**Activity Overview**

In preparation for their visit to the Desert Botanical Garden, students will first examine the concept of the life cycle using the common butterfly as an example. Students will then play a game in which they become part of the life cycle of a certain plant or animal and must find the other students who represent different stages of the same life cycle. Following a discussion about investigations, students will be introduced to three plants and animals they will be investigating during their visit to the Desert Botanical Garden. Based on their discussion, they will develop questions which may be answered during their field trip.

To support the Inquiry in the Garden lesson plans, you may also use the tutorials and Virtual Habitat in DBG’s Digital Desert. These interactive activities will prepare students for their investigations by teaching them about the characteristics of deserts and the Sonoran Desert habitat.

**Materials**

(Original: All of the following materials are provided as downloadable graphics.)

- Life Cycle Stages Example Cards:
  - Butterfly Life Cycle Stages
  - Red Spotted Toad Life Cycle Stages
  - Gambel’s Quail Life Cycle Stages
  - Mesquite Tree Life Cycle Stages
  - Desert Cottontail Life Cycle Stages

- Pictures of the following plants and animal:
  - Cactus Wren
  - Agave
  - Saguaro Cactus

*continued*
Learning Objectives

Upon completion of this activity, students will be able to...

- list and describe the primary stages in the cycle of life.
- describe the life cycles of the butterfly, Gambel’s quail, red spotted toad, and mesquite tree.
- describe at least two ways to conduct an investigation.
- identify and name a cactus wren, agave, and saguaro.

Background Knowledge:

These are concepts the educator should understand and can be found in the glossary.

<table>
<thead>
<tr>
<th>Decompose</th>
<th>Lifecycle</th>
<th>Metamorphosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pups</td>
<td>Vegetative reproduction</td>
<td></td>
</tr>
</tbody>
</table>

Activity Procedures

1. Introduction.

Explain to students that they will be visiting the Desert Botanical Garden where they will be seeing some very interesting desert plants. Remind them that often where there are lots of plants, there are lots of animals, too! During their field trip, they will be “detectives” as they investigate the life cycles of some very interesting desert plants and animals. This class lesson will help them prepare for that field trip.

2. Review characteristics of a desert.

Point out that the Botanical Garden is called the Desert Botanical Garden because it is located in the desert and focuses on desert plants. Ask students if they know the name of the desert in which the Garden is located? “The Sonoran Desert! Ask students if anyone can describe a desert. What makes a desert a desert? Help students understand that a desert is typically hot and dry and has very little rainfall.

continued…
Activity Procedures

3. Discuss life cycles.
   Since the trip will be focusing on life cycles, ask students:
   
   What is the life cycle?

   Who (or what) has a life cycle?

   Why is it called a “life cycle?”

   Can someone give an example of a life cycle?

   Entertain answers to the life cycle questions and lead a discussion based on students’ answers. Some points to make in the discussion include:

   The life cycle describes the different stages of life including birth (live or as an egg), childhood, adulthood, and reproduction (a new birth).

   It is called the life “cycle” because it has no beginning and no end (cycle = circle).

   It is also called a cycle because it repeats itself.

   Although death is part of the life cycle, it is the reproductive stage that keeps the cycle going.

   Even in death, the cycle continues as living things decompose and return to the earth as soil.

4. Review the Life Cycle of a Butterfly
   Reiterate that a life cycle has no beginning and no end. The life cycle does have an order however. As an example, ask students if they can list the order of the life cycle of a butterfly. Help students come up with the stages of egg, larva, pupa, and butterfly (if necessary use the Example Cards as hints). As students respond correctly, hand out a Butterfly Life Cycle Stages Example Card to the first student who stated the stage on the card. Have the four students with the cards come to the front of the class and hold up their cards. Ask them to get in the correct order of the butterfly’s life cycle. Students will most likely stand in a line to show the order. If they do, remind them that it is a life cycle so how might they stand to demonstrate that? If they do not do so on their own, help students to stand in a circle in the correct order of egg, larva, cocoon, butterfly, and egg again. Once again point out that the circle shows that there is no beginning and no end.

   continued...
5. More Plant and Animal Life Cycles

Have the first four students sit down then ask the class if they think they can figure out some other plant or animal life cycles. Bring out the other Life Cycle Stages Example Card (Gambel’s quail, mesquite, desert cottontail, and red spotted toad) and call on 14 volunteers. Randomly hand out the Example Cards to the student volunteers. Tell them that they each have a life cycle stage of a particular animal or plant. For the activity, they should walk around the room and group together with others in the life cycle of their particular plant or animal. When they have found all the other stages of their life cycle, they should stand together in the correct order (again in a circle).

6. Discuss the Example Life Cycles

Give students time to find and group with the others in their life cycle. If necessary, they may ask for help from the other students in the class. Once students have found their groups and are in their circles, review each life cycle and discuss the stages. Discuss the similarities and differences of the different life cycles. Involve the entire class in the discussion. You may also explain that these are real plants and animals that live in the Sonoran Desert and like all plants and animals, they have life cycles. The groups and stages are as follows:

- Mesquite tree – seed, seedling, tree, tree with seed pods, seed
- Red spotted toad – egg, tadpole, tadpole with legs, adult, egg
- Gambel’s quail – egg, chick, adult, egg
- Desert cottontail – newborn, young rabbit, adult rabbit, newborn

continued…
**Activity Procedures**

7. Prepare for your field trip investigation.

During your field trip, you will learn about the life cycles of several other desert plants and animals. Each of these has something special about its life cycle, and as a class, you will investigate each of these. First, ask students the following:

> What does it mean to investigate and how could we investigate a plant or animal at the Desert Botanical Garden?

Discuss student responses and help students to come up with the following:

> To investigate means to find the answer to a question through a system of inquiry or research.

> We can investigate the plants and animals by asking the guide good questions.

> We can read information in a book, online, or on signs at the Garden.

> We can investigate by observing the plant or animal in question.

> We can investigate by setting up an experiment to help us answer our questions.

Ask students what kinds of investigation might be most practical during their field trip. Help students understand that observing the specific plant or animal will be one of the best ways to answer their questions. Also simply asking their guide is encouraged. However, they should be sure to be prepared with good, clear questions to ask their guide. To prepare students for their investigation they will now look at a picture of each plant or animal, learn its name, and get a hint about what it is so different and special about it. The hint will help them prepare good questions to ask their guide and will also help them focus their observations.

continued…
8. **Cactus wren.**

Hold up the picture of the cactus wren and ask if anyone knows what kind of bird it is. Explain that this is one of the animals you will be learning about during your field trip -- and will likely see. Have everyone say its name and discuss its identifying features such as its color, markings, and size (about 7 – 9 inches long). Can students name the stages of a cactus wren’s life cycle? (egg, chick, adult, egg)

Given this bird’s name and what is seen in the picture, where might it be found? Near cactus! If you don’t see the actual bird however, you will definitely see a special sign of the bird, likely in a cactus. Ask students:

*What sign of a cactus wren do you think we might see in a cactus?*

Once students come up with the correct answer of “nests,” commend them and tell them that that is part of their hint for their investigation on their field trip. Here is the rest of the hint:

*Hint: There is something very different and special about cactus wrens’ nests.*

Ask students what they think might be so special about a cactus wren’s nest? As students respond, point out that you will just have to discover this during your field trip. As you all discussed before, how might they investigate the cactus wren? Remind students that as previously discussed, they should take time to observe the cactus wren and/or certain cacti during their visit to the DBG. They should also come up with some good questions to ask their guide. Ask students for examples of things they might look for or good questions they might ask. Help them come up with any or all of the following:

*Where do cactus wrens build their nests?*
*What do cactus wrens use in their nests?*
*Do cactus wrens build special kinds of nests?*
*What might we observe if we watched a cactus wren for a long time?*
*What’s special about a cactus wren’s nest?*

Ask students to remember their questions. In addition to making their own observations, they should be prepared to ask their guides their questions during the field trip.

*continued...*
Activity Procedures


Hold up the picture of the agave and ask if anyone knows what kind of plant it is. Again, explain that this is one of the plants they will see and learn about during their field trip. Have everyone say its name and discuss its identifying features such as the shape of its leaves, its growth form, and its tall stalk. Explain that they will see many different types of agaves but they will not all have the long stalk. Ask students:

*Does anyone know what the stalk is for?*

As students respond, commend the correct answer which is that the stalk is actually its flower stalk -- on top of the stalk are the plant’s flowers. It is part of the life cycle of the agave. Can students name the stages of an agave’s life cycle? As students respond to this question, their answers will likely be seed, seedling, adult plant, seed. Point out that that is just one of the agave’s life cycles! Yes! This is actually their hint for their investigation about agaves. Here is the rest of the hint:

*Hint: Agaves have three different types of life cycles.*

Tell students that their investigation will be about finding out the three types of life cycle of the agave. Again, how might they find this out? By observing agaves during their field trip and asking their guide good questions. Do students have some ideas about how these life cycles could be different? What are some things they might observe about agaves? What are some good questions to ask their guide? Help students come up with any or all of the following:

*Do all agaves look the same?*

*What is different about some agaves that might mean they have a different type of life cycle?*

*How do agaves reproduce?*

Ask students to remember their questions. In addition to making their own observations, they should be prepared to ask their guides their questions during the field trip.

continued…
Activity Procedures

10. Saguaro.

Hold up the picture of the saguaro and ask if anyone knows what kind of plant it is. Again, explain that this is one of the plants they will see and learn about during their field trip. Have everyone say its name and discuss its identifying features such as its growth form, spines, and appearance. Can students name the stages of the saguaro’s life cycle (seed, young plant, adult plant, seed)? This plant, unlike the agave, has just one type of life cycle but there is something very interesting about how it grows that you will be investigating. Here is your hint:

*Hint: There is a special “rule of thumb” about how saguaros grow.*

Tell students that their investigation will be about how saguaros grow. Somehow, this will be related to their thumb! Once again, ask student how they might find this out. Again discuss the importance of making observations and asking good questions of their guide. Help students come up with the following observations to make and/or questions to ask:

- *How tall do saguaros grow?*
- *How long do saguaros live?*
- *What do young saguaros look like?*
- *How old are saguaros when they start to grow arms?*

Again, ask students to remember their questions. In addition to making their own observations, they should be prepared to ask their guides their questions during the field trip.

11. Activity wrap-up.

Wrap up this activity by reviewing some of the life cycles learned. Once more, repeat the names of the plants and animal they will investigate during their field trip and ask students if they will be able to recognize them when they are at the Garden. Have students repeat some of the questions they came up with for their investigations and remind them to remember their questions so that they can make observations and ask their guides when they are on their field trip.
## RELATED ADE STANDARDS:

### LANGUAGE ARTS STRAND 3: LISTENING AND SPEAKING

<table>
<thead>
<tr>
<th>Concept</th>
<th>Performance Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3: Students effectively listen and speak in situations that serve different purposes and involve a variety of audiences.</td>
<td>LS-F1. Use effective vocabulary and logical organization to relate or summarize ideas, events and other information.</td>
</tr>
</tbody>
</table>

### SCIENCE STRAND 1: INQUIRY PROCESS

<table>
<thead>
<tr>
<th>Concept</th>
<th>Performance Objective</th>
</tr>
</thead>
</table>
| C1: Observations, Questions, and Hypotheses - Observe, ask questions, and make predictions. | PO 1. Formulate relevant questions about the properties of objects, organisms, and events in the environment. (See M02-S2C1-01)  
PO 2. Predict the results of an investigation (e.g., in animal life cycles, phases of matter, the water cycle). |

### STRAND 2: HISTORY AND NATURE OF SCIENCE

<table>
<thead>
<tr>
<th>Concept</th>
<th>Performance Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2: Nature of Scientific Knowledge - Understand how science is a process for generating knowledge.</td>
<td>PO 1. Identify components of familiar systems (e.g., organs of the digestive system, bicycle).</td>
</tr>
</tbody>
</table>

### SCIENCE STRAND 4: LIFE SCIENCE

<table>
<thead>
<tr>
<th>Concept</th>
<th>Performance Objective</th>
</tr>
</thead>
</table>
| C2: Life Cycles - Understand the life cycles of plants and animals. | PO 1. Describe the life cycles of various insects.  
PO 1. Describe the life cycles of various mammals.  
PO 1. Describe the life cycles of various organisms. |
Inquiry in the Garden
Desert Detectives
Inquiry in the Garden

Desert Detectives
Inquiry in the Garden

Desert Detectives
INQUIRY IN THE GARDEN

Desert Detectives
INQUIRY IN THE GARDEN

Desert Detectives
Inquiry in the Garden
Desert Detectives