth today has been here for millions of years. Because of the hydrologic cycle (water cycle), the earth's water is always in some state of motion. It is an endless circulation of water from the oceans to the atmosphere to the rivers and groundwater back to the oceans again.

The Hydrologic Cycle

Energy or heat is needed to evaporate water from lakes, rivers, soils or even plants. This evaporated water moves through the atmosphere as vapor and when it cools it falls to the earth as rain, snow or hail. Once it hits the surface of the earth it will take one or two paths: it runs off the soil into lakes and rivers or it soaks into the soil.

The water that ends up in oceans, lakes, and rivers is quickly heated by the sun and evaporates again. The water that soaks into the soil may have many different paths to follow before it is evaporated into the atmosphere again. Some stays near the surface as moisture for plants to use in growing. In the growing process, plants will give off water to the atmosphere. This is called transpiration. Water that does not stay near the surface in the soil will go downward into the earth filling the aquifers. Some water may stay deep within the earth and move around for many years before it makes its way to the surface again.

Because South Dakota has a dry climate, most of the water that falls as rain or snow is quickly evaporated back to the atmosphere from rivers, lakes, wetlands, soils or through crops, grasses and trees. Only a small amount of that water makes its way to the groundwater. Some of the groundwater eventually moves to rivers, wetlands or lakes where it evaporates. The great amount of energy available for evaporation compared to the amount of water available in south Dakota favors the evaporation part of the hydrologic cycle.

Because the earth is a water recycler, the amount of water on earth today is the same amount of water that was on earth millions of years ago. People do not "use up" water but merely use it and

pass it on. Over many years of using water, some of the water has been contaminated. This reduces the amount of fresh water suitable for human and animal use.

VOCABULARY TERMS: (Do not assume the students will know the meaning of the following words. You will probably have to explain them)

Aquifer	A large water source under the ground
Condensation	Water vapor becoming a liquid
Evaporation	Liquid becoming a gas
Groundwater	Water under the ground
Hydrologic	Relating to water
Percolation	Water moving downwards through openings in the soil - also known as infiltration
Precipitation	Rain, sleet, snow, or hail
Surface run off	Water that runs along the soil and goes into lakes and rivers
Transpiration	Direct transfer of water from leaves or plants or skins of animals into the atmosphere
Water vapor	water as a gas in the air

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MATERIALS LIST

(FOR 6 TERRARIUMS PER SESSION / 6 SESSION WITH 24 STUDENTS PER SESSION - A TOTAL OF 36 TERRARIUMS)

CONSUMABLES

- Plastic terrarium containers (36)
- 2 inch plants (2 plants per terrarium = 84 total plants)
- Sand (3/4 cup per terrarium = 27 cups or about 15 pounds of sand)
- Soil (2 cups per terrarium = 72 cups or about 2 - 5 gallon buckets of soil)
- Small mesquite chips (3/4 cup per terrarium = 27 cups)
- Plastic dinosaurs (2 per terrarium = 72 total)
- Paper towels
- Garbage can liner
- Water (about 1 gallon)
- Pencils
- Newspapers (to cover supply tables and work stations)
- Approximately 14 paper grocery sacks to store and mark class terrariums (2 per class)

NON-CONSUMABLES

- 6 large squeeze water bottles (one per table)
- 80 - 9 oz. cups
- 40 - 16 oz. cups
- 1 - clear 2-cup container (can be a 16 oz. plastic cup)
- 1 - 3 oz. cup
- Globe (optional)
- Poster-tak
- Rags
- Text folder of instructions
- Visuals (set of : 1 banner of hydrologic cycle and 1 poster of Terrific Terrariums cross section)
- Markers

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ROOM REQUIREMENTS

- An unadorned wall from which to display the banner and poster
- Close to a water source
- Tables for work stations
- Large garbage can
- 2 - 8' tables for supplies
- 1 - 6' or 8' table for demonstration supplies

PRE-PREPARATION:

Pre-preparation can include any or all of the following:

- Check supplies against supply list
- Order plants from a greenhouse or florist (specifically terrarium plants)
- Order or purchase terrarium containers (donut hole clear plastic containers with lids work best)
- Purchase dinosaurs, soil, sand and mesquite chips
- Photocopy 180 Terrific Terrarium student handouts
- Photocopy 6 Teacher answer keys
- Practice activity

PREPARATION: Approximately 1 hour to set up

Preparation on presentation day for 6 session with 24 - 30 students per session

- Display banner and poster where easily viewed by students
- Fill 36 - 9 oz. cups with sand
- Fill 36 - 9 oz. cups with mesquite chips
- Fill 36 - 16 oz. cups with soil
- Set up work stations. Each station will accommodate 3 - 6 students
- Cover supply, demonstration, and work station tables with newspapers

Each station will need:

- 1 cup of soil
- 1 cup of sand
- 2 plants
- 1 cup mesquite chips
- 2 dinosaurs
- 1 terrarium container
- 1 large squeeze bottle

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SAMPLE ROOM SET UP (PAGE 1)

VISUALS DISPLAYED AT FRONT OR SIDE OF ROOM
WHERE STUDENTS CAN EASILY VIEW

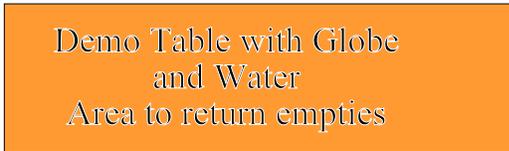
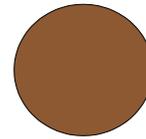


TABLE FOR PRESENTER MATERIALS



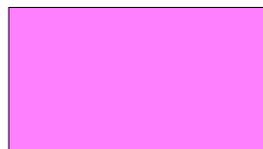
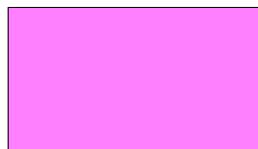
TABLE FOR SUPPLIES FOR EACH SESSION



LARGE LINED
GARBAGE CAN



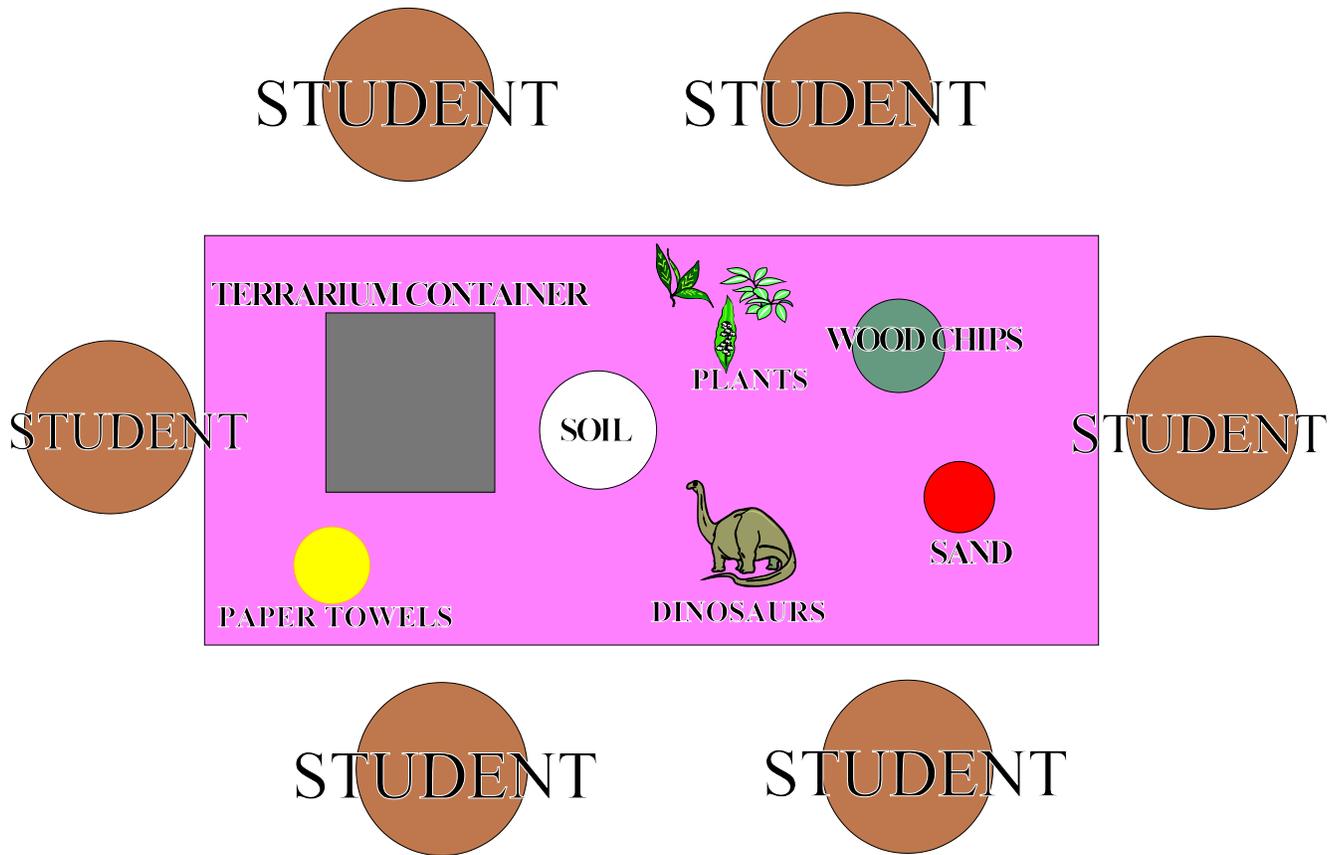
6 WORK STATIONS WITH 3-6 STUDENTS PER STATION



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SAMPLE ROOM SET UP (PAGE 2)

SAMPLE WORK STATION



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THIS IS A 20 - 25 MINUTE PRESENTATION

(Procedure note cards for this presentation are included)

This activity is a hands-on activity. To best explain and supervise this activity it is suggested that you do this activity prior to presenting it.

INTENDED STUDENT OUTCOMES

By completing this activity the students should be able to :

- Understand how little fresh water is available for human and animal consumption
- Understand water is recycled, not made
- Explain the hydrologic cycle
- Understand why a terrarium does not *need* to be watered

PROCEDURE:

1. Introduce yourself with enthusiasm to your students!

2. Break the class in **GROUPS of 4-6 students**. You may wish to ask the teacher to assist you with this step. (If the room set up is as suggested, this step will be done as the students enter)

THIS IS THE STEP THAT EXPLAINS THE QUANTITY AND LOCATION OF THE EARTH'S FRESH WATER

3. Have students look at the globe and guess how much of the earth is covered with water (70%). Review several examples of salt water resources and several examples of fresh water resources (Oceans and their names: Atlantic, Pacific, Indian, and Arctic. Rivers and their names: Nile - world's longest river, the D River in Oregon - world's shortest river, the Amazon River, the Mississippi River, local rivers. Lakes and their names: the Great Lakes: Erie, Huron, Ontario, Superior, and Michigan), local lake names). Some students may suggest sea names or local water bodies (ponds, streams, gulfs, etc.) Explain that 1% of the world's freshwater is drinkable and talk briefly about whether the students feel that the available freshwater is evenly distributed throughout the world.

THIS IS THE STEP THAT EXPLAINS THE HYDROLOGIC CYCLE

4. Use the visual to explain the hydrologic cycle. Explain each process using the background information provided earlier.

TERRARIUM CONSTRUCTION

5. Begin with one student placing sand in the bottom of the small container. Have student evenly distribute the sand. Explain the sand is needed for drainage of water away from the plant's root system to prevent rotting.

6. Have another student pour soil on top of the sand. Explain the plants will receive nutrients from the soil.

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7. Demonstrate how to remove plants from the small containers. Have one student at a time place each of the plants into the soil. Show students how to separate the roots and not to disturb the sand layer as they place the plants into the soil. You may need to ask the teacher for assistance during this step.
8. Have another student place the wood chips on top of the soil. Explain the wood chips act like a mulch helping to slow the evaporation step in the hydrologic cycle.
9. Have another student place the dinosaurs in the terrarium. Ask the student why you chose to place dinosaurs in the terrarium (they should respond that the dinosaurs used the same water that we use today).
10. Have another student carefully brush any dirt out of the edge of the bottom of the terrarium.
11. You put a small amount of water around each of the plants. Explain to students that condensation should appear on the sides of the terrarium if the water level is appropriate. Explain that once the “right” amount of water is on the inside of terrarium, the terrarium will water itself by recycling it’s own water. Place lid onto the terrarium.

CLEAN UP AND SET UP FOR NEXT SESSION

1. Replenish the work stations: Have each student bring an empty container to the supply table, stack carefully and pick up a full container. Student should return to work station with the new supplies and leave there for next class. Ask one student at each work station to bring the terrarium to the front of the class. This student will replace the dinosaurs and the terrarium container at the work station. Place 2 or 3 terrariums in a paper sack, then label with school and teacher’s name. Explain to teacher that her classes’ sacks will be at a central location to pick up before leaving for the day (central location can be at the check in point, or the lobby of the classroom’s building, etc.).
2. After the students have replaced the materials, thank them for participating, compliment them on their good behavior, distribute handouts and answer key to teacher.

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FINAL CLEAN UP AFTER LAST SESSION

Approximately 45 minutes

- Replace banner into storage tube
- Replace all Procedure cards and instructions in folder
- Save all plastic cups
- Empty and save all squeeze bottles
- Return left over supplies to bulk containers
- Store all items in large box
- Clean up all work surfaces
- Complete evaluation form