**Concept Block Two: Organisms and Their Environments**

1. **In this section we will concentrate on the following standard and its components:**

**Standard: 4Sb: The student will demonstrate an understanding of the characteristics and patterns of behavior that allow organisms to survive in their own distinct environments. (Life Science)**

**4Sb.1:** Classify organisms into major groups (including plants or animals, flowering or

 non-flowering plants, and vertebrates [fish, amphibians, reptiles, birds, and

 mammals] or invertebrates) according to their physical characteristics.

**4Sb.2:** Explain how the characteristics of distinct environments (including swamps,

 rivers and streams, tropical rain forests, deserts, and the polar regions) influence

 the variety of organisms in each.

**4Sb.3:** Explain how humans and other animals use their senses and sensory organs

 to detect signals from the environment and how their behaviors are influenced by these signals.

**4Sb.4:** Distinguish between the characteristics of an organism that are inherited and

 those that are acquired over time.

**4Sb.5:** Explain how an organism’s patterns of behavior are related to its environment

**4Sb.6:** Explain how organisms cause changes in their environment.

1. **These concepts correspond to the following sections in the Scott Foresman Science textbook:**
2. Chaper 1: Plant Structure and Function, pages A5-A14
3. Chapter 2: Animal Structure and Function, pages A35-A61
4. Chapter 3: Energy In Ecosystems, pages A68-A71
5. Chapter 4: Surviving in the Encironment, pages A98-115
6. **These concepts are encountered in the following *Reading Street* stories and articles:**
* Fast Facts: Black Bears (Unit 1)
* Horned Lizards and Harvesting Ants (Unit 1)
* Adelina’s Whales (Unit 3)
* The Ant and the Bear (Unit 3)
* The Great Kapok Tree (Unit 3)
* Encanto: Pink Dolphin of the Amazon (Unit 4)
* Mysterious Animals (Unit 4)
* This Land is Your Land (Unit 1)
* Marvin of the Great North Wood (Unit 2)
* Sea Animals on the Move (Unit 3)
* The Great Kapok Tree (Unit 3)
* Antarctic Journal (Unit 5)
* The Stranger (Unit 3)
* Time for a Change (Unit 3)
* Logging Camps (Unit 3)
* Lost City: The Discovery of Machu Pichu (Unit 5)
1. **Concept Block 2 Content Summary:**

**4Sb.1:** Classify organisms into major groups (including plants or animals, flowering or

 non-flowering plants, and vertebrates [fish, amphibians, reptiles, birds, and

 mammals] or invertebrates) according to their physical characteristics.

Content Summary:

* Scientists classify organisms into groups to help them understand the relationships between the many forms of life on Earth. This creates a common language for scientists and is very helpful in the identification of organisms.
* All known organisms are placed into groups based on shared characteristics. This practice was originated by Aristotle thousands of years ago, when he placed all organisms into one of two Kingdoms (Plant or Animal). Carolos Linnaeus built on this concept in the 1700’s, creating the modern classification (taxonomic) system.
* The modern classification system has five kingdoms (It’s really six if you want to get fancy, but the old five kingdom system is fine for now). All organisms fit into one of these Kingdoms:
* Moneran Kingdom- Very simple, tiny, single-celled organisms, mostly *bacteria*
* Protist Kingdom- Fancier single-celled organisms, including *amoebas and paramecium,* mostof them have structures allow them to move freely
* Fungi Kingdom- Mostly many-celled plant-like organisms that get nutrients from the things they live on. They include *mushrooms, bread mold, and puff balls. Yeast*, is a single celled fungus and is important in the production of bread and beer.
* Plant Kingdom-Many-celled organisms that are usually green and get their energy from the sun, they include *grass, trees, and mosses* (more below).
* Animal Kingdom- Many-celled organisms that move on their own and eat other organisms for food, they include fish, frogs, bears, and turtles (more below).
* Organisms within each Kingdom can be further subdivided into increasingly specific groups. The further down the system you go, the more closely related the organisms become. For example, worms, dogs, and wolves are all members of the animal kingdom, yet dogs and wolves share more characteristics with one another than with worms, so we would expect to find them sharing more categories. The worm in turn would branch off into groups with members it is more similar to, like leeches and flukes.
* The easiest way to envision the modern taxonomic system is to think of it as a pyramid balancing on its tip. In this case, the broad base at the top represents the largest group, the Kingdom. The subsequent categories get smaller and more specific as you work your way down, ending at the tip, or species designation. In many ways it’s like shopping on line. If you wanted new sandals you would start with the whole web, go to an online shoe store, click on ladies shoes (or men’s), go to casual shoes, and then sandals. You would then search the ladies (or men’s) sandals section for a pair of sandals with the characteristics you were looking for. In the illustration below, the dog, the worm, and the wolf would all share the top level (Kingdom), but the worm would branch off from there. The dog and the wolf would stay together, sharing categories all the way down to *genus.* They would differ only at the bottom, as they are separate species; *Canis familiaris* and *Canis lupus.*

 

 *Source:* *lcelaya@amphi.com*

* For our purposes we can concentrate on the first few (broadest) categories. We will also recognize that there are five Kingdoms (Monerans, Protists, Fungi, Plants, Animals) but will narrow our focus to plants and animals.

Plant Kingdom:

* The easiest way to understand the basics of botany (plant science) is to group all plants based on whether or not they produce seeds and flowers

* The most basic kinds of plants don’t produce seeds or flowers. They reproduce using spores, which can be thought of as primitive seed-like structures. These plants include *ferns and mosses*. They are typically small and limited to life in moist areas. They are among the oldest groups of plants, as their ancestors were around long before flowering plants arrived.
* Plants that produce seeds have advantages over spore producing plants, so they are found in much greater abundance. There are two basic groups of seed plants; cone bearing plants and flowering plants.
* Non-Flowering Plants (Conifers) - are plants that do not produce flowers but do produce seeds. The seeds of these species form within a protective cone. Conifers are referred to as evergreens because they keep their needle-like leaves throughout the year. *Pine, spruce, fir, and cedar trees* are all conifers. Conifers are not as old as ferns and mosses, but they’ve been around longer than the flowering plants.
* Flowering Plants- are the Cadillac’s of the plant world. They are top of the line. They produce flowers and seeds. There are millions of different types of flowering plants. They range from *simple grasses and palm trees to berry bushes and oak trees*. Many of what we consider the most beautiful plants, like *roses, lilies, and daffodils* are flowering plants. But, the flowers of these plants aren’t there for looks, their job is reproduction. Flowers contain pollen and eggs that combine to form seeds in a process called pollination. Flowering plants can pollinate themselves or catch pollen in the wind and produce offspring with plants that are miles away.

Animal Kingdom:

* Like plants, animals are classified based on shared characteristics. Organisms within the animal Kingdom can be initially divided into groups based on whether or not they have a spinal cord. Organisms that lack backbones (or skeletons all together) are called invertebrates and fall into different phyla based on other characteristics. Animals with backbones (vertebrates) all fall under the phylum *Chordata.* When you see the term *chordata* think “spinal cord” (chordata literally means *has cord*). Invertebrates include sea sponges, jellyfish, worms, crustaceans, insects, and arachnids. Some of them are soft bodied, and some of them have hard shells called exoskeletons, but none of them have backbones!
* All vertebrates are in the Kingdom Animalia, the Phylum Chordata, and the *Sub*-phylum Vertebrata (there are a few critters with spinal cords but no backbones). They belong to different classes based on their characteristics. Think of the different vertebrate groups like you would think of different kinds of cars. The oldest models are pretty simple, but newer features are added over time and they get fancier and more sophisticated with each model. So, a fish is pretty basic, whereas a mammal is top of the line. These are the groups of vertebrate animals:
* Cartilage Fish (Class Chondrichtyes)- Also called cartilaginous fish, these ancient fish have soft skeletons that are made of cartilage, the stiff but flexible tissue we have in our ears and noses. The only hard structures they have are their teeth, which can sometimes be found at the beach. Cartilage fish include *sharks, skates, and rays.*
* Boney Fish (Class Osteicthyes) - get an improvement over their cartilage boned cousins. They have skeletons made of real bone. Almost any fish you can name belongs here*. Bass, guppies, goldfish, swordfish, clown fish…*
* Amphibians (Class Amphimbia)- represent a link between aquatic organisms and land dwelling critters. Most live on land but are forever tied to the water. Amphibians have a big advantage over fish, because they can travel between land and water at will. However, there is a hitch. Amphibian eggs do not have shells so they must be layed in the water. Furthermore, the young that hatch are fully aquatic creatures (tadpoles) that look like minnows. It is not until they sprout legs that they can walk away from the ponds and stream they were born in. Even then they can’t stray far from water or their moist skin will dry up. Amphibians include *frogs, toads, salamanders, and newts.*
* Reptiles (Class Reptilia)- have two major advantages over amphibians; their dry, scaly skin keeps in moisture, and their eggs have a leathery shell that holds in water too. This allows reptiles to live in hot dry places. However, just like their predecessors they are cold-blooded (ectothermic), which keeps them from living in cooler areas. Since they don’t have a source of internal heat, they must rely on the sun to heat themselves up, and some places just aren’t warm enough to keep them going. Reptiles include *Snakes, lizards, turtles, crocodiles, and alligators.*
* Birds- have feathers that allow them to fly, but they also have one other feature that allows them thrive almost anywhere. Birds are the first creatures to be warm-blooded (endothermic). That’s why there are penguins in Antarctica, but no snakes. Birds lay eggs like reptiles do, but their shells are harder, and must be incubated by their parent’s body heat. Birds include *pigeons, crows, chickens, and ducks*.
* Mammals- are top of the line vertebrates. They are warm-blooded and covered in hair. Female mammals keep their eggs inside of their bodies and give birth to live offspring. Perhaps the most amazing thing about mammals is that mammal mothers produce milk and feed their babies from their own bodies. Dogs, cats, squirrels, and bats are mammals. You are a mammal too.

**4Sb.2:** Explain how the characteristics of distinct environments (including swamps,

 rivers and streams, tropical rain forests, deserts, and the polar regions) influence

 the variety of organisms in each.

* If you drive across the U.S. you see that different places have different types of plants, and animals. The area around Phoenix, Arizona looks very different from the area around Washington, DC. This is largely due to the fact that climate and weather are different in different regions of the country. These unique areas support groups of plants and animals that are adapted to life in that area.
* Large geographic areas with unique plants and animals are referred to as *biomes.* Biomes themselves are broken up into smaller areas called *ecosystems.* Ecosystems are unique areas within Biomes where organisms interact with each other and their physical environment. For example, North Carolina falls within a Deciduous Forest Biome. However, within that Biome there are meadow, pond, stream, and mountain ecosystems

which are distinct from one another.

The main Biome types are:

* *Deciduous Forest Biomes-* are characterized by large forests that have trees that lose their leaves in the winter. These forests support many animals like deer, bear, squirrels, raccoons and song birds. The majority of the East Coast of the U.S. is deciduous forest.
* *Coniferous Forest Biomes (Taiga) -* are characterized by evergreen trees (conifers). They share many animals with deciduous forest biome, but have unique creatures like moose, wolverines, and elk. Coniferous forests are common in the Northern and North Western U.*S.*
* *Grassland Biomes-* are characterized by large flat prairies covered in grasses. There are few trees on these grasslands. Grasslands support interesting animals like buffalo, antelope, and prairie dogs. Most of the Midwest portion of the U.S. was originally a grassland prairie.
* *Desert Biomes-* suffer from a distinct lack of rainwater. The plants and animals found in Desert Biomes are uniquely adapted for life in a hot, dry world. Deserts are characterized by cacti and scrub bushes. Many reptiles and birds like the roadrunner call the desert home. The Southwestern U.S. is mostly desert.
* *Tundra Biomes*- Are a bit like frozen deserts. They have a lot of water but it is held in snow and ice. They are cold places that remain below freezing most of the year. They support a few mosses, lichens, and grasses, but no large trees. They are home to caribou, polar bears, seals, and snow hares. The Northern part of Alaska is Tundra.
* *Rainforest Biomes-* are found in tropical areas around the equator. They receive a great deal of rain and therefore support an amazing array of plants. Rainforests are often called jungles. They have more unique plants and animals than all the other biomes combined. Parrots, sloths, iguanas, and jaguars live in rainforests. Central and South America have large areas of rainforest.



 *Source:* [*www.somers.k12.ny.us*](http://www.somers.k12.ny.us)

* Different types of ecosystems include:
* *Wetland Ecosystems-* are areas between dry land and water. They are characterized by water saturated soils that support grasses, shrubs like cattails, and water tolerant trees like Cyprus and swamp oak. Wetlands are home to beavers, herons, ducks, and frogs. Wetlands are often called swamps, bogs, or marshes.
* *Meadow Ecosystems-* are open fields within larger biomes. Meadows have plants like grasses and shrubs, and are homes to rabbits, birds, mice, and turtles.
* *Aquatic Ecosystems-* are underwater ecosystems. They include freshwater ponds, streams, rivers, and lakes, and saltwater seas, oceans, and reefs.

**4Sb.3:** Explain how humans and other animals use their senses and sensory organs

 to detect signals from the environment and how their behaviors are influenced by these signals.

* A *stimulus* is anything that causes an organism to react or respond. These stimulus/response reactions drive the behavior of all organisms. For example, many trees respond to the shorter days of autumn by losing their leaves. At that same time of year, birds begin to migrate, and bears prepare for hibernation. Daily sunsets tell day-time (diurnal) creatures it’s time to go to sleep, but also let bats and other nocturnal animals know that it’s time to rise and shine. Animals also have built in responses to dangerous stimuli. For example, we run from fires and predators, drop hot potatoes, and jump up when we sit on a tack.

**4Sb.4:** Distinguish between the characteristics of an organism that are inherited and

 those that are acquired over time.

* The characteristics or features of an organism are called *Traits.* We are born with some of our traits, and we pick some of them up over time.
* Inherited Traits- are the characteristics that we are born with. They are determined by the unique combinations of genes we get from our parents. Hair color, eye color, bone length, and body type are examples of inherited traits.
* Genetic traits that help an organism survive (and reproduce) are typically passed on to that organisms offspring. This helps strengthen the overall species and supports its success over time.
* Acquired Traits- are habits or characteristics we pick up over time. Knowing how to read, write, and do math are acquired traits.

**4Sb.5:** Explain how an organism’s patterns of behavior are related to its environment

* In order for an organism to succeed, it must be both physically and behaviorally adapted to life in its environment. Physical characteristics like camouflage coloration or antlers are important for an organism’s survival. However, behavioral characteristics like hiding from predators or digging burrows are equally important.
* Just as organisms are physically matched to their environments, they are behaviorally matched as well. For example, zebras travel in large herds as protection from lions, and alligators remain motionless for hours waiting for potential prey. Many species of birds in northern latitudes migrate south in the winter. Tropical birds do not display that behavior, as they don’t have weather extremes to contend with.

**4Sb.6:** Explain how organisms cause changes in their environment.

* We’ve established that the environment molds the organisms that live in it. Organisms change in response to changes in their environment. Inversely, organisms can cause changes in their environment. For example, beavers drastically change the areas they build dams in. Their dams flood streams and turn forests and fields into wetlands. Earthworms continually enrich soil as they eat their way through it. This changes the soil, making it better for plants to grow in. Humans have changed the earth more than any other species in history. We alter the environment to better suit us. We cut down forests, build roads and homes, and grow crops on farms. Some of the changes that humans make are beneficial. Some of the changes we make are harmful to other organisms.
1. **Suggested Resources:**

The following sites provide activities and ideas in support of the above standards. Some can be used as is; others may need to be leveled for use in the fourth Grade classroom. All of them can be used as references to provide ideas for assisting your instruction.

**4Sb.1:** Classify organisms into major groups (including plants or animals, flowering or

 non-flowering plants, and vertebrates [fish, amphibians, reptiles, birds, and

 mammals] or invertebrates) according to their physical characteristics.

<http://www.kidsbiology.com/biology_basics/classification/classification1.php>

<http://www.squidoo.com/kidsinvestigatetheanimalkingdom>

<http://sciencenetlinks.com/media/filer/2011/10/04/classification.swf>

**4Sb.2:** Explain how the characteristics of distinct environments (including swamps,

 rivers and streams, tropical rain forests, deserts, and the polar regions) influence

 the variety of organisms in each.

<http://environment.nationalgeographic.com/environment/freshwater/aquatic-ecosystems/>

<http://kids.nceas.ucsb.edu/biomes/freshwater.html>

<http://sofia.usgs.gov/virtual_tour/kids/ecosys.html>

<http://www.kidsgeo.com/geography-for-kids/0165-biomes.php>

**4Sb.3:** Explain how humans and other animals use their senses and sensory organs

 to detect signals from the environment and how their behaviors are influenced by these signals.

<http://www.coolscienceexperimentsforkids.com/2009/06/stimuli-and-response/>

<http://herbarium.desu.edu/pfk/page11/page12/page13/page13.html>

<http://animals.about.com/cs/zoology/a/aa061801a.htm>

<http://faculty.washington.edu/chudler/amaze.html>

<http://scienceline.ucsb.edu/getkey.php?key=1014>

**4Sb.4:** Distinguish between the characteristics of an organism that are inherited and

 those that are acquired over time.

<http://www.brainpop.com/science/ecologyandbehavior/behavior/preview.weml>

<http://www.ehow.com/about_6327721_animal-instinct-vs_-learned-behavior.html>

<http://animalbehaviour.net/KidsPages/KidsStuff.htm>

**4Sb.5:** Explain how an organism’s patterns of behavior are related to its environment

<http://www.nature.com/scitable/knowledge/library/both-environment-and-genetic-makeup-influence-behavior-13907840>

<http://www.epa.gov/climatechange/kids/impacts/effects/ecosystems.html>

<http://www.learningscience.org/lsc1corganisms.htm>

**4Sb.6:** Explain how organisms cause changes in their environment.

<http://www.biokids.umich.edu/guides/tracks_and_sign/build/>