

Lesson Plan: Bahamian Terrariums

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Narrative: *The following lesson plan will focus on Bahamian ecology through classroom presentations, online research, hands-on terrarium building, and student presentations. The number of students being reached in the following activities will be around 125. Each class will have roughly 25 students. They will be introduced to Bahamian biotic and abiotic factors through introductory PowerPoint presentations prepared in the Bahamas by Earthwatch staff and altered by the classroom teacher. Next, the students will be put into groups of 3-4 and come up with a plan for each level of their 3-part terrarium. The different levels will have various abiotic and biotic elements that will mirror a Bahamian ecosystem. Students can get ideas for their Bahamian ecosystem from the PowerPoint notes as well as conducting research online for native species. Each student will be required to bring in 2-3 items for the terrarium construction. Then, two days will be allotted for students to build and place biotic and abiotic factors into their terrariums. The final day will be student presentations, where groups will explain how their terrariums are similar to Bahamian ecosystems.*

Lesson Title	Bahamian Terrariums
Grade Level	6 th grade
Content Area	Science
Time Allowed	5 class periods (50 minutes each)
	<ul style="list-style-type: none"> • Day 1: PowerPoint presentation on Bahamian biotic and abiotic factors and project description • Day 2: Group organization, research and planning • Day 3: Terrarium Construction • Day 4: Terrarium Construction • Day 5: Group Presentations
Academic Standards	6.6. Broad Concept: Sources of materials differ in amounts, distribution, usefulness, and the time required for their formation.
Abstract	As a basis for understanding this concept, 4. Explain that the atmosphere and the oceans have a limited capacity to absorb wastes and recycle materials naturally. Students should have previous knowledge about ecosystems both aquatic and terrestrial. They should also have a brief introduction on biotic and abiotic factors

	and how these factors work together in an ecosystem. At the conclusion of the unit, students should be able explain and understand how systems can be limited in their capacity to absorb wastes and recycle materials naturally. In addition, students should learn about the ecology of the Bahamas and how their terrarium compares to one of the island systems.
Goal	Students will be able to: <ul style="list-style-type: none"> • Gain an understanding of Bahamian ecosystems • Construct a model ecosystem and understand how biotic and abiotic factors work together • Work together as team to plan, research, organize, construct and present terrariums
Performance indicators	<p>Final Terrarium Includes</p> <ul style="list-style-type: none"> • 3 different levels – 1 aquatic and 2 terrestrial with abiotic and biotic factors parallel to Bahamian ecosystem • Journal of observations • Directions followed and proper team work procedures followed <p>Presentation Includes</p> <ul style="list-style-type: none"> • Clear explanation for students and teacher • Comparison with Bahamian ecosystems • Clear and enthusiastic presentation
Background Information	Students will need to have knowledge about terrariums, biotic and abiotic factors and systems.
Materials	<ul style="list-style-type: none"> • Bahamian abiotic and biotic PowerPoint • Terrarium planning, organizing and construction sheets/rubric • 3x2 Liter bottles for each group • Scissors (razor blade for teacher) • Permanent markers • Sand • Hermit Crab (student optional)

	<ul style="list-style-type: none"> • Dirt/Soil • Rocks • Coral (teacher may supply) • Shells • Grasses • Plants (similar to Bahamas) • Water • Additional abiotic/biotic factors that could be found in Bahamian ecosystems • Journals or paper • Pen/pencil
Technology	<ul style="list-style-type: none"> • Smartboard and/or projector and computer to show PowerPoint • Additional computers with internet for additional research
Instructional Procedure	<ol style="list-style-type: none"> 1) Students should have introduction to systems (ecosystems), <ol style="list-style-type: none"> a) abiotic and biotic factors and how each works together b) how wastes can affect systems and the importance of recycling and carrying capacity. 2) Bahamian Ecosystem PowerPoint Presentation <ol style="list-style-type: none"> a) Pictures and explanation of wildlife b) Pictures and explanation about physical environment c) Pictures and explanation about affects of tourism other global factors on wastes d) How you can help – Coastal Ecology Project/Earthwatch in general 3) Project Description and Group Work <ol style="list-style-type: none"> a) Put students into groups of 3-4 b) Distribute and read through project directions and expectations c) Each group assigns each member a group role d) Student planning for terrarium construction (each student brings items for project) e) Homework: students do additional research about Bahamian

	<p>ecosystems</p> <p>f) Group members begin terrarium construction</p> <p>g) Ongoing journal observations and reflection on Bahamian ecosystems, terrarium, and group cooperation</p> <p>h) Group presentation about terrarium and comparison to Bahamas</p> <p>i) Additional suggestions/brainstorming on how we could help the Bahamas or other ecosystems (like ours!) – conservation efforts</p>
Assessment	Following presentations, terrariums and journals will be submitted and graded for creativity and accuracy to Bahamian ecosystems. Teamwork and student roles within groups will also be evaluated and configured into the total grade.
Connection to other Content Areas	<p>English – students will keep a journal of their observations about their own terrariums and how each compares and contrasts with the Bahamas. In addition, during presentations, students will verbally explain these findings.</p> <p>Social Studies – an extension activity could have students research the affect of the changing Bahamian environment on the lives of the Bahamian people.</p>
Acknowledgements	Elyse Lerum – fellow teacher at Alice Deal Middle School (help with terrarium construction lesson plan), Kathleen Sullivan Sealy (altered PowerPoint presentations)

Handouts to be used in Bahamian terrarium lesson plan are attached to email.

Ecosystem Planning Guide

Group Name _____
 Pd _____

Architect _____

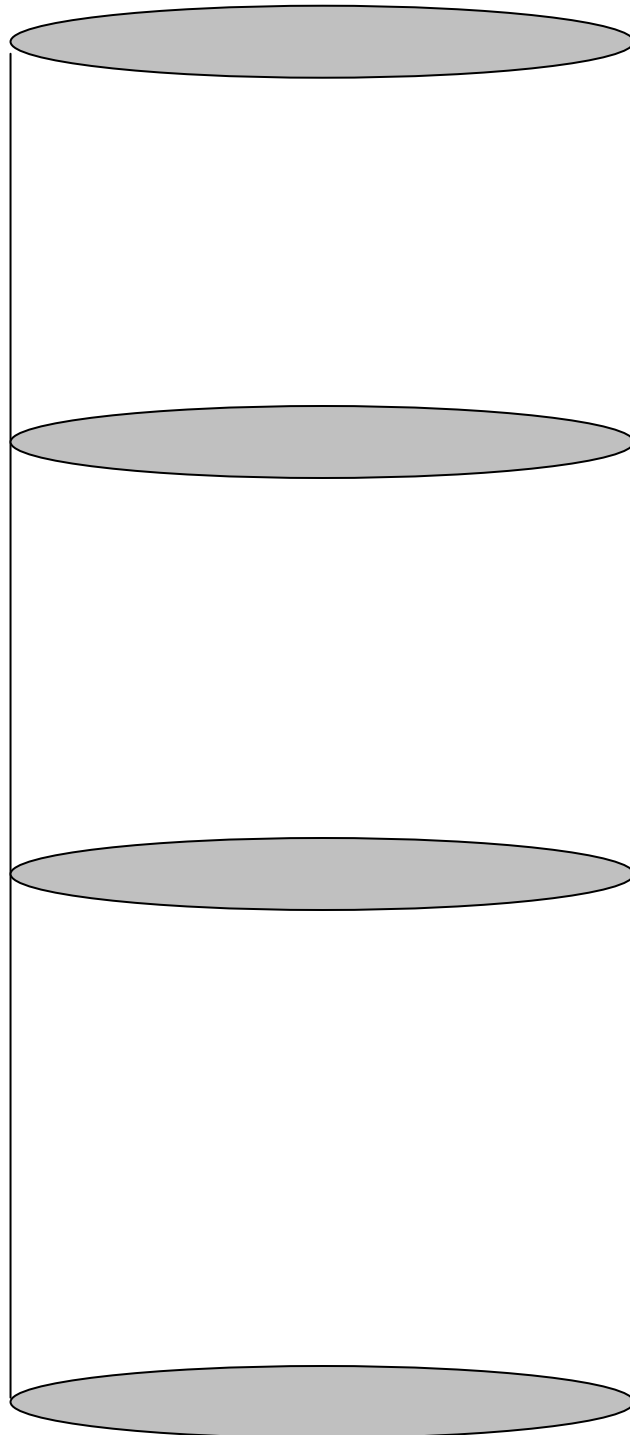
Builder _____

Materials _____

Manager _____

Leader _____

Sketch / Plan

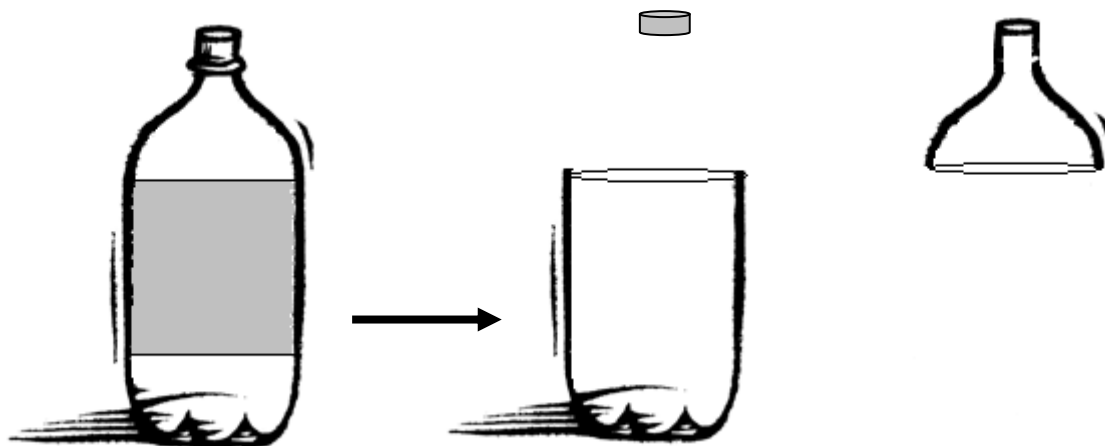


Items Needed / Notes

Top level - terrestrial highland	
Item	Responsible
Middle level - terrestrial lowland	
Item	Responsible
Lower level - aquatic	
Item	Responsible

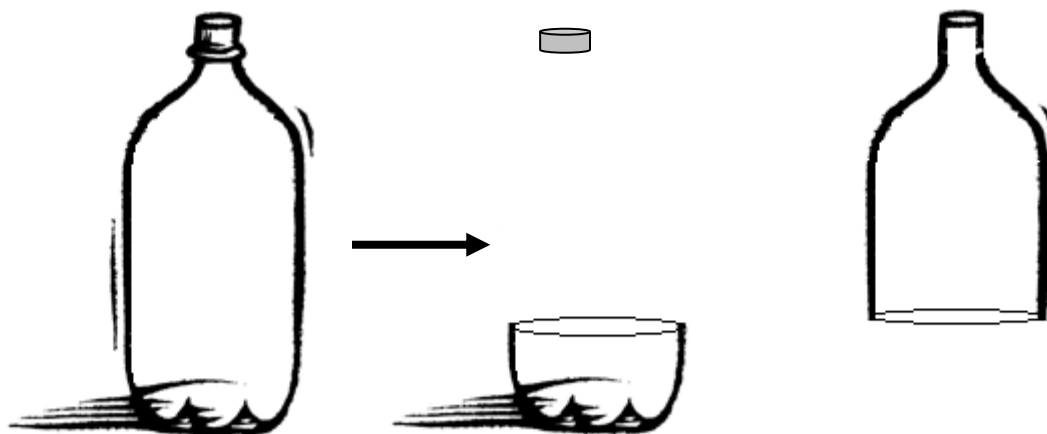
Construction Plan - do not write on this sheet!

Bottle A



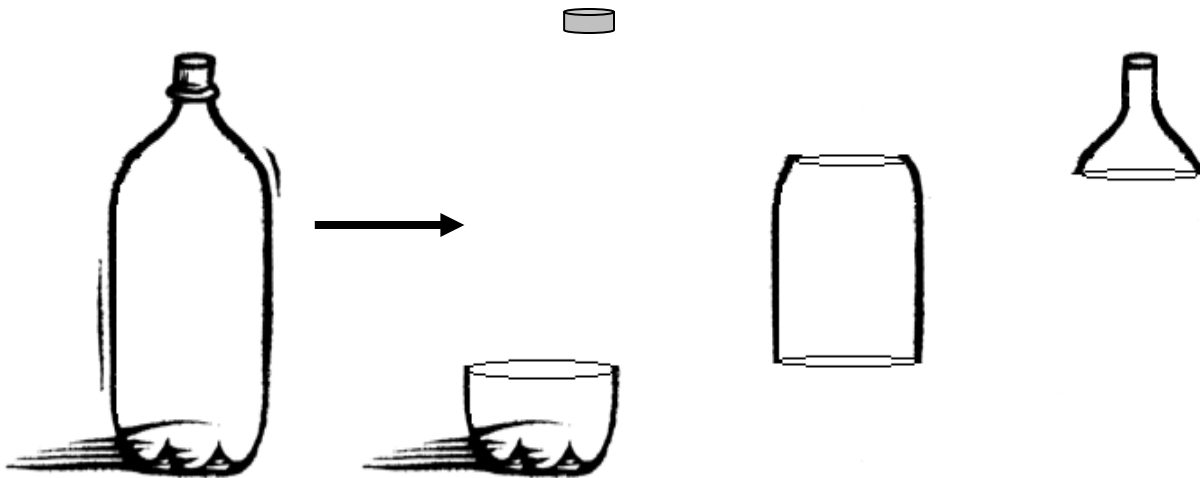
1. With the label on the bottle, make a slit along the top edge of the label.
 2. Using the scissors, cut along the top edge of the label.
 3. Only after cutting, remove the label from the bottle and discard.
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Bottle B



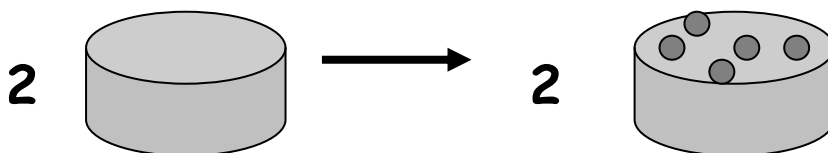
1. Make a slit along the ridge on the bottom of the bottle. (The ridge runs along where the label is/would be)
2. Using the scissors cut along that ridge. If there is a label, remove and it.

Bottle C



1. Place the inverted cup over the top of the bottle. Trace a ring along the lower edge of the cup.
 2. Make a slit along the marked ring on the top of the bottle. Also make a slit along the bottom ridge of the bottle. (The ridge runs along the bottom of where the label is/would be)
 3. Using the scissors cut along the ridge (bottom) and the ring (top).
For bottles with a label, remove it after cutting.
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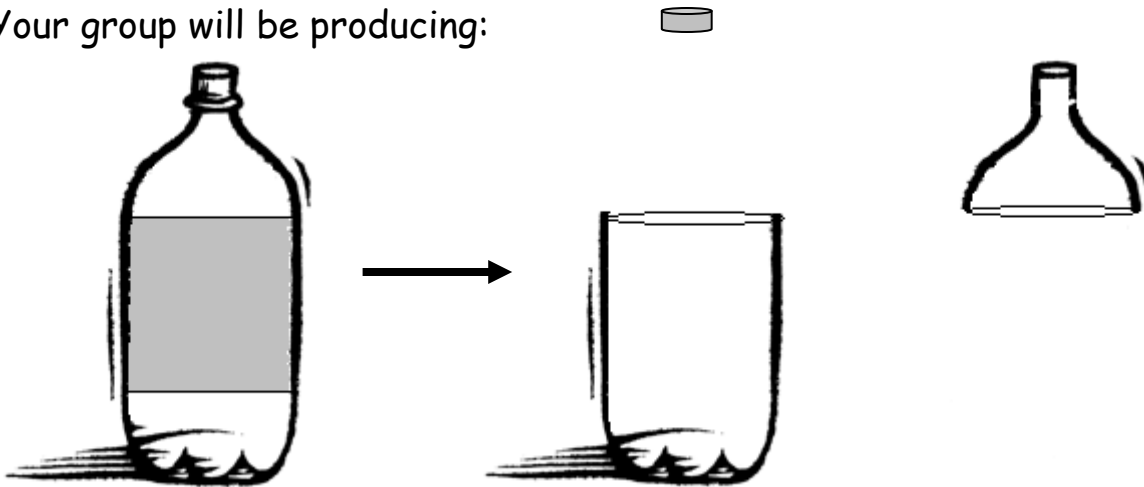
Caps



1. Put on goggles.
2. Remove the plastic insert on the underside of the caps with holes.
3. Place the cap right-side-up on a board on the floor. Using the hammer and a nail, make 5 holes in each of 2 caps.

Group A

Your group will be producing:



The materials you will need:

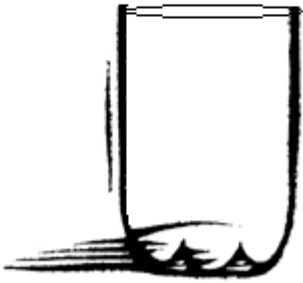
- 1 razor blade
- 3 pairs of scissors
- bottles WITH labels

Your instructions:

4. With the label on the bottle, have the group member using the razor blade make a slit along the top edge of the label.
5. Have a group member using the scissors cut along the top edge of the label.
6. Only after cutting, remove the label from the bottle.
7. Discard the label.
8. Have a runner take your caps to **Group D** and your finished components to **Storage A**.

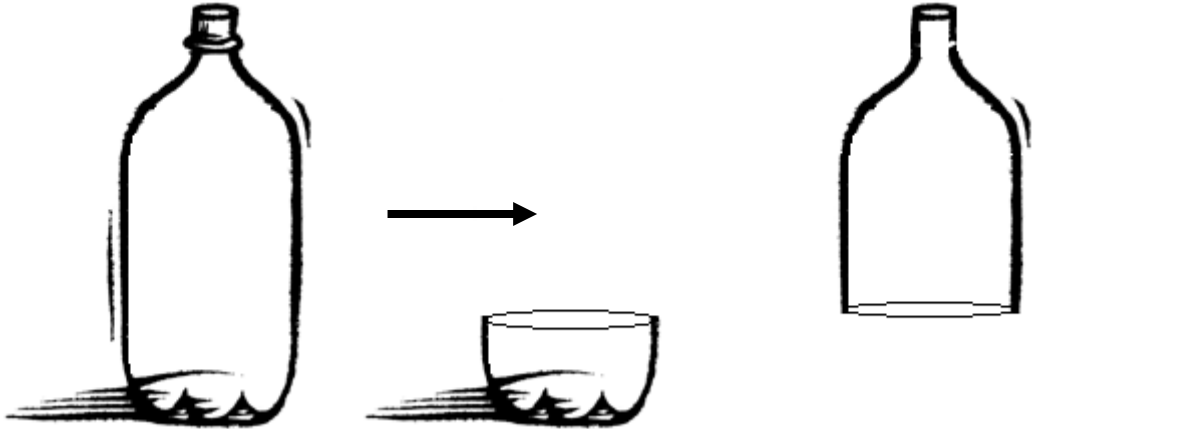
Clean-up: Have a runner take all your finished products. Place all of your materials listed above back into your group's tray except the razor blade. Return the razor blade directly to your teacher. Use a paper towel to clean your work area.

Storage A



Group B

Your group will be producing:



The materials you will need:

- 1 razor blade
- 3 pairs of scissors
- bottles with or without labels

Your instructions:

3. Have the group member using the razor blade make a slit along the ridge on the bottom of the bottle. (The ridge runs along the bottom of where the label is/would be)
4. Have a group member using the scissors cut along that ridge.
5. For bottles with a label, remove it after cutting.
6. Have a runner take your caps to **Group E**, your finished components to **Storage B**, and your bottom sections to the recycling area.

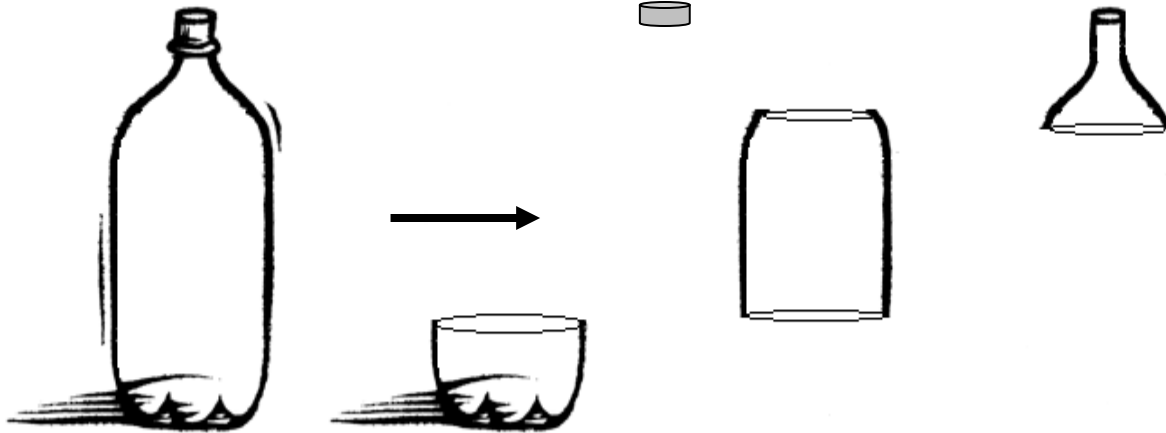
Clean-up: Have a runner take all your finished products. Place all of your materials listed above back into your group's tray except the razor blade. Return the razor blade directly to your teacher. Use a paper towel to clean your work area.

Storage B



Group C

Your group will be producing:



The materials you will need:

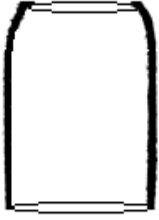
- 1 razor blade
- 2 pairs of scissors
- bottles with or without labels
- marking pen
- template cup

Your instructions:

4. Have one group member place the inverted cup over the top of the bottle. Trace a ring along the lower edge of the cup.
5. Have the group member using the razor blade make a slit along the marked ring on the top of the bottle. Also make a slit along the bottom ridge of the bottle. (The ridge runs along the bottom of where the label is/would be)
6. Have a group member using the scissors cut along that ridge and the ring at the top of the bottle.
7. For bottles with a label, remove it after cutting.
8. Have a runner take your caps to **Group G**, your finished components to **Storage C**, and your bottoms to the recycling area.

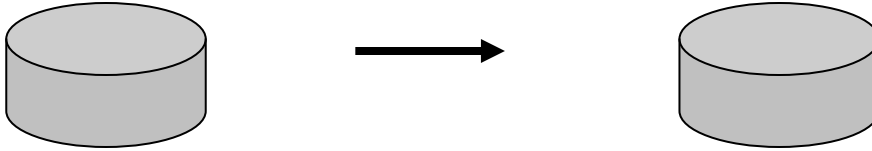
Clean-up: Have a runner take all your finished products. Place all of your materials listed above back into your group's tray except the razor blade. Return the razor blade directly to your teacher. Use a paper towel to clean your work area.

Storage C



Group D & E

Your group will be producing:



The materials you will need:

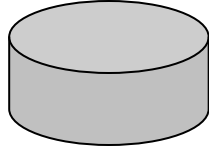
- 2 marking pens
- 2 hammers
- cardboard
- 2 nails

Your instructions:

1. You will receive the caps from a runner.
2. Upon receiving the caps, have a group member using a marking pen mark the 9 holes to be driven into the cap. This group member should remove the plastic lining from the inner part of the cap as well.
3. After the holes have been marked, have a group member using the hammer create the nine marked holes.
4. Have a runner take your finished caps to **Storage D & E**.

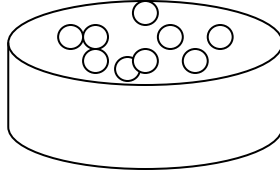
Clean-up: Have a runner take all your finished products. Place all of your materials listed above back into your group's tray except the nails. Return the nails directly to your teacher.

Storage D & E



Group G

Your group will be producing:



The materials you will need:

- seeds of multiple varieties

Your instructions:

1. You will receive the caps from a runner.
2. Upon receiving the caps, fill each of the caps with the following:

_____ squash seeds

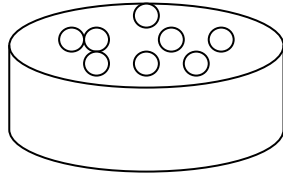
_____ herb seeds

_____ beans & peas

3. After the caps have been filled, have a runner move the caps to **Storage G**.

Clean-up: Have a runner take all your finished products. Place all of your materials listed above back into your group's tray.

Storage G



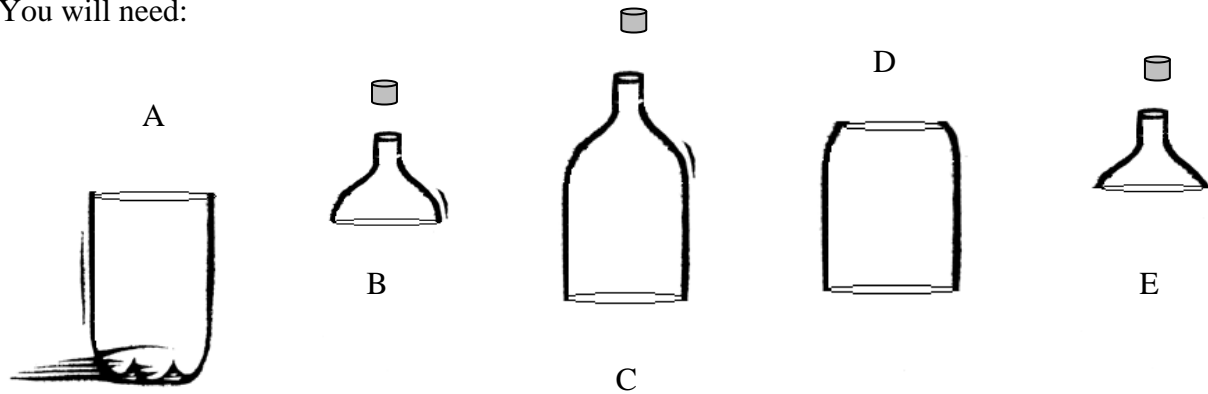
Group F

As members of Group F you are runners. You are the only students authorized to be moving around the classroom. You will distribute bottles to groups from the appropriate starting locations so they can begin their work. You will act similarly to waiters moving materials from one group to another as the need arises. You should be alert to every group's need. As groups produce products, you should move carefully around the classroom to collect and store those products in their appropriate places. You may also receive special instructions from your teacher. Ask if any questions arise.

**** Do Not Write On This Sheet ** Do Not Write On This Sheet ****

Assembling Your Ecosystem

You will need:



Step 1. Creating your aquatic ecosystem.

1. Put any biotic and abiotic factors for your aquatic ecosystem into **Part A**.
2. Place a cap with holes onto **Part B**.
3. Turn **Part B** upside-down and place it onto your aquatic ecosystem, lining up the cut edges of **Parts A & B**.
4. Staple the two edges together in at least 4 different places.

Step 2. Assemble your first terrestrial ecosystem.

1. Place your biotic and abiotic factors of choice for your first terrestrial ecosystem into **Part B**.
2. Slide **Part C** onto the top of **Parts A & B**. **Part C** should fit onto the *outside* of the others and should fit snugly.
3. Place a cap with holes over the top of **Part C**.

Step 3. Assemble your second terrestrial ecosystem.

1. Slide **Part D** over the top of **Part C**. This should fit snugly as well.
2. Tape around the bottom edge of **Part D** to keep anything from leaking out.
3. Place the abiotic and biotic factors you have chosen for your second terrestrial ecosystem into the area between **Parts C & D**.
4. Put a cap *without* holes over the mouth of **Part E**. Invert **Part E** and place it over the top of **Part D**.

Congratulations! Your ecosystem is complete!