

# Fourth Grade Life Science

## STRUCTURE AND FUNCTION: Internal and External

### **Background Information**

Plants and animals evolve to survive and reproduce in their environments. Both their internal and external structures will be well suited to support survival, growth, behavior and reproduction.

All animals have a mouth. Its function is to take in food, without which it could not survive to reproduce. The type of mouth, however, will vary between animals, depending on what they have evolved to eat. Internal organs of the digestive system will likewise vary depending on an animal's diet. All parts of the system for eating and digesting food must work together.

Plants also have internal systems for processing food and water. Although most of the "food" used by plants is produced in the leaves from air and light, many essential nutrients, like nitrogen, are brought in with water through the roots. A system of tubes, called the xylem, carry water from the roots up through the other structures of the plant, and finally to the leaves. A second system of tubes, called the phloem, carry sugars produced in the leaves down to all the other parts of the plant.

### **Performance Expectation: 4-LS1-1** From Molecules to Organisms: Structures and Processes

Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. <https://www.nextgenscience.org/pe/4-ls1-1-molecules-organisms-structures-and-processes>

### **Disciplinary Core Idea**

LS1.A: Structure and Function: Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

### **Science and Engineering Practices**

Constructing explanations for science: Identify the evidence that supports particular points in an explanation.

Engaging in argument from evidence: Construct an argument with evidence, data, and/or a model.

### **Crosscutting Concepts**

Structure and Function: Internal and external structures serve specific functions within plants and animals.

Systems and system models: A system can be described in terms of its components and their interactions.

### **Activity 1 - Animal Survival**

#### **Materials**

- Animal Survival PowerPoint
- Student Pages
- 1 pack of multi-color construction paper for the class
- Scissors
- Crayons, markers, or colored pencils
- Glue or transparent tape
- A few spinners (0 through 9) or ten-sided dice

## **Suggested Implementation**

Show students a picture of some natural environment that appears hostile to human life. A few examples are included in your resource folder.

Ask the class:

- *Could you survive in this environment?*
- *For how long?*
- *What might you want to bring to help you survive?*

Point out that humans can bring various tools to help them survive. Plants and animals, however, don't generally use tools. They must evolve behaviors and body structures that allow them to survive.

Help students find a partner. Pass out the Student Pages for Activity 1 – Animal Survival.

Ask for volunteers to read the introductory information and Problem statement from the Student Pages. Students can either chose a biome and time, or you can have them use a spinner or die to determine those factors randomly. They may be unfamiliar with some of the biomes. Having a few laptops or reference books available will allow them to discover what a taiga or tundra look like.

Using construction paper, students then create a 3D model of the environment as shown in the instructions. Depending on available time, you may allow them to get very detailed, or just stick with the basics.

Examples can be seen in the slideshow in your resource folder.

Finally, students are asked to imagine what an animal living in that environment might look like. What structures and behaviors would the animal need to survive? Students don't have to describe any real animals. Imaginary beasts are fine! In the next activity they will create one.

## **Activity 2 – Imagine an Animal**

### **Materials**

- Student Pages
- Animal Body sheet (1 per group)
- Heads and Tails sheet (1 per group)
- Digestive Organs sheet (1 per group)
- Transparent tape or glue sticks
- Scissors
- Markers, crayons, or colored pencils

## **Suggested Implementation**

Pass out the Student Pages for Activity 2 – Imagine an Animal.

Ask for volunteers to read the introductory information and Problem statement from the Student Pages.

Step 1 is just a review of what students did in the previous activity.

Each group gets one *Animal Body* sheet, one *Heads and Tails* sheet, and one *Digestive Organs* sheet.

Steps 2 through 9 explain how to select appropriate structures from which to assemble the imaginary animal.

### ***A note on reproduction:***

*The topic of reproduction can bring on blushing, giggling, or puzzlement very quickly. These are all perfectly reasonable reactions. In this activity, reproduction is simply the way two imaginary animals make their offspring (imaginary baby animals). The only part which students are asked to consider is step #1 – one animal getting the attention of another. The rest can remain a mystery, unless you want go further in your discussions. Of course, animals can't even get to step #1 unless they can survive in their environment. Anything which helps them survive while young also helps them reproduce once they become adults.*

Step 10 gives each student group an opportunity to present their animal and its environment to the class. They should describe the structures and behaviors of the animal and explain how they work together to help the animal survive and reproduce.

A slide show with examples of imaginary animals and their environments can be found in your resource folder.

## **Activity 3 – Inside Plants**

### **Materials**

- Student Pages
- 3 Stalks of Celery per group
- Red Food Coloring
- Hand Lenses
- Cups
- Water

## **Suggested Implementation**

Hand out student pages and ask for volunteers to read to introductory information and problem statement.

Give each group (of two or three students) one stalk of celery. Encourage them to make detailed observations of the exterior. Then suggest they break and pull it apart to look for interior structures.

Show students the cups, water, and food coloring and ask them to consider how these materials might be used to see and explore any structures inside the celery. Have them record a plan in writing or pictures for your approval. Only after you approve their plan should you let them begin. Allow students to proceed with any plan (even one that won't work) as long as it is safe.

Many students may already be aware of the way celery will draw colored water up from a cup. Even so, don't assume they know, and don't let-on that you know. Allow those who have never seen this to discover it themselves or by seeing another group do it. Don't stop the activity just by observing the fact. Have students dissect the colored celery to see in detail what structures are actually involved. Have them compare the results between groups and discuss why some celery drew in the colored water better than others.

Tips for Success:

- Fresh celery works best. Try to buy it the day before the activity.
- Buy celery with leaves still at the top.
- If you keep it overnight in your refrigerator, be sure it doesn't freeze. As water freezes, ice expands, rupturing the cell walls.
- Cut off the bottoms of the stalk on the morning you plan to use them.
- The water should have several drops of food coloring in it. Blue and red food coloring tend to create the best visual contrast in the celery.

## **Assessment**

The following single point rubric can be used to assess student understanding. For each of the four criteria listed below, either circle the proficient description or add notes to a box indicating why the student's performance was either lacking or exceptional.

Areas that need improvement. Developing Performance	Criteria for Proficient Performance	Evidence of exceeding standards. Advanced Performance
	Students gave their model animals structures appropriate for their survival, growth, behavior, and reproduction.	
	Students could identify at least one plant structure in celery and use evidence to explain its likely function.	
	When presenting to the class, students referenced environmental factors to explain why the structures they chose for their model animals are appropriate.	
	Students explained how two or more structures or behaviors worked together as a system to help the model animal survive and reproduce.	

### Accommodations

Cutting paper with scissors requires **fine motor skills**. Students with difficulty can be paired with an appropriate partner.

Reading aloud instructions with students can help those still developing **grade-level reading skills**.