Teacher:	Subject and Grade Level: **Henry the Hedgehog Takes a Nature Walk** Biology, Ecology, Polymers Grades 1 – 5	Date

Lesson objectives: Students will follow along with the story of Henry the Hedgehog as he looks for a suitable place to have lunch and take a nap. This interactive story line will expose students to the **#Biology** and habitat of this charming and unique animal, the **#Ecology** of the moss that he finds; and then students will engage in a fun, hands-on experiment with Henry that introduces them to **#Polymers**.

MS-CCRS or NGSS Standards:

L.1.4 Adaptations and Diversity

Conceptual Understanding: Plants respond to stimuli to adapt to changes in the environment. There are distinct environments in the world that support certain types of plants. Plants have features that help them survive in their environment.

L.1.4 Students will demonstrate an understanding of the ways plants adapt to their environment to survive.

L.1.4.1 Explore the cause-and-effect relationship between plant adaptations and environmental changes.

L.1.4.2 Describe how the different characteristics of plants help them to survive in distinct environments.

L.2.1 Hierarchical Organization

Conceptual Understanding: Animals have unique physical and behavioral characteristics that enable them to survive in their environment. Animals can be classified based on physical characteristics.

L.2.1 Students will demonstrate an understanding of the classification of animals based on physical characteristics.

L.2.3 Ecology and Interdependence

Conceptual Understanding: Animals thrive in environments where their needs (air, water, food, and shelter) are met. The environment where plants and animals live sometimes changes slowly and sometimes changes rapidly.

L.2.3A Students will demonstrate an understanding of the interdependence of living things and the environment in which they live.

Conceptual Understanding: All animals and plants need food to provide energy for activity and raw materials for growth Animals and plants have physical features and behaviors that help them survive in their environment. All living things in an environment interact with each other in different ways and for different reasons.

L.2.3B Students will demonstrate an understanding of the interdependence of living things.

L.2.4 Adaptations and Diversity

Conceptual Understanding: Living things need air, food, water, and space to survive. Different

environments support different types of plants and animals. Animals have adaptations allowing them to grow and survive in the climate of their specific environment.
L.2.4 Students will demonstrate an understanding of the ways animals adapt to their environment in order to survive.

L.3.1 Hierarchical Organization
Conceptual Understanding: Plants and animals have physical characteristics and features that allow them to receive information from the environment. Structural adaptations within groups of plants and animals allow them to better survive and reproduce in an environment.
L.3.1 Students will demonstrate an understanding of internal and external structures in plants and animals and how they relate to their growth, survival, behavior, and reproduction within an environment.
L.3.1.1 Examine evidence to communicate information that the internal and external structures of animals function to support survival, growth, and behavior.
L.3.1.2 Examine evidence to communicate information that the internal and external structures of plant function to support survival, growth, behavior, and reproduction.

L.3.4 Adaptations and Diversity
Conceptual Understanding: When the environment or habitat changes, some plants and animals survive and reproduce, some move to new locations, and some die.
L.3.4 Students will demonstrate an understanding of how adaptations allow animals to satisfy life needs and respond both physically and behaviorally to their environment.
L.3.4.1 Obtain data from informational text to explain how changes in habitats (both those that occur naturally and those caused by organisms) can be beneficial or harmful to the organisms that live there.

L.4.2 Reproduction and Heredity
Conceptual Understanding: Scientists have identified and classified many types of plants and animals. Each plant or animal has a unique pattern of growth and development called a life cycle. All of Earth's cycles are driven by energy which can be traced back to the sun.
L.4.2 Students will demonstrate an understanding of life cycles, including familiar plants and animals.
L.4.2.1 Compare and contrast life cycles of familiar plants and animals.

L.5.3 Ecology and Interdependence
Conceptual Understanding: All organisms need energy to live and grow. Energy is obtained from the sun. Cells transform the energy that organisms need to perform essential life functions through a complex sequence of reactions in which chemical energy is transferred from one system of interacting molecules to another.
Conceptual Understanding: A major role an organism serves in an ecosystem can be described by the way in which it obtains its energy. Energy is transferred within an ecosystem by producers, consumers, or decomposers. A healthy ecosystem is one in which a diverse population of life forms can meet their needs in a relatively stable web of life.
L.5.3B Students will demonstrate an understanding of a healthy ecosystem with a stable web of life and the roles of living things within a food chain and/or food web, including producers, primary and secondary consumers, and decomposers.

L.5.3B.1 Obtain and evaluate scientific information regarding the characteristics of different ecosystems and the organisms they support.
L.5.3B.2 Develop and use a food chain model to classify organisms as producers, consumers, or decomposers. Trace the energy flow to explain how each group of organisms obtains energy.

Safety: Monitor younger students while using toothpicks to avoid injury.

Materials (per table):

- Exploration activity sheet
- Small plastic hedgehogs (one per student)
- Moss (enough for each student to have a piece)
- Small, shatterproof magnifying glass (one per student)
- Zip top, rectangular snack bag (one per student) with hedgehog outline drawn onto it
- Wooden toothpicks (10 – 15 per student, likely one to two boxes per classroom)
- Teacher will supply water to fill and seal snack bags before lesson.

ENGAGEMENT

I'd like to know who in here has ever taken a walk through the forest? *Allow for response.*
I'm wondering if you've ever seen a bunch of short, green, squishy plants living on big rocks and wood along the forest floor? *Allow for response.* Today we are going to follow our little friend, Henry the Hedgehog as he takes a walk through the forest and looks for a suitable place to have lunch and take a nap.

EXPLORATION

Ask: Who can tell me some facts about hedgehogs? Where do they live? What do they eat? Do they like to live alone or in groups? How do they protect themselves? I'd like you to look at your activity sheet and see if you can circle the answers to some of these questions before we start. I'm going to give you a couple of minutes to do that, and then we will discuss them and see if you are correct. *Provide fact sheet on hedgehogs with picture choices for students to circle.*

Elaborate/Explain that Hedgehogs are small, spiny animals that are primarily nocturnal. They sleep for a large portion of the day under bushes, grasses, rocks, or most commonly in dens dug underground mostly in dry, woodland areas. Hedgehogs are insectivores and eat all sorts of invertebrates, birds' eggs, and newborn mice. They are partial to soft fruit in autumn. Hedgehogs are solitary animals and are not social. They are known to curl into a prickly ball when attacked, which deters most predators.

- L.2.1, L.2.3, L.2.4, L.3.1

Ask: Today, Henry the Hedgehog is taking a walk through the woods. He finds an old rock wall covered in soft, green moss. He wonders if this might be a good place to take a nap or find some lunch. Henry is an expert at forest plants, but what do you know about these plants? Let's return to our fact sheet and see how many moss facts you get right. *Students complete fact sheet for moss.*

Engage and **Explore** students in Discussion.

Tell me about some of the moss facts that you chose. *Allow students to provide feedback on answer choices.* Let's talk about the moss that Henry found and see if you were correct.

Elaborate/Explain

- Moss is one of the oldest and most diverse plant species on the planet, with over 25,000 varieties in existence!
- Moss was one of the very first land plants and was able to spread across the entire globe.
- Mosses are important for many reasons for life on Earth, such as providing a great habitat and source of food for insects and other invertebrates.
- Mosses are Bryophytes, which are a group of small, non-vascular flowerless plants. That means they have no roots or vascular tissue, but instead absorb water and nutrients from the air through their surface (e.g., their leaves).
- Most of them only grow a few centimeters in height, and since they don't need roots, they can grow in places that other plants cannot, like on the surface of rocks, walls, pavement, etc. They typically form dense green clumps or mats, in damp or shady locations.
- Moss is considered a decomposer because it lives on organic substrates. The shady forest floor is a great place for mosses because decaying leaves, logs and soil provide the necessary nutrients and moisture for moss to grow. Mosses have adapted to these environments and play a crucial role in the decomposition process.
- They are not like most plants that have flowers, seeds, and roots. Instead, they produce spores and have stems and leaves. Because mosses are non-vascular (unlike regular flowering plants), they have adapted special ways to avoid drying out when there isn't enough rain or water around. They grow in short, matted clumps to help prevent evaporation; and when they do get dried out, they become dormant for a while until there is sufficient moisture again.
- Mosses are commonly used for decorative purposes, such in gardens and by florists. Mosses can also be used as insulation and for their ability to absorb liquids up to 20 times their weight.
- Moss is a keystone genus and benefits habitat restoration and reforestation. Certain kinds of mosses have been used for cleaning up oil spills, filtering drinking water, and even as dressings on wounds.
- L.1.4, L.2.3, L.3.1, L.3.4, L.4.2, L.5.3

Ask: Oh my gosh! After eating his lunch, Henry the Hedgehog looked down and noticed that he has lost his spikes! *Show snack bag filled with water but no "spikes."* His spikes are what he uses to defend himself against predators. I have an idea… Let's give him back his spikes so he will feel safe enough to curl up in the moss and take a nice nap. What do we have that we can use to make spikes for Henry? *(allow students to answer: toothpicks)* What will likely happen if we poke toothpicks into these snack bags that are full of water? *Students will probably say that water will leak out.* Who would like to try an experiment to test out that idea and see if that "hypothesis" is true or not. *All student response.*

Explore: Let's each work together to carefully give Henry his spikes back. Take a toothpick and carefully poke it into each of the dots marked on Henry's outline. Once the toothpicks are "in" the bag, just leave them alone and don't wiggle them around. *Allow time for students to do this activity.*

Teacher Note on Activity –

Step 1. Get a ziptop plastic bag and draw your little hedgehog! (if not provided already)

Step 2. Pour water inside the plastic bag, fill it up to three-fourths, and lock it. Make sure it is zipped well and no water leaks from the opening.

Step 3. Now grab the toothpicks and start putting the hedgehog's "spikes!"

Step 4 Observe the hedgehog. Is it leak-proof? How did this happen?

EXPLANATION

What is the science behind this hedgehog activity? Is it magic? How did this drawn hedgehog become leak-proof even after pricking it with toothpicks?

It's not magic, but we can explain it with science! You see, plastics are made up of **polymers**. These polymers are long and flexible chains of molecules. If you try to forcefully break them (like by poking them with a stick), they will immediately pull back together, resulting in a seal forming around the stick!

EXTEND

To extend your discoveries, try different scenarios and find out if the results would be different!

- Try a bigger stick or a pencil.
- Try to poke it all the way through the plastic.
- Try to wiggle the stick to make a bigger hole.
- Try to pull out the stick and put it back.
- What happened when you did this? Discuss your observations and findings!

EVALUATION

To summarize, we learned that mosses provide food, shelter and homes for a wide variety of wildlife as well as producing oxygen, absorbing carbon and air pollution, preventing soil erosion and retaining and filtering water. There are over 25,000 species of moss in the world, and they collectively capture more carbon than trees. I believe we have decided that the moss is a great place for Henry the Hedgehog to find lunch and safely take a nap.

REFERENCES

https://ypte.org.uk/factsheets/hedgehog/hedgehog-habits
https://ypte.org.uk/factsheets/hedgehog/hedgehog-habits
https://www.nationalgeographic.com/animals/mammals/facts/hedgehog
https://en.wikipedia.org/wiki/Hedgehog
https://animalcorner.org/animals/hedgehog/
https://www.semanticscholar.org/paper/Sphagnum%E2%80%94A-Keystone-Genus-in-Habitat-Restoration-Rochefort/5f7a9223a99a3b9dacfb070b24be93d0873dd323
https://stri.si.edu/story/bryophytes

Materials Ordering Information

Hedgehog figurines: ($9.99/25pc)

https://www.amazon.com/Hedgehog-Toy-Figurines-Decoration-Cognitive/dp/B0C2J84MMB/ref=sr_1_9?crid=2XCDWJV6Y28T8&keywords=hedgehog%2Btoy&qid=1706893331&sprefix=hedge%2Caps%2C117&sr=8-9&th=1

Moss: ($9.99/box)

https://www.amazon.com/Artificial-Decorative-Centerpieces-Christmas-Planters/dp/B0B5DDYFFF/ref=sr_1_45?crid=17OPD95Q50Y95&keywords=moss%2Bballs&qid=1706893559&sprefix=moss%2Caps%2C105&sr=8-45&th=1

Handheld, shatterproof magnifying glasses: ($14.99/24)

https://www.amazon.com/Magnifier-Magnifying-Classroom-Observation-IRCHLYN/dp/B07S3PP73G/ref=sxin_14_pa_sp_search_thematic_sspa?content-id=amzn1.sym.92181fe7-c843-4c1b-b489-84c087a93895%3Aamzn1.sym.92181fe7-c843-4c1b-b489-84c087a93895&crid=23XN8DM0RUBTS&cv_ct_cx=shatterproof+magnifying+glass+for+kids&keywords=shatterproof+magnifying+glass+for+kids&pd_rd_i=B07S3PP73G&pd_rd_r=b8f20059-d7aa-4dac-92a4-c9c35b5b069e&pd_rd_w=vNiIH&pd_rd_wg=YsbYG&pf_rd_p=92181fe7-c843-4c1b-b489-84c087a93895&pf_rd_r=KDRPXQZRAEGB7EPXEMT4&qid=1706893709&sbo=RZvfv%2F%2FHxDF%2BO5021pAnSA%3D%3D&sprefix=shatterproof+mag%2Caps%2C109&sr=1-3-364cf978-ce2a-480a-9bb0-bdb96faa0f61-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9zZWFyY2hfdGhlbWF0aWM&psc=1

Snack bags: ($7.31/box; 0.02/ea)

https://www.amazon.com/Amazon-Basics-Storage-Previously-Solimo/dp/B095PMD8JG/ref=sr_1_1_ffob_sspa?crid=2F9U03U1GDWZG&keywords=snack+bags&qid=1706894132&s=home-garden&sprefix=snack+b%2Cgarden%2C119&sr=1-1-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&psc=1

Single point wooden toothpicks: ($5.29/1500 classroom kit)

https://www.amazon.com/Bamboo-Wooden-Toothpicks-Count-Single-Point/dp/B094PFJ5TF/ref=sr_1_8?crid=1LAKKQ96SUX2R&keywords=toothpicks%2Bwood&qid=1706894200&s=home-garden&sprefix=tooth%2Cgarden%2C110&sr=1-8&th=1