

**NYSSLS 5-E Lesson Planning Template**

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<b>Grade/Grade Band:</b> Preschool/Pre-K - 4	<b>Topic:</b> STEAM/Project-based Learning	<b>Lesson # 1-6 in a series of 6+lessons</b> <b>Lessons length - 20 - 60 minutes each</b> <b>*These lessons could be used as parts in a larger unit and could easily be modified to fit timeframe restrictions*</b>
<b>Brief Lesson Description:</b> Students will dive into the relationship an animal ( the Eastern Gray squirrel) has with itself, its biological parents and its environment. The knowledge presented over this series of lessons will give students a deeper understanding of what an organism needs to survive as well as how that organism comes to express specific traits that aid in its success. Students will also deepen their understanding of the elements a habitat must possess to be helpful in survival. Students will then use this knowledge to participate in Squirrel Mapper, a real citizen science research project. These lessons can be taught in sequence or separately, they can be taught as stations or individually to supplement existing content. They can also be modified to suit all grade levels and background knowledge.		
<b>Performance Expectation(s):</b> <b><u>NYS Preschool Learning Standards</u></b> <ul style="list-style-type: none"><li>● P-LS1-1. Observe familiar plants and animals (including humans) and describe what they need to survive.</li><li>● P-LS3-1. Develop a model to describe that some young plants and animals are similar to, but not exactly like, their parents.</li></ul> <b><u>NYS Kindergarten Learning Standards</u></b> <ul style="list-style-type: none"><li>● K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.</li><li>● K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.</li></ul> <b><u>NYS First Grade Learning Standards</u></b> <ul style="list-style-type: none"><li>● 1-LS3-1. Make observations to construct an evidence-based account that some young plants and animals are similar to, but not exactly like, their parents.</li></ul> <b><u>NYS Second Grade Learning Standards</u></b> <ul style="list-style-type: none"><li>● 2-LS2-2. Develop a simple model that illustrates how plants and animals depend on each other for survival.</li><li>● 2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.</li></ul> <b><u>NYS Third Grade Learning Standards</u></b> <ul style="list-style-type: none"><li>● 3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.</li><li>● 3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.</li><li>● 3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.</li></ul> <b><u>NYS Fourth Grade Learning Standards</u></b> <ul style="list-style-type: none"><li>● 4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.</li><li>● 4-LS1-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.</li></ul>		
<b>Specific Learning Outcomes:</b> <ul style="list-style-type: none"><li>● Students will be able to describe characteristics (provide at least one example) a gray squirrel (of any color) needs to survive.</li><li>● Students will be able to describe similarities and differences between offspring and their biological parents (genetic variation - a gray/black/white/brown black coat on an offspring whose parents possess different gene combinations).</li><li>● Students will be able to explain how EGS use their external parts to help them survive in the environment (providing at least one example like coat color, feet mechanisms, tail).</li><li>● Students will be able to explain how plants and animals depend on each other for survival.</li><li>● Students will be able to identify and list what animals need to survive.</li><li>● Students will be able to explain why different animals are found in different habitats.</li><li>● Students will be able to explain, using evidence, that plants and animals have traits inherited from their parents and that variation of these traits exists in a group of similar organisms.</li><li>● Students will be able to explain,using evidence, that traits can be influenced by the environment.</li><li>● Students will be able to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.</li></ul>		

**Narrative/Background Information**

**Prior Student Knowledge:**

**Before the introduction of these lessons...**

- Students should have some knowledge of basic needs for survival (food, water, shelter)
- An understanding that offspring are born via their biological parents and possess physical similarities and differences related to their parents genome.
- Background knowledge of local animal and plant species (specifically squirrels) and where they are found/live.
- How animals are able to blend into their surroundings (camouflage).
- An understanding of living vs. nonliving things

**Science & Engineering Practices:**

**Pre-K:**

Planning and Carrying Out Investigations  
Obtaining, Evaluating, and Communicating Information

Constructing Explanations and Designing Solutions

**Kindergarten:**

Analyzing and Interpreting Data  
Obtaining, Evaluating, and Communicating Information

Constructing Explanations and Designing Solutions

**1st Grade:**

Constructing Explanations and Designing Solutions

**2nd Grade:**

Planning and Carrying Out Investigations

**3rd Grade:**

Constructing Explanations and Designing Solutions

**4th Grade:**

Engaging in Argument from Evidence

**Disciplinary Core Ideas:**

**Pre-K:**

**LS1.A:** Structure and Function

**LS3.A:** Inheritance of Traits

**LS3.B:** Variation of Traits

**Kindergarten:**

**ESS3.A:** Natural Resources

**1st Grade:**

**LS1.D:** Information Processing

**LS3.A:** Inheritance of Traits

**LS3.B:** Variation of Traits

**LS1.D:** Information Processing

**2nd Grade:**

**LS4.D:** Biodiversity and Humans

**LS2.A:** Interdependent Relationships in

Ecosystems

**3rd Grade:**

**LS3.A:** Inheritance of Traits

**LS3.B:** Variation of Traits

**4th Grade:**

**LS1.A:** Structure and Function

**Crosscutting Concepts:**

**Pre-K:**

Systems and System models  
Structure and Function

**Kindergarten:**

Patterns

**1st Grade:**

Patterns

Structure and Function

**2nd Grade:**

Cause and Effect

Structure and Function

Patterns

**3rd Grade:**

Cause and Effect

**4th Grade:**

**LS1.A:** Structure and Function

**Possible Preconceptions/Misconceptions:**

Confusion between living and nonliving things

All Squirrels live in the forest

Gray and black squirrels are different species of squirrels

Physical traits are random

What a scientist is/does

**Teaching Materials:**

- Computer/printer
- paper/markers
- glue/scissors
- squirrel mapper website and links on "additional resources" page

Other optional materials:

- ipad/tablet devices
- animal figurines
- ability to laminate materials
- Picture books on squirrels or forest animals (can be used as a lesson hook) (a few examples -below):
  - The very hungry caterpillars forest hide and seek – Eric Carle
  - The Busy Little Squirrel by Nancy Tafuri
  - The Leaf Thief By Alice Hemming
  - Counting on Fall by Lizzan Flatt

**Handout/Activities**

- [Lesson 1 – Nature Walk Summative Assessment](#)
- [Lesson 2 -- Survival trait cards activity cards \(printed and laminated if possible\)](#)
- [Lesson 4 -- Animals match cards](#) and [Animal match cards - habitat version](#)
- [Lesson 5 -- Habitat Poster example](#)

- Lesson 6 --Great examples of animal camouflage can be found from these two links:
  - [National Geographic Animals in concealment](#)
  - [Project Learning Tree examples of camouflage](#)

**Safety:**

Constant student supervision when walking around outside the classroom  
Any preparations for students with outdoor allergies or disabilities

**LESSON PLAN – 5-E Model**

**ENGAGE: Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions:**

Lesson Hook:

1. **Introductory conversation with students**

**Possible script:**

- Have students gather in a circle on the floor and tell them that we are going to be working as **scientists** today!
- Ask them, “What is a **scientist**?” Take some time to discuss this. Talk about what a scientist looks like. You can show images of different scientists (those in more stereotypical outfits with a whitecoat, goggles, and then others that show people doing field work or exploring something in their field. This is a great opportunity to address any misconceptions about how a scientist might appear)
  - “A **scientist** is a person who works to learn as much about our world and environment as possible. They look very closely at things around us, and in nature, sometimes using tools and performing experiments, all to find out new information.”
- Ask if they know what an **experiment** is. (Take some time to hear answers from the students.)
  - **Experiments** are tests scientists do to see if things are the way they seem. “So today we are going to work as a scientist, a biologist actually!
    - A **Biologist** is a special type of scientist that studies living things.”
  - Are you ready to get started?! As a biologist, we need to first **observe** (to watch, look at, see) living things.
  - “Where do you think we can find some living things (helpful if students understand/have had a lesson on **living vs. nonliving**)?” “Right, we need to go outside!” (if this is not possible for your class then see other options listed under modifications.)
  - “When we get outside we are going to look all around for all living things! This includes plants, animals, and insects.” But one animal we are going to keep a close eye out for is... (here you have the option to announce the special creature or play a game with students to guess it.)
    - Play a game of “*I am thinking of an animal...*” Give the students three clues to guess a gray squirrel. Use manipulatives here if possible. A piece of furry material, something that is the color gray, a nut, something that is sharp (like their teeth)
    - Alternative games – play “I spy” outside, a memory game, or create a virtual puzzle that slowly reveals a photo of a squirrel.
    - Once they guess it, show them a picture to confirm everyone will be looking for the same thing.

*\*Despite the length of this intro, the conversation and guessing games are not meant to exceed approximately 5-10 minutes and will greatly depend on students' prior knowledge/attention span.\**

**EXPLORE: Lesson Description –**

**Lesson 1 -- A walk outside**

**(modification -- a window watch or video)** Please remember to go over any safety rules regarding leaving the school building.

- a. Take the students outside and remind them what they are doing/looking for.
  - “While we walk, we are going to look for anything that is alive! Keep a special eye out for squirrels. We are trying to find them today! We also want to look at where each living thing is located (is it in the grass, a tree, the sky?). What is it doing and what does it need to **survive** there?.” (Survive - to be able to continue living).
  - “When you notice something, yell it out! (Teachers need to keep a list of everything that is found, where it is found and a photograph with the exact location.)
  - Teachers -- It is important for reporting purposes within the SquirrelMapper project, to record any squirrels that are identified while on the walk and the location they are spotted. If there are devices available for student use, have them help by taking photos themselves. This could be a fun way to implement technology and deepen the investigation for them.
    1. At the end of the walk, having a collection of photos of all the living things that were found will greatly help the students recall the activity the next day as well as further extend the conversation and activities in the following lessons.
- b. Lead a nature walk around your campus (include a wooded area if possible) so that students can see as many living things as possible.
- c. The hope is that students will see some of the following; birds, chipmunks, squirrels, other small mammals, insects, amphibians (salamanders and frogs/toads), reptiles (turtles), trees, flowers, other students and teachers. Nothing is too

- small to stop and investigate.
- d. As each new living thing is identified, ask questions like;
    - Where does that creature live?
    - What does this creature eat?
    - What does this creature need to survive?
    - Do any of these things work together?
    - Do they need each other?
  - e. Have students take turns yelling out what they see or play a game of iSpy to jumpstart the process. Make sure to stop and look at any and all living things that students find and are interested/excited about.
  - f. Additionally, if you have access to magnifying glasses, this can be helpful to look more closely and work like a biologist. All sightings are good opportunities to support their ideas and how they relate to the objective of the lesson. If possible, have the students help to take a photo of any living thing they find.
  - g. Whenever you notice a gray squirrel, photograph and note their location. (*This photo can later be uploaded to iNaturalist, which is the data collection site for the citizen science study. Students can then see how their work is used in a real life science. Visit the SquirrelMapper website for more info on this or reference the SquirrelMapper lesson below.*)
  - h. Summative assessment – Box sketch – have students draw organisms they saw on the walk as well as circle one item that each organism needs to survive/succeed in their habitat. For older students, they should elaborate in their explanations. Handout linked [here](#). Students can complete the handout to the best of their ability and it can be reviewed after lesson 2 the following day. In Lesson 2 students will deepen their knowledge of survival. Afterwards students can make changes to their worksheet based on what they have learned.
  - i. **Elaborate** : Have students each bring in two toilet paper rolls or one paper towel roll. Have them decorate the rolls and then glue them together along the center. Attach a string to act as a neckband. These will become students' binoculars to take outside on the walk.

## Lesson 2 -- Needs for survival

- a. Open with a story (a list of picture books can be found [here](#))
  - b. Review activities from the previous day
    - Have everyone gather together in a circle.
    - Talk briefly about what organisms were found on the walk the day before.
    - Review key terms discussed in the first lesson (**scientist, biologist, experiment, observe, living, nonliving, survive**).
    - Review photos taken the previous day.
  - c. Play "How would you survive?" card game with students
    - Scatter [survival cards](#) in the center of the circle
    - As you review each creature that you saw on the walk, ask the students to take and hold up a card from the pile that represents what it needs to survive. (Cards include images representing food, water, shelter, camouflage, air, friends, sunshine, body parts (ears, nose, tail, etc), and senses (add more or fewer choices depending on your groups).
    - These cards can be as simple as including food, water, shelter, air or can have many other choices. Review choices until only the correct survival cards are left in the air.
    - Elaborate: Print, cut out and laminate the acorn cards linked [here](#). Attach a paperclip to each acorn card. Then attach a string to a stick/wooden dowel and cut out a stencil of a squirrel paw. Attach a small magnet to the paw and then attach the paw to the string. Let the students stretch the string to grab a card from the center of the pile as if a squirrel arm is reaching for an acorn. Squirrel paw stencil linked [here](#).
  - d. Identify *specific* physical characteristics that organisms possess to help them to survive. For the squirrel - A bushy tail, specialized feet, coloring for camouflage, sharp teeth etc. Additional background information can be found on the [SquirrelMapper website](#) at the bottom of the page.
    - Discuss 2-3 creatures with specialized traits, making sure to discuss the Eastern Gray Squirrel (EGS). *If you did not see an EGS on the walk, talk about what you might have seen on another walk and fill in the blank with EGS.*
      1. Specific traits of the EGS that assist in survival include coat color, hind feet, specialized teeth, eye lenses. \*For more information please use the [SquirrelMapper](#) website and introductory powerpoint (found in the **FOR EDUCATORS** tab under additional resources, scroll to the bottom of the page.)
      2. To further connect ideas, look at photo/video of a squirrel in nature (while they climbs trees using specialized feet), running around in winter time (fur coat to stay warm), sharp teeth (to crack open nuts/feed/gnaw), bushy tail (for balance), using a gray coat to camouflage in the forest and a black coat to stand out in an urban environment (both positives for survival in their specific habitat)
    - Discuss the EGS variation in coat color (gray or black coat color) and how that is a trait that it can get from its parent, even if the parents coat color is different from its offspring.
- d. Finish the lesson with a song/dance:

- [https://youtu.be/-DLOW8LBSSU?si=lZ7gHJ\\_Pit2\\_D5rB](https://youtu.be/-DLOW8LBSSU?si=lZ7gHJ_Pit2_D5rB) – gray squirrel song version 1
  - <https://youtu.be/5uf3WwYfUYw?si=iNVls4evn-N8JMLK> – gray squirrel song version 2
  - [https://youtu.be/J1U5i\\_scF\\_M?si=E-TFIRKFOGGttGVe](https://youtu.be/J1U5i_scF_M?si=E-TFIRKFOGGttGVe) – gray squirrel family song version 3
- e. Summative assessment – Box sketch – Handout linked [here](#). Have students review their work from the previous lesson and make changes (in another color) so you can see what they have learned and how they better understand the concepts.

### **Lesson 3 -- Explore iNaturalist**

(Prior to this activity, make an account on iNaturalist for the Class/Teacher/Students depending on your district permissions)

- a. Lesson Hook -- show students a video from the "[additional materials](#)" page.
- Two good options:**
- i. Ninja Warrior Squirrel Obstacle course
  - ii. Squirrels in the forest
- b. Instruct students to look closely for what body parts the squirrel has to help him survive. After the video, have students draw a picture of one specialized part of the squirrel's body and how it was used to help them survive.
- c. Assessment - Share and then discuss the drawings with the class
- d. Use the [iNaturalist Squirrel Mapper](#) website to show students how to map the photos of squirrels that were taken during the nature walk (<https://www.inaturalist.org/projects/squirrelmapper>)
- e. Take a look at the website with students and show them how the photos they took on their nature walk will become part of the citizen science data.
- f. \*This activity could be used to introduce students to the Squirrel Mapper project, as part of a hook, and to show the different variations of the EGS.
- g. If students were able to take their own photographs during the nature walk at school or from home, and have devices/permissions they can upload the photos themselves to the iNaturalist website.

### **Lesson 4 -- Make a Match**

This lesson highlights genetic variation in its most basic understanding. The emphasis of this lesson is on similarities and differences in the appearance of offspring from their biological parents.

- a. Have students sit in a large circle and scatter animal match cards (linked [here](#) and in the materials section) around the center of the circle. These photo cards should be of various animals as juveniles and adults, or siblings. Have the students match up the photos as best they can. Which parent/sibling looks most related to each other. Go around the circle letting each student/pair of students make a match. This game will be repeated in a few rounds so that there are enough pairs of animal cards for each child to take a turn. Alternatively you can flip the cards over and play a memory match game with older groups.
- b. We want students to identify pairs and then be able to explain the reason for their choice. What evidence do they have that the two are related, or why they are not. This opens up the discussion regarding inheritance of traits. Offspring get their physical traits from their biological parents, but they are not exactly the same. Please refer back to the SquirrelMapper website for background information to help you talk through this with your students. A punnett square of the parent/offspring combinations can be found in the tutorial of the squirrel reproduction game [here](#). Click NEXT until the chart appears.
- c. Especially important to highlight are the pairs of squirrel photos (with a gray squirrel and a black color morph being a related pair). Other great examples of color variations linked [here](#). These pairs will provide students with context for variability in traits passed from parents to offspring. It is likely students will only have reference for adult and baby animals that look very similar to each other.
  - We want students to use their own background knowledge of habitats to identify places that each species would best survive. This round of the game opens up the discussion of habitats and items that all species need to survive. A discussion of each matching pair also allows students to learn how an animal's body parts are often equipped to best suit their specific habitat.
    1. Vocabulary to focus on here -- **genes** and **trait**
    1. **Trait** - a characteristic we use to describe a person/animal/organism (i.e. hair or eye color, height)
    2. **Genes** - a code that tells the trait what to do or what to show - they are like directions
- d. A second round of this game can be played - using photos of animals matched to their habitat. Continue allowing students to go around the circle and choose a matching pair.
- e. Summative questions to ask:
  - Do organisms need to look alike to be from the same parent?
  - Do organisms need to live in the same place if they are the same species?
  - What makes a habitat a good place for an organism to live?

### **Lesson 5 -- Where Should They Stay? (3rd/4th grade)**

- a. This hook activity will allow students the opportunity to design and defend what they believe is the best habitat for an ESG and the black color morph.
- b. Provide Students with poster paper, coloring supplies, scissors, glue and cut out photos of a gray and black EGS (one set per group). If you have magazines with outdoor scenes that would be a fun addition.

- c. Review different kinds of habitats with students and remind them to draw on their own experiences of these creatures to develop their ideas.
- d. On half of the poster paper have students draw a habitat they believe is best suited for the gray coat, and on the other half, draw a habitat that is best suited for the black color morph. (An example of how to set up the poster paper can be found [here](#)).
- e. Students should then make a list of bullet points to explain and defend their ideas.
- f. After students have drawn their designs, they will present their ideas to a partner. Afterwards, the teacher may choose to have students go around the room and briefly and present their ideas to the class. Students can ask questions of each group and they will get to see how their ideas compare to others in the class.
- g. After briefly presenting their poster, students are asked to further research this topic. Students can then draw conclusions from their research related to what they believed was the most advantageous habitat. After sufficient time to research, the teacher will lead a discussion from hearing what students learned.

**Lesson 6 -- Play Squirrel Spotter** ([SquirrelSpotter linked here](#))

- a. Hook - Camouflage scavenger hunt.
  - In your classroom, hide animals (figurines or photos) in a way that they are camouflaged. Also hide some so that they are obvious and easy to spot. (alternatively this can be played outside).
  - When students find an animal, ask them to note why it was easy or difficult to spot the animal.
    - 1. Modification: Hold up photographs of animals that are camouflaged and those animals within a habitat where they are easy to spot. (resources to help review camouflage are linked in the teaching materials section).
- b. Activity: Play Squirrel Spotter -- website [here](#).
  - Ideally, if devices are available, students can work individually or in pairs to play. Alternatively they can play as a large group, taking turns or asking an audience to locate the squirrel in each photo. At the end of the game their data will appear in a graph that outlines their success spotting squirrels.
- c. Review students results
  - Help students make connections by looking over the data. How does their success compare to the average? What did they believe to be the most difficult to spot? Why?
- d. Have a discussion regarding squirrel coat color and location. Ask simple questions to make sure students understand the point of how different habitats are beneficial for squirrels with different coat colors (and other species of animals).
  - “Where was it easiest to see the black squirrels?”
  - Why was it hard to find the gray squirrels in the forests?
- e. Play a class round of the game and note what was learned through the discussion.
- f. Elaborate: For older grade levels –Teach and then play another interactive video game on the SquirrelMapper website linked [here](#). This game will provide an opportunity to build a squirrel population based on genetics and habitat constraints.

**EXPLAIN: Concepts Explained and Vocabulary Defined:**

scientist, biologist, experiment, nonliving, living, habitat, survive, camouflage, genes, traits, observe

**ELABORATE: Applications and Extensions:**

Opportunities to elaborate the lessons are mentioned throughout the plan. Most of these activities can be used as a stand alone lesson, broken into smaller chunks, and/or used in combination to form a larger unit. Depending on the grade level, deeper discussion can be used to formatively assess student understanding. In each lesson there are opportunities to modify based on students' background knowledge. Many of these ideas may be new to your students, with language that may take time to understand. Highlighting the unique opportunity of this citizen science project can engage student interest. There are also many standards within the NYS learning standards and NGSS where these lessons can supplement an already existing curriculum. Find links to the NYS learning standards on the Squirrel Mapper website.

**EVALUATE:**

**Formative Monitoring (Questioning / Discussion): In all lessons –**

Conversation/ discussion

Start each lesson with a “do now” and end it with an “exit slip”

Games used throughout the lesson

Other options:

Whiteboard Q&A

Survey/Polls

Kahoot

**Summative Assessment (Quiz / Project / Report):**

**Lesson 1/Lesson 2 – Nature Walk Squirrel Survival**

**Lesson 3 – Squirrel adaptation drawings**

**Lesson 5 – Student analysis of this data will be a summative assessment for the teacher.)**

Poster project (in its final version)

**Lesson 6** – Data from Squirrel spotter game will provide data for the citizen science project (but should not be used to assess student learning).

**Differentiation/Modifications:**

**Lesson 1:**

- Please make sure to accommodate any 504 plans for the nature walk as well as review specific safety measures with students prior to leaving the classroom. If unable to leave the building, students can be allowed to watch out the window of their classroom or school room for 5-10 minutes. (If watching from inside, students should be rotated in different locations over the 5-10 minutes. Try to move them every minute so they are redirected back to the activity). Additionally, watching videos of forest creatures move through their habitat could be substituted here. Videos of humans in their habitats as well can serve as a good comparison.
- Have the kindergarten students bring a small clipboard with them. Attach a sheet with images of things that they are expected to find on the walk. Students will circle/mark off the items they have observed.

**Lesson 2- 6:**

- modify for age and grade level by requiring simpler instructions and/or fewer of the assessment tasks. Review content with students in multiple ways.

**References:**

- [www.squirrelmapper.org](http://www.squirrelmapper.org)
- Thorington, Richard W; Ferrell, Katie E.. Squirrels (The Animal Answer Guides: Q&A for the Curious Naturalist) (p. 27). Johns Hopkins University Press. Kindle Edition.