



VERMONT INSTITUTE OF NATURAL SCIENCE
2723 Church Hill Rd. Woodstock, VT 05091

ADAPTATIONS – AMAZING INSECTS

Adapted and Adaptable

Focus: Insects share a basic structural design, while special adaptations, both behavioral and physical, allow each species to meet the demands of its specific habitat.

Concepts/Ideas:

- A. All insects have the same basic body structure.
- B. Physical and behavioral adaptations allow each kind of insect to meet the demands of its specific habitat.
- C. Insects are very adaptable and can be found and observed in a variety of habitats
- D. Insects collected for study should be carefully examined, then returned to their natural habitat.

Vocabulary: adaptation, physical adaptations, behavioral adaptations, head, thorax, abdomen, exoskeleton, chitin, antennae, compound eye, simple eye (ocelli), spiracle, mandible, ovipositor

Skills:

- A. Comparing and contrasting the body structure of different kinds of insects.
- B. Active listening and discussion to learn about behavioral and physical adaptations of various insects.
- C. Using a hand lens to observe live insects' body structure and physical adaptations.
- D. Using tools to collect and observe insects outdoors.

Grade Expectations:

Grades PK-K (S30, S38)

Insects are living animals. They need food, water and air to survive.

Grades 1-2 (S30, S38)

Insects are a group of animals that all have the same basic body structure. Insects have body parts that enable them to get the food, water and air they need to live and that make it possible for them to survive in the particular places they live.

Grades 3-4 (S30, S38, S39)

Insects have physical and behavioral characteristics that help them to get what they need to survive in their environment. There are many different kinds of Insects; they are grouped according to similarities in body structure.

Grades 5-6 (S38)

Insects are classified into basic groups; insects in each group share some distinguishing characteristics.

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ADAPTATIONS – GRASSES

Slender Stalks with Seeds that Nourish the World

Focus: Grasses are uniquely adapted to withstand challenges of harsh weather conditions and browsing animals. Members of the grass family produce grains, a vital food source.

Concepts/Ideas:

- A. Grasses have unique characteristics and adaptations that contribute to their success in a wide range of habitats.
- B. There are many kinds of grasses, some of which can be differentiated by their seed heads.
- C. Humans and other animals depend on grass plants for food and other products.

Vocabulary: adaptation, grass, stem, node, sheath, roots, rhizome, pollen, stamen, anther, and pistil, seed.

Skills:

- A. Close examination of grasses to observe their unique characteristics
- B. Active listening and observation to understand specific adaptations of grasses
- C. Creating a model using paper, glue, scissors and poster board that illustrates the characteristic structure of grass plants.
- D. Comparing and contrasting different varieties of grasses.
- E. Observing grass plants outdoors and recording variations and adaptations.
- F. Discussing the importance of grass plants to humans and other animals

Grade Expectations:

Grades PK-K (S30, S38)

Grasses are living plants. They require nourishment, sunlight, water and air to survive.

Grades 1-2 (S30, 38)

Grasses are a group of plants that all have a similar structure. Grasses' unique structures make it possible for them to survive in a wide range of habitats.

Grades 3-4 (S30, S38, S39)

Grasses have physical characteristics that make it possible for them to acquire what they need to survive in their environment. There are many different kinds of grasses; they may be grouped according to similarities in their seed heads.

Grades 5-6 (S38)

Many kinds of grasses may grow together in one area; they may be grouped according to similarities in structure and identified by specific characteristics.

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ADAPTATIONS – HUNTER-HUNTED
A Complex Relationship

Focus: Animals that hunt other animals for their food, and the animals that are hunted, have special adaptations to meet the challenges of their particular roles.

Concepts/Ideas:

- A. In a healthy ecosystem there is a balance between predators (hunters) and prey (hunted) animals as long as there are adequate habitat resources (food, water, & shelter) to provide for each group's successful reproduction.
- B. Animals that hunt other animals for food have adaptations that help them to find and catch their prey. Animals that are hunted have special adaptations that help them to become aware of predators and to escape from, defend against, or discourage them. Some adaptations are common to both predators and prey.
- C. Animals display a variety of different hunting and escaping strategies.

Vocabulary: adaptation, physical adaptation, behavioral adaptation, ecosystem, habitat, predator, prey, herbivore, carnivore, omnivore, nocturnal, diurnal, crepuscular, interdependence

Skills:

- A. Active listening to understand the shifting balance and interdependence between groups of predators and their prey.
- B. Comparing and contrasting adaptations that are specific to hunted animals and hunting animals and discussing adaptations the groups have in common.
- C. Experiencing the role of predator and prey through a game of hiding and searching.
- D. Creating a model using paper, crayons, pencils and tape to show adaptations a predator would need to capture prey.

Grade Expectations:

Grades PK-K (S30, S34)

Rabbits and foxes are living animals. Plants and animals need food, water, and air to survive.

Grades 1-2 (S30, S35)

Rabbits and foxes are animals that are made up of body parts that enable them to survive in the particular places they live. All animals depend on plants. Some animals eat plants for food; other animals eat animals that eat plants.

Grades 3-4 (S30, S34, S35)

Animals, like rabbits and foxes, have physical and behavioral characteristics that help them to get what they need and to defend themselves in their environment. Energy derived from food is needed for all animals to stay alive and grow. All animals' food sources begin with plants. Organisms can only survive in habitats in which their needs are met.

Grades 5-6 (S35, S36)

Energy within an ecosystem originates from the sun; plants use energy from the sun to make energy rich food, animals eat food that plants make. The number of animals that an ecosystem can support depends on the kinds of organisms present and the availability of food, water and other resources.

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ADAPTATIONS – TEETH AND SKULLS
Dentition Determines the Diet

Focus: Different types of teeth are adapted to grasp, hold, and chew different types of food. Examining the kinds of teeth a mammal has and the shape of its jaw and skull helps us determine the type of food it eats.

Concepts/Ideas:

- A. The teeth of plant-eating mammals (herbivores) are different from those of meat-eating mammals (carnivores).
- B. Humans have different types of teeth that perform different actions when we eat.
- C. Different kinds of mammals have different tooth-types corresponding to the kinds of food they eat.
- D. Arrangement of teeth along with skull shape and eye placement help to tell about an animal's lifestyle.

Vocabulary: adaptation, mammal, predator, prey, carnivore, herbivore, insectivore, omnivore, incisors, canine teeth, molars, jaw, skull, diet

Skills:

- A. Actively listening to learn about the variations in animals' teeth and their uses in eating food.
- B. Observing and discussing the different kinds of teeth humans have and how they are used.
- C. Comparing and contrasting mammal teeth and relating the skull and teeth of an animal to the foods it eats.
- D. Examining animal skulls and using observations to hypothesize generalizations about the animal's diet, lifestyle and identity.
- E. Creating a model of a set of teeth designed to fit a particular animal's diet.

Grade Expectations:

Grades PK-K (S30, S38)

People and other animals have teeth. They use them to eat food that is needed to stay alive.

Grades 1-2 (S 30, S38)

Animals including humans have different kinds of teeth used to eat different kinds of food.

Grades 3-4 (S30, S38, S39)

Animals that eat meat have teeth and skull shapes that are different from animals that eat only plants. They may be differentiated and grouped according to tooth-type, skull shape and the kinds of food they eat.

Grades 5-6 (S38)

Teeth and skulls of mammals share many similarities, but these features may vary widely in shape and size. Particular teeth and skull features can be used to identify a specific mammal.

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ADAPTATIONS – BEAKS, FEET, AND FEATHERS
Fantastic Flying Machines

Focus: Birds' incredible adaptations enable them to fly, keep warm, and procure food.

Concepts/Ideas

- A. All birds and only birds have feathers.
- B. Different adaptations allow birds to live in various habitats and feed on a variety of food sources.
- C. Bird beaks are adapted for obtaining specific kinds of food in specific ways.
- D. Bird "feet" are adapted for various lifestyles.
- E. Wings and tail are adapted to help birds feed and nest in specific habitats.
- F. Most birds' eyes are adapted to provide keen vision and to help them hunt prey or avoid predators.

Vocabulary: adaptation, feather, contour feather, flight feather, down, vane, barbs, barbules, shaft, probing, bird feet, beak/bill, raptor, talons, predator, prey, preening, molting.

Skills:

- A. Observing details of feather structure using a hand lens.
- B. Comparing and contrasting different types of bird beaks, feet, and feathers to understand various bird adaptations and ways they help birds succeed.
- C. Using utensils and tools to simulate kinds of beaks that serve a bird best to obtain different types of food.
- D. Creating a bird model using scissors, tape, paper and markers that has adaptations that will make it successful in meeting its needs.

Grade Expectations:

Grades PK-K (S30, S38)

Birds are living animals that need food, water, and air to survive. A bird uses its eyes, beak, and feet to find, collect and eat food. Feathers cover a bird's body and wings and help it to fly.

Grades 1-2 (S30, S38)

Birds are in a group of animals that have feathers covering their body. Birds' feathers and other body parts, including the beak and feet, enable them to get food and water that is needed for survival in the places they live.

Grades 3-4 (S30, S38)

Birds have physical and behavioral characteristics that enable them to obtain food, find a mate, build a nest, raise young, and protect themselves in the places that they live.

Grades 5-6 (S30, S38)

Feathers of different kinds of birds share similarities in structure, but may vary widely in shape, size and coloration. Structural features of feathers are related to their location on the bird's body and how they function. Birds have physical and behavioral characteristics that enable them to survive and reproduce.



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ADAPTATIONS – OWLS
Silent Predators of the Night

Focus: Owls are uniquely adapted for their lives as nocturnal predators.

Concepts/Ideas:

- A. Owls have special adaptations that allow them to be successful as nocturnal predators.
- B. Variation in owl calls allows members of same species to locate or identify each other.
- C. Owls usually swallow smaller prey whole and rip larger prey into pieces, coughing up indigestible parts in the form of a pellet.
- D. Examination of a pellet can tell what an owl has been eating.

Vocabulary: adaptations, nocturnal, birds of prey, predator, prey, raptors, facial disk, beak, talons, asymmetrical, owl call, owl pellet, indigestible.

Skills:

- A. Identifying through observation, active listening and discussion the special adaptations that owls have that help them to be successful nighttime hunters.
- B. Listening to and comparing calls of some different owls.
- C. Experiencing locating sounds and hunting as an owl would.
- D. Discussing how owls eat.
- E. Examining, sorting and classifying objects found in owl pellets, using evidence and diagrams to speculate about what owls eat and to recognize their role in food chains.

Grade Expectations:

Grades PK-K (S30, S38)

Owls are living animals that need food, water, and air to stay alive. An owl uses its beak, feet, ears and ability to fly to hunt for and catch food. Owls eat mice and other small animals.

Grades 1-2 (S30, S38)

Owls are birds of prey; they depend on and hunt small animals as food. Owls have body parts that help them to survive in the particular places they live.

Grades 3-4 (S30, S38)

Owls have specific physical and behavioral adaptations that help them to get what they need and to defend themselves in their environment. Owls are carnivores; they eat small animals and have unique adaptations for digesting their food.

Grades 5-6 (S30, S38)

Physical characteristics of owls may vary according to the kinds of food they eat and the places they live. Particular habits and features are used to identify a specific kind of owl.

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ADAPTATIONS – THORNS & THREATS

Plants' and Animals' Strategic Defenses

Focus: In order to protect themselves, plants and animals have developed many different defenses.

Concepts/Ideas:

- A. Animals and plants have particular physical adaptations or defense strategies that protect them from predation or other threat.
- B. Plants are often adapted to be inedible or distasteful.
- C. Animals may have physical and/or behavioral adaptations that protect them from predators.
- D. Despite the different defense strategies, some creatures are able to circumvent these defenses, evolving new behaviors and adaptations to exploit the food source.

Vocabulary: adaptation, defense strategy, predation, thorn, threat, inedible, distasteful, venom, toxin, poison.

Skills:

- A. Active listening to understand some defense strategies used by animals.
- B. Observing and identifying different defense strategies used by plants and animals.
- C. Observing outdoors and recording the variety of ways plants make themselves inedible or distasteful.
- D. Expressing through role-playing the ways some animal and plant defenses work.
- E. Creating a model using paper, pencils, crayons or markers to show some defense adaptations that could outdo those occurring in nature.

Grade Expectations:

Grades PK-K (S30)

Living plants and animals have ways of protecting themselves from things that may hurt or eat them.

Grades 1-2 (S30)

Animals and plants have body parts that enable them to defend protect themselves and to survive in the particular places they live.

Grades 3-4 (S30)

Animals and plants have physical and behavioral characteristics that help them to defend and protect themselves in their environment.

Grades 5-6 (S30, S38)

Plants may have very effective defenses that keep them from being eaten. Some of these defenses make them toxic or irritating to humans. These plants may be grouped according to similarities in appearance and structure and identified by specific unique characteristics.

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ADAPTATIONS – FROGS AND POLLIWOGS
Miraculous Transformation

Focus: Frogs and toads can live in a wide range of habitats and temperatures because of their unique physical adaptations and specialized life cycles.

Concepts/Ideas

- A. Frogs and toads, both amphibians, have similarities and differences. Like other amphibians, they live part of their lives in water and part on land. In each life stage they have adaptations that allow them to survive in particular surroundings.
- B. Most frogs and toads mate in water in spring or early summer, and females lay eggs in water. Eggs develop into legless tadpoles or “polliwogs” with a tail and gills and over time metamorphose into tailless adults with lungs and legs.
- C. Frogs, like most predators, eat live prey. Special adaptations make it possible for them to catch moving insects within their reach.
- D. Each species of frog has a different courtship call that the male sings to attract females of his species.

Vocabulary: adaptations, amphibians, frog, toad, egg, tadpole, adult, herbivore, carnivore, metamorphosis, prey, gills, frog calls, habitat.

Skills:

- A. Active listening and observation to learn about special adaptations of frogs, toads and tadpoles.
- B. Listening and role-playing to understand the stages of growth and development of frogs from egg to adult.
- C. Comparing and contrasting characteristics of frogs and tadpoles.
- D. Identifying through role-playing, investigation and observation, frogs’ adaptations in different stages of development.
- E. Listening to and comparing calls made by different species of frogs.

Grade Expectations:

Grades PK-K (S30)

Frogs and toads are living animals that need food, water, and air to survive. They live part of their life in water and part on land.

Grades 1-2 (S30, S31)

Frogs and toads have body parts that enable them to survive in water and on land at different stages of life. Frogs undergo stages of development and change from egg to adult. Frogs come from male and female parents.

Grades 3-4 (S30, S31, S38)

Frogs and toads have physical and behavioral characteristics that enable them to survive in the particular places they live during each stage of life. They are amphibians, and the details of their life cycles are unique to their kind. Frogs and toads, as all living things, have common stages of development. They can be differentiated by certain physical characteristics.

Grades 5-6 (S38)

Different kinds of toads and frogs may live together in one area. They are grouped according to similarities in body structure and identified by distinguishing physical and behavioral characteristics.

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ADAPTATIONS – Beavers

Focus: The beaver modifies its habitat to suit its needs, and it has many adaptations for life in its watery environment.

Concepts/Ideas:

- A. Beavers have physical and behavioral adaptations that allow them to move about in and out of water in their wetland habitat.
- B. Beavers cut trees and branches by gnawing to obtain food and building materials for dams and lodges.
- C. Beavers change the areas they inhabit by cutting trees, building dams, and creating ponds, making it possible for them to access and transport food and building materials and to establish a protected habitat.

Vocabulary: adaptations, habitat, beaver, rodent, prey, incisors, valves, guard hairs, undercoat, forage, cambium, dam, lodge.

Skills:

- A. Identifying through observation, active listening, and discussion some of the special adaptations that beavers have that help them to survive in wetland habitats.
- B. Experiencing through role-playing some of the activities that beavers must accomplish in order to survive.
- C. Observing and recording signs of beaver activity and impacts on habitat at a beaver pond.

Grade Expectations:

Grades PK-K (S30, S38)

Beavers are living animals that require food, water and shelter to survive. They eat parts of trees and branches for food and use branches to build a home.

Grades 1-2 (S30, S38)

Beavers are mammals. Beavers have body parts that enable them to get food and water and to build a shelter so that they can survive and raise young in the places they live. Beavers depend on plants for food and shelter.

Grades 3-4 (S30, S38)

Beavers have physical and behavioral characteristics that protect them and enable them to get what they need to survive in their environment.

Grades 5-6 (S30, S38)

Beavers' physical and behavioral adaptations enable them to transport building materials and food, build shelters and dams and establish a protected habitat.

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