

LESSON 1: UNDERSTANDING RAINFOREST ECOSYSTEMS

Lesson plan overview

In this lesson, students will investigate how rainforest species interact through mutualism, commensalism, predation, competition, and camouflage. They will analyze real-world examples, construct a rainforest food web, and explore the critical role of keystone species in maintaining ecosystem balance. Through graphing and illustration, students will combine math and art skills to better understand the complexity of rainforest biodiversity and why protecting these systems is vital for ecological stability.

Educational materials

- **Videos:** 'Keystone Species and Ecosystem Balance'; 'Interactions in the Rainforest'
- **Worksheet:** Rainforest Interactions (identify examples of mutualism, predation, camouflage, and more)
- **Quiz:** Define interaction types and identify them in new scenarios
- **Math tie-in:** Food web graphing
- **Art tie-in:** Camouflage challenge
- **Classroom discussion questions:**
 - Why are keystone species so important?
 - What other relationships do animals and plants have?

WORKSHEET: Rainforest Interactions



Name: _____ Date: _____

Instructions: Read the definitions of each interaction type. Then read the rainforest animal scenarios below and decide which interaction type they represent. Write the correct term next to each scenario.

Mutualism

Both species benefit from the interaction.

Camouflage

An organism blends into its environment to avoid predators or sneak up on prey.

Defensive adaptation

Traits or behaviors that protect an organism from being eaten.

Commensalism

One species benefits from the interaction, while the other is neither helped nor harmed.

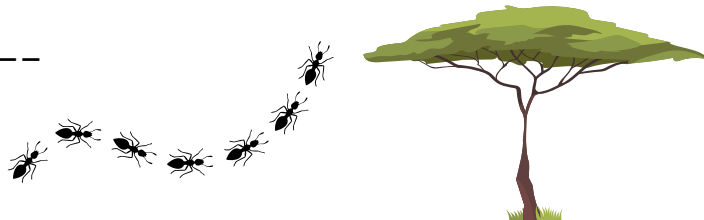
Predation

One species hunts and eats another.

Acacia tree and ants

Tiny ants live inside the thorns of acacia trees. The ants get food and shelter, while the ants protect the tree from other insects and even large animals that try to eat its leaves.

→ Interaction type: _____



Jaguar and capybara

The jaguar stalks a capybara by the riverbank. It pounces and catches the capybara for its meal.

→ Interaction type: _____



Leaf insects

A leaf insect rests on a tree branch. Its body looks exactly like a green leaf, making it nearly invisible to predators like birds.

→ Interaction type: _____



Orchid on a tree

An orchid grows high up on a rainforest tree. It uses the tree for support to reach sunlight but doesn't harm the tree.

→ Interaction type: _____



Sloth and algae

Green algae grow on the fur of a sloth. The algae get a safe place to live, while the sloth benefits from camouflage, since its green-tinted fur helps it blend into the trees.

→ Interaction type: _____



Army ants and other animals

A moving swarm of army ants clears everything in its path. Birds and small mammals follow the swarm to catch insects that try to escape the ants.

→ Interaction type: _____



Harpy Eagle and monkey

A Harpy Eagle soars above the canopy and spots a howler monkey. The eagle swoops down and captures the monkey for food.

→ Interaction type: _____



Poison dart frog and predator

A predator tries to eat a brightly colored poison dart frog. The frog's toxic skin makes the predator spit it out and learn to avoid it in the future.

→ Interaction type: _____



WORKSHEET: ANSWER KEY



Scenarios and correct answers

Ants and acacia trees

Ants live inside the hollow thorns of the acacia tree and protect it from herbivores. In return, the tree provides food and shelter.

✓ Mutualism

Jaguar and capybara

A jaguar stalks a capybara near a river and attacks it for food.

✓ Predation

Leaf insects

A leaf insect rests among tree leaves, its body perfectly blending in with the foliage so predators can't spot it.

✓ Camouflage

Sloth and algae

Algae grow on the fur of a sloth. The algae get a safe habitat, while the sloth gains camouflage by turning green.

✓ Mutualism

Army ants and other animals

Army ants sweep through the forest. Birds and mammals follow to catch insects fleeing from the ants.

✓ Commensalism (the animals benefit, ants are unaffected)

Harpy Eagle and monkey

A Harpy Eagle swoops down from the canopy and captures a howler monkey.

✓ Predation

Poison dart frog and predator

A predator tries to eat a brightly colored poison dart frog but spits it out due to its toxic skin.

✓ Defensive adaptation

WORKSHEET: Video Viewing Questions



Name: _____ Date: _____

Answer while or after watching the videos.

Mutualism:

Which two species work together in mutualism?

How does each species benefit from this partnership?

Predation:

What animal is a top predator in the rainforest?

Why is predation important for keeping the ecosystem balanced?

Camouflage:

Give an example of an animal that uses camouflage.



Why does camouflage help both predators and prey?

Keystone species:

What is a keystone species?

List one keystone animal and one keystone plant from the rainforest.

What might happen if they disappeared?

QUIZ: Rainforest Interactions



Part A – Definitions (multiple choice)

Choose the correct definition for each term.

Mutualism is when:

- a) One species hunts and eats another
- b) One species benefits, the other is unaffected
- c) Both species benefit from the interaction
- d) An organism blends into its environment

Predation is when:

- a) Both species benefit
- b) One species benefits, the other is unaffected
- c) One species hunts and eats another
- d) One species hides from another

Camouflage is when:

- a) An organism blends into its environment to hide or hunt
- b) Both species benefit
- c) One species hunts another
- d) One species benefits, the other is unaffected

Defensive adaptation means:

- a) Traits or behaviors that protect an organism from predators
- b) Both species benefit
- c) An organism hides by blending in
- d) One species hunts another

Commensalism is when:

- a) Both species benefit
- b) One species benefits, the other is unaffected
- c) One species hunts another
- d) One species hides from another

QUIZ: Rainforest Interactions



Part B: Scenarios (matching)

Match each scenario with the correct interaction type.

Leaf insects hide among real leaves to avoid predators.

ANSWER_-----

Jaguars hunt capybaras for food.

ANSWER_-----

Leafcutter ants feed fungi, and the fungi provide food for the ants.

ANSWER_-----

Orchids grow on rainforest trees, gaining access to sunlight while the tree is unaffected.

ANSWER_-----

Poison dart frogs have toxins in their skin to keep predators away.

ANSWER_-----

Answer bank:

Mutualism

Predation

Camouflage

Commensalism

Defensive adaptation

QUIZ: ANSWER KEY



Part A

- c
- c
- a
- a
- b

Part B

- 6. Camouflage
- 7. Predation
- 8. Mutualism
- 9. Commensalism
- 10. Defensive adaptation

MATH TIE-IN

Food Web Graphing



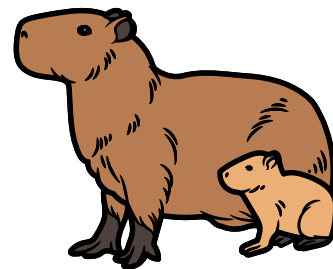
Instructions:

Provide students with a simplified food web that includes jaguars, capybaras, insects, leafcutter ants, fungi, orchids, and keystone species (like Brazil nut trees).

Ask students to:

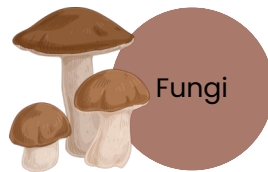
- Count how many direct connections each organism has (degree of interaction).
- Graph trophic levels (producers, herbivores, carnivores, decomposers).
- Create a bar chart showing the number of species at each trophic level.

Optional extension: Have students remove the keystone species from the web and re-graph how many connections are lost.

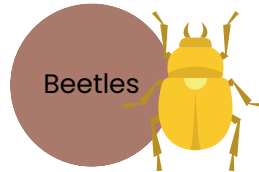


MATH TIE-IN

Food Web Graphing



Fungi



Beetles

Decomposers

Fungi (leafcutter ants farm fungus; also decomposes dead matter)
Beetles

Tertiary consumers (top predators)

Jaguar (hunts capybara, sloths, wild pigs)
Harpy Eagle (hunts monkeys, sloths, birds)

Secondary consumers (omnivores/carnivores)

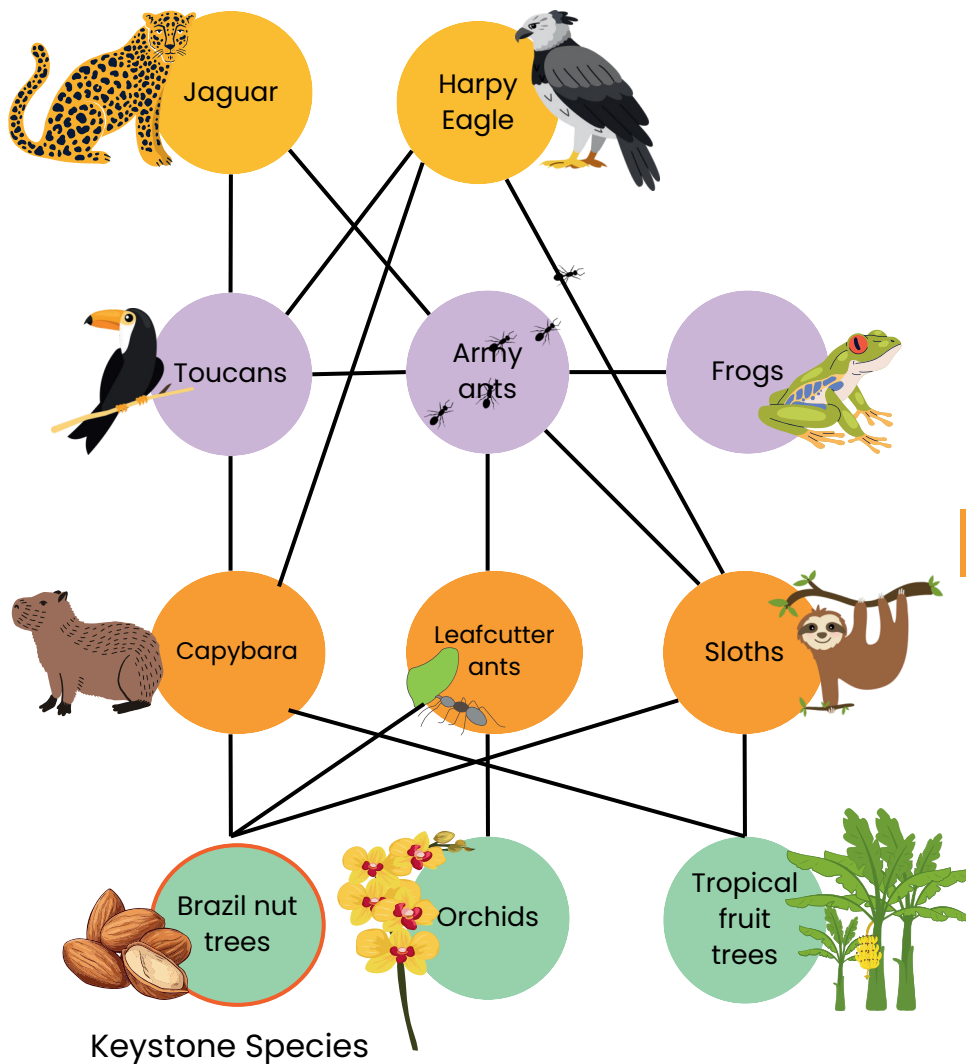
Toucans (eat fruit, eggs, insects)
Army ants (eat insects, small animals)
Frogs (eat insects)

Primary consumers (herbivores)

Capybara (eats grasses, aquatic plants, fruits)
Leafcutter ants (harvest leaves for fungus)
Sloths (eat leaves)

Producers (plants)

Brazil nut tree (keystone species)
Orchids
Tropical fruit trees



MATH TIE-IN (FOR TEACHERS)



Sample food web connections

Brazil nut tree → agoutis, monkeys, insects (primary consumers).

Orchids/fruit trees → toucans, capybara, sloths.

Capybara → jaguar (predation).

Sloths → Harpy Eagle, jaguar.

Leafcutter ants → carry leaves → fungus (mutualism).

Fungus → feeds ants; decomposes organic matter.

Army ants → eat insects, frogs, sometimes small mammals.

Toucans → eat insects, eggs, fruit → preyed on by Harpy Eagle.

Frogs → eat insects → eaten by snakes, toucans, jaguars (indirectly).

Jaguar → apex predator, eats capybara, sloths, wild pigs.

Harpy Eagle → apex predator, eats monkeys, sloths, toucans.

Decomposers (fungi, beetles) → recycle nutrients back to soil for producers.

Correct trophic levels

Producers: Brazil nut tree, orchids, fruit trees.

Primary consumers: Capybara, leafcutter ants, sloths.

Secondary consumers: Frogs, army ants, toucans.

Tertiary consumers: Jaguar, Harpy Eagle.

Decomposers: Fungi, beetles.

Expected graphs

Producers: 3

Primary consumers: 3

Secondary consumers: 3

Tertiary consumers: 2

Decomposers: 2

Extension answer

Removing the Brazil nut tree → agoutis and monkeys lose a food source → fewer dispersers of seeds → other plants decline → jaguars, eagles lose prey → collapse of ecosystem balance.

ART TIE IN



Camouflage Challenge: Hidden in the Rainforest

Instructions:

- Students choose an animal (leaf insect, tree frog, jaguar, owl butterfly, etc.)
- On a large sheet of paper (or digital art app), they draw or paint a rainforest background (trees, leaves, vines).

They must then blend their animal into the scene using camouflage strategies:

- Color matching (e.g., greens and browns)
- Pattern mimicry (e.g., bark, leaves)
- Disguise (e.g., insects that look like sticks or leaves)

Optional: Host a gallery walk where classmates try to spot the hidden animals.

Inspiration

