

SCIENCE·3D

LIFE IN THE TREES

In this packet, sample student answers are provided in **red** and notes to teachers are in **blue**.

During this **Mission Research**, students will explore system models ranging from engineering and body systems, to ecological systems.



ACTIVITY I: SYSTEMS AND MODELS

Nature, society, and engineering contain many systems. Some are physical. Others are digital or even social. Body systems, ecosystems, political systems, and transit systems are just a few examples. We are going to investigate several kinds of systems when we study kinkajous and other animals in the rainforest.

What is a system? A system is a set of parts that work together. Systems have a few key characteristics.

Components: the parts of the system that interact. For example, the brain, nerves, and sensory cells are components of the nervous system.

Inputs: the things that move into a system. Examples include data flowing into a computer system, energy flowing into an ecosystem, and pollution flowing into water.

Outputs: the things that come out of a system. Examples include the movements of a character in a video game or carbon dioxide being released from the respiratory system of animals.

Boundaries: the things that define where the system starts and ends. Boundaries may not be rigid. For example, there could be a gradual change from where one ecosystem ends and another begins. Other boundaries might be a physical surface, such as the outside of a computer.

Properties: characteristics of systems. The temperature in the rainforest is an example.

Interactions: how different parts of the system work together.

Let's work with some systems to get ready for our mission!

1. **Draw** a diagram of a system that you might create to help a scientist climb into a tall tree in the canopy of the rainforest. You can use any machines or objects you would like.

Answers will vary. Accept reasonable answers. One example is a rope and pulley system.



2. **List** the components of your system.

Answers should be based on the diagram but might include: ropes, the tree, pulley, climber.

3. **Describe** the boundary of your system.

Answers should be based on the diagram. A sample answer includes: The boundary of my system is the edge of the ropes and pulleys.

4. **Describe** the inputs and outputs of your system.

Answers should be based on the diagram. A sample answer includes: The input is somebody pulling a rope. The output is moving the climber into the tree.

5. **Describe** the interactions in your system.

Answers should be based on the diagram. A sample answer includes: The person pulling the rope interacts with the rope. The rope pulls on the climber to lift them up. The pulley nailed to the tree keeps the rope from falling.

Extend the Lesson: Have students share their diagrams with the class or a small group. Have them update their plans based on feedback.

6. Choose a body system. **Draw** a diagram of the system.

Answers will vary. Accept reasonable answers. One example is the digestive system.



7. **List** the components of your system.

Answers should be based on the diagram. An example of a good answer might list the organs in the digestive system.

8. **Describe** the boundary of your system.

Answers should be based on the diagram. A sample answer includes: The boundary of my system is the organs that are part of it.

9. **Describe** the inputs and outputs of your system.

Answers should be based on the diagram. A sample answer includes: The input is food. The output is nutrients for the body and waste products.

10. **Describe** the interactions in your system.

Answers should be based on the diagram. A sample answer includes: The mouth starts breaking down food. Then the esophagus passes it to the stomach that breaks down food more. The intestine takes the food from the stomach and absorbs nutrients and passes waste products out.

ACTIVITY 2: PARTS OF THE CANOPY ECOSYSTEM

The canopy is part of the rainforest ecosystem. Let's classify some of the components of the system.

1. Next to each picture in the table on the next page, classify each species using the terms below. Then, fill in the traits you used to classify each species. List any other traits you know are shared by that animal group.

Arthropod, Mammal, Bird, Reptile, Amphibian

Species	Type of Animal	Traits
	Mammal	Hair; gives live birth; feeds young milk
	Reptile	Scaly skin; lays leathery eggs
	Amphibian	Wet smooth skin; lays eggs that can dry out
	Arthropod	No backbone; exoskeleton; jointed legs; body segments
	Bird	Feathers; lays hard eggs; wings

2. **Draw** what a pollination system might look like in the rainforest. Label the components.

Complete drawings should include multiple flowers, pollen and nectar as well as an animal that drinks nectar and moves pollen.



3. **Draw** what a plant dispersal system might look like in the rainforest. Label the components.

Complete drawings should include fruits as well as an animal that eats fruits and then moves to excrete seeds.

