Atmosphere Investigation

Surface Temperature Data Sheet

* Required Field

School Name: _____ Study Site: _____

Observer names: _____

Date: Year_____ Month _____ Day _____ Universal Time (hour:min): _____

***Surface Temperature**

Site's Overall Surface Condition (Select One): ❑ Wet ❑ Dry ❑ Snow

Sample	Temperature Measurement (°C)	Snow Depth (mm) (*if snow selected above)
1		❑ zero ❑ Trace (<10 mm) ❑ Measureable (>10mm) _____ mm
2		❑ zero ❑ Trace (<10 mm) ❑ Measureable (>10mm) _____ mm
3		❑ zero ❑ Trace (<10 mm) ❑ Measureable (>10mm) _____ mm
4		❑ zero ❑ Trace (<10 mm) ❑ Measureable (>10mm) _____ mm
5		❑ zero ❑ Trace (<10 mm) ❑ Measureable (>10mm) _____ mm
6		❑ zero ❑ Trace (<10 mm) ❑ Measureable (>10mm) _____ mm
7		❑ zero ❑ Trace (<10 mm) ❑ Measureable (>10mm) _____ mm
8		❑ zero ❑ Trace (<10 mm) ❑ Measureable (>10mm) _____ mm
9		❑ zero ❑ Trace (<10 mm) ❑ Measureable (>10mm) _____ mm

Surface Air

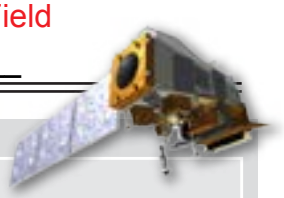
Comments: _____

_____

***Sky Conditions (next page):**

* Required Field

Study Site: _____ Date: _____ Time (UT): _____



1. What is in Your Sky?

Total Cloud/Contrail Cover:

- ○ Sky is Obscured →
- ○ None (Go to box 2)
- ○ Few(<10%)
- ○ Isolated (10-25%)
- ○ Scattered (25-50%)
- ○ Broken (50-90%)
- ○ Overcast (90-100%)

- ○ Fog
- ○ Heavy Rain
- ○ Heavy Snow
- ○ Blowing Snow
- ○ Sand
- ○ Spray
- ○ Smoke
- ○ Dust
- ○ Haze
- ○ Volcanic Ash

Go to box 6

*If you can observe sky color or visibility, complete box 2

2. Sky Color and Visibility

Color (Look Up): ○ Cannot Observe ○ Deep Blue ○ Blue ○ Light Blue ○ Pale Blue ○ Milky

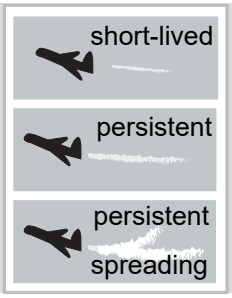
Visibility (Look Across): ○ Cannot Observe ○ Unusually Clear ○ Clear ○ Somewhat Hazy ○ Very Hazy ○ Extremely Hazy

3. High Level Clouds

○ No High Level Clouds Observed (Go to box 4)

Cloud Type:

- ○ Contrails (number of): → #
- ○ Cirrus #
- ○ Cirrocumulus #
- ○ Cirrostratus #



Cloud Cover:

- ○ Few (<10%)
- ○ Isolated (10%-25%)
- ○ Scattered (25%-50%)
- ○ Broken (50%-90%)
- ○ Overcast (>90%)

Visual Opacity:

- ○ Opaque
- ○ Translucent
- ○ Transparent

4. Mid Level Clouds

○ No Mid Level Clouds Observed (Go to box 5)

Cloud Type:

- ○ Altostratus
- ○ Altocumulus

Cloud Cover:

- ○ Few (<10%)
- ○ Isolated (10%-25%)
- ○ Scattered (25%-50%)
- ○ Broken (50%-90%)
- ○ Overcast (>90%)

Visual Opacity:

- ○ Opaque
- ○ Translucent
- ○ Transparent

5. Low Level Clouds

○ No Low Level Clouds Observed (Go to box 6)

Cloud Type:

- ○ Fog
- ○ Nimbostratus
- ○ Cumulonimbus
- ○ Stratus
- ○ Cumulus
- ○ Stratocumulus

Cloud Cover:

- ○ Few (<10%)
- ○ Isolated (10%-25%)
- ○ Scattered (25%-50%)
- ○ Broken (50%-90%)
- ○ Overcast (>90%)

Visual Opacity:

- ○ Opaque
- ○ Translucent
- ○ Transparent

6. Surface Conditions

Mandatory:

	Yes	No		Yes	No
Snow/Ice	○	○	Dry Ground	○	○
Standing Water	○	○	Leaves on Trees	○	○
Muddy	○	○	Raining/Snowing	○	○

Optional:
You may submit any or all

Temperature: ___°C
Barometric Pressure: ___mb
Relative Humidity: ___%

Comments: _____

Soil (Pedosphere) Investigation

Soil Moisture Data Sheet - Transect Pattern

* Required Field

Study Site: _____

Observer names: _____

Date samples collected: Year: _____ Month: _____ Day: _____

Local Time: ____:___ (Hours:Min) UT: ___:____ (Hours:Min)

Soil State: (check one) *

❒ Measureable ❒ Frozen ground ❒ Snow on ground ❒ Graupel on ground

❒ Hail on Ground ❒ Frozen water on ground

Note: If Measureable is selected, continue below; all other selections stop here.

_____

Drying method: (check one) ❒ 95-105˚ C oven ❒ 75-95˚ C oven ❒ other _____

Average drying time: Hours/minutes _____

Daily Metadata: (optional)

Length of Line: _____ m Compass Bearing: _____ Station Spacing: _____ m

Directions:

Transects should be 50 m long, located in an open field. Measurements are made 12 times/yr. during a regular interval of your choice. Enter the data for your samples collected between 0-5 cm (10 single samples plus 1 triple sample):

Observations:

				A	B	C	(A-B)/B-C)
Sample Number	Offset from end of Transect (m)	Container ID#	Container Volume (mL) *(Optional)*	Mass of wet soil and container (wet mass) (g)	Mass of dry soil and container (dry mass) (g)	Mass of empty container (g)	Soil Water Content (from calculations) (g/g)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							

Preparation

Part 1:

- Read the Elementary GLOBE book *All About Earth: Our World on Stage* – either read it to the class or have students read it to themselves. The book can be downloaded from www.globe.gov/elementaryglobe.
- Make two wall charts titled: "What do plants need to live?" and "What do we want to learn?"

Part 2:

- Make a copy of the *Earth System in a Bottle Recipe Card* for each student or group of students. Optional: laminate the recipe cards so they won't get wet during this activity.

Part 3:

- Make copies of *Earth System in a Bottle Student Activity Sheet* so that each group has a blank sheet for each observation they make. Make a folder for each group. Another option is to make smaller photocopies of the activity sheet so you can fit two sets of the sheet on each piece of paper (using landscape formatting).
- Prepare the soda bottles by cutting them as shown in Figure 1.

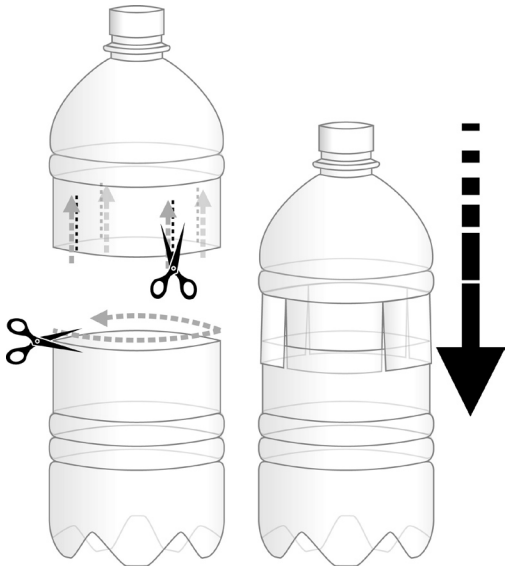


Figure 1: Cut bottle in half and cut vertical slits as shown. Slide top over bottom of bottle, pushing alternate flaps to the inside.

- Prepare stations at which student groups can plant their terrariums.
- Plant one terrarium ahead of time to determine the correct ratio of soil to water. The amount of water needed to thoroughly moisten about 3 cups of soil will vary depending on the type of soil available locally and on the initial moisture content of the soil.
- Spread some of the soil in a large tray, baking sheet or on newspaper and set it to dry out (preferably in a sunny window) for two days. This soil will be used in the "No water" treatment.

Part 4:

- No preparation necessary.

Teacher's Notes

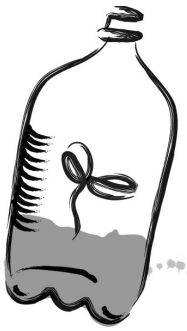
In this activity students will plant some control terrariums that have all the elements a plant needs to grow (soil, water, light) and other experimental terrariums that lack one of these elements. They will monitor their terrariums closely to gather data on what plants need to grow.

Science background:
Plants need the following things in order to grow: Soil, Water, Light and Air (oxygen and carbon dioxide).

Soil:
Plants need soil to anchor their roots. They also absorb through their roots necessary minerals dissolved in the water contained in soil.

Water:
Like all living things, plants need water to survive. Plants need water to soften the seed coat - a process that begins germination - and to maintain all their life functions. Water evaporates from the surface of plant leaves in a process known as "transpiration." This evaporation provides the force that allows the roots to draw water up from the soil. Transpiration also cools the plant, just as the evaporation of sweat from our skin surface cools us! Transpiration accounts for 10% of all water contributed to the atmosphere in the form of water vapor.

Earth System in a Bottle Recipe Card



Earth System in a Bottle Recipe

Each group will make two terrariums. All groups will make a terrarium that has all of the parts of the Earth's systems. Then each group will make a second terrarium that is missing one part of the Earth's systems.

Earth System in a Bottle

1. Put about **three cups of soil** in the bottom section of the terrarium and pat the soil gently until it is fairly firm.

2. Add about a **quarter cup of water** and look at the soil from the side to make sure that all of the soil gets wet. If there's still dry soil, add more water.

3. Drop **4-5 radish seeds** onto the surface of the soil. Use your fingertip to push the seeds just below the soil surface. Sprinkle a little more soil on top of the seeds just to cover them.

4. Place the top section of the terrarium on top, pushing alternate flaps to the inside and outside so that it fits securely. Make sure the lip/top is still on the bottle.

5. Tape the top and bottom sections together to create an airtight seal.

6. Label the terrarium with your groups' names and place it on a sunny windowsill (or under a grow light if you have one).

Experiments

Student groups: check with your teacher to decide which of the three experiments below you are doing.

No light

To darken the terrarium, wrap it with a **sheet of foil** large enough to go around the bottle twice. Crimp the foil securely shut over the top and bottom of the bottle.

No soil

Instead of soil, place a thoroughly **moistened paper towel** in the bottle, folded to fit into the bottom section.

No water

Follow the planting directions above except **omit the water**. Be sure to use previously dried soil.

NAME:_____

Earth System in a Bottle Student Activity Sheet

Date: _____

This terrarium included:

- ☐ Light
- ☐ Soil
- ☐ Water
- ☐ Seeds/plants
- ☐ Air

Draw what you see in this terrarium.

Write about what you see in this terrarium.

_____

_____

_____