Elementary Unit of Study:
Interdependent Relationships in Ecosystems*
Kentucky Core Academic Standards (KCAS) for Science: 3-LS4-3

Unit Title From Critter Jitters to Wiser Survivors: What Affects Organisms' Survival in Habitats?

Teacher _____

Grade Level 3

Approximate Length of Unit One week

Context

This unit is designed for a third grade self-contained classroom where the teacher has the flexibility to integrate reading, mathematics, and science instruction. This unit takes place over 5 days including completion of the culminating performance. The students will engage in investigations with worms as well as several simulations that model organisms' survival in different habitats. Writing instruction will be integrated as students learn to construct an argument with evidence through writing scientific explanations. Data analysis in the form of graphs will support mathematics integration. A large open space is preferable for the games. Otherwise, all of the activities can be completed in a regular classroom with simple, inexpensive supplies.

* This unit of study was written by the Kentucky Environmental Literacy Plan Implementation Advisory Team with Vivian Bowles, Science Teacher at Kit Carson Elementary in Madison County, Kentucky, as the lead. The unit will be field tested during the 2014-15 academic school year and revised as needed following field testing. The template for the unit was developed by the Kentucky Department of Education, who also collaborated with KEEC on unit development.

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Bundle Standards

3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. [Clarification: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.]

Cross Cutting Concepts

3-LS4-3 Cause and Effect – relationships are routinely identified and used to explain change

Disciplinary Core Idea

Adaptations – For any different environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all

Science Engineering Practices

Construct an argument with evidence

W3.2 – Writing: Text Types and Purposes Write informative/explanatory texts to examine a topic and convey ideas and information clearly. A) Introduce a topic and group related information together; include illustrations when useful to aiding comprehension; B) Develop the topic with facts, definitions, and details; C) Use linking words and phrases to connect ideas within categories of information; D) Provide a concluding statement or section.

SL3.4 – Presentation of Knowledge and Ideas

Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly and at an understandable pace.

Unit Organizer

Critter Jitters or Wiser Survivor: What affects an organism's survival chances in its habitat?

Supporting Standards

Science 3-LS4-4 Systems and System Models – A system can be described in terms of its components and their interactions

Mathematics 3.MD.B.3 – Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one and two step "how many more and "how many fewer" problems using information presented in scaled bar graphs.

E/LA W3.1- Write opinion pieces…supporting a point of view with reasons
W3.3-Write narratives…using effective techniques, details, and other clear sequence
W3.5 With support…develop and strengthen writing…by planning, revising, and editing
RI 3.1- Ask and answer questions to demonstrate understanding of a text…

RI 3.2-Determine the main idea of a text; recount the key details and explain how they support the main idea
RI 3.3-Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in a technical procedures in text, using language that pertains to time, sequence, or cause and effect.

Practices Emphasized in this Unit
Students will construct arguments with evidence based on experiences, print, and digital texts.

Essential/Guiding Questions
Science 3-LS4-3: How can students construct and present arguments with evidence that in a particular habitat an organism can survive well, less well, or not at all?

What makes a good home for critters?
What happens when a critter's habitat changes?
What makes critters good hunters or hiders?

E/LA:
How can I share information about how well critters can survive in a habitat?
How will the student: A) Introduce the topic and group related information together; include illustrations to aiding comprehension; B) Develop the topic with facts, definitions, and details; C) Use linking words and phrases to connect ideas within categories of information; and D) Provide a concluding statement?

What Students Will Know and Be Able to Do
Students will know:
1. A habitat is a system that supports the basic needs of a variety of organisms living there.
2. Living and non-living factors in a habitat can affect an organism's ability to survive.
3. Physical and behavior adaptations help organisms survive in their habitat.
4. As a habitat changes, an organism's survival chances might change with it.

Students will be able to:
1. Model, define, and describe how a habitat supports the basic needs of organisms coexisting there, and graph data about the habitat.
2. Model and describe how organisms coexist in an ecosystem and how some organisms depend on others for food (energy).
3. Describe physical and behavior features of organisms that affect their chances of survival in a habitat.
4. Describe and explain causes and effects of habitat changes on an organism living there.

Summative/End of Unit Assessment

Natural History Museum Display for a museum walk: The student will prepare and present an informative oral presentation that supports an argument that in a particular habitat an organism (of his/her choice) can survive well, less well, or not at all. The oral presentation will include written text and illustration to support the claim with evidence from experiences, print, and/or digital sources.

Natural History Museum Display Directions

Directions:

1. Choose an organism to research.
2. Develop and use the rubric as you do your work.
3. Complete the Research Notes as you find information about your organism. Remember to include the titles of print and digital sources where you find your information.
4. Make a diorama of your organism in its habitat. Remember to include where it finds shelter, clean water, clean air, and food.
5. Plan, draft, revise, edit, and publish your ***argument*** that <u>in a particular habitat the organism can survive well, less well, or not at all</u>. Use the Writing Checklist as you work.

Practice and give an oral presentation on your organism. Include your illustration in your presentation.

Success Criteria

In collaboration with students, develop an outline of success criteria for the summative/end of unit assessment.

(See Sample Rubric, attached)

With guidance and support of the teacher, students will develop a rubric for evaluation based on these criteria:

The topic (claim), about a singular organism/population in a particular habitat, is introduced at the beginning of the presentation and includes a claim about that organism's survival chances in that habitat.

Supporting details (evidence) include facts about:

- The non-living and living factors in the habitat that affect that organism's survival chances (food, water, shelter, clean air)
- The organism's physical and/or behavior traits that influence its survival chances
- (If applicable) How changes in the habitat affected the organism's survival

The report/presentation includes linking words, such as *and, also, but, another, more,* to connect ideas within categories of information.

There is a conclusion statement or section about the topic and initial claim.

During the oral presentation, the speaker will speak clearly at an understandable pace.

Entry-level Assessment
Students will answer questions about the components of a habitat and the organisms that live there

Types of Assessments			
Assessment	**Learning target aligned to assessment**	**Write F for Formative an S for Summative (may be both)**	How Often?
Anecdotal records	_____	_____ _____	_____
Class discussions	_____	_____ _____	_____
Conferences and interviews	__x____	___F___ _____	_____
End of unit tests	_____	_____ _____	_____
Journals, learning logs	____x__	___F___ _____	_____
Performance tasks/assessment	_____	_____ _____	_____
Projects	___x___	_____ ___S___	_____
Running records	_____	_____ _____	_____
Selected and/or constructed responses	_____	_____ _____	_____
Self-assessment/reflection	_____	_____ _____	_____
Student revision of assessment	_____	_____ _____	_____
Student work folder	_____	_____ _____	_____
Writing tasks			
Other: _____	_____	_____ _____	_____

Performance Task/Assessment (PBA)

Use (circle one) Formative (Summative)

Refer to the Summative/End of Unit Assessment above.

Learning Experiences
See attached chart

Unit Sequencing
See attached chart

Resources/Technology/Tools
See attached

Natural History Museum Display Directions and Research Notes

A. Directions:

1. Choose an organism to research.
2. Develop and use the rubric as you do your work.
3. Complete the Research Notes as you find information about your organism. Remember to include the titles of print and digital sources where you find your information.
4. Make a diorama of your organism in its habitat. Remember to include where it finds shelter, clean water, clean air, and food.
5. Plan, draft, revise, edit, and publish your **argument** that in a particular habitat this organism can survive well, less well, or not at all. You may do this on paper or digitally. Use the Writing Checklist as you work.

   Practice and give an oral presentation on your organism. Include your illustration in your presentation.
6. Claim: A _____ is/isn't a good home for a _____.

1. Evidence:
   a. Where I found my information:

   b. Its natural habitat is _____
   c. Sources for _____'s basic needs in its habitat:
      1. Shelter/Home:

      2. Clean water:

      3. Food:

4. Clean air/oxygen:

d. Physical traits that help this organism:
   1. Get energy

   2. Hide from predators/hunt prey

e. Behavior traits that help the organism's survival:

f. What dangers does your organism face in its habitat? How do these dangers affect its survival chances? What might it do to avoid them?

7. Writing Checklist:

___ Topic and claim are introduced at the beginning of my presentation.
___ Information that supports my topic/claim includes facts, definitions, and details.
___ I grouped information that goes together.
___ I used linking words such as *because, so, and, but, for example, …*
___ I used capital letters, punctuation, grammar, and spelling correctly
___ I included an ABCD illustration or media that supports my topic/claim.
   ___ A= Accurate
   ___ B=Big
   ___ C=Colorful
   ___ D=Detailed

Sample Rubric for Final Product
Natural History Museum Display Scoring Rubric

	Level Four	Level Three	Level Two	Level One
Topic focus	The topic/**claim** is about a singular organism/population in a particular habitat and includes a claim about its survival chances in that habitat	The topic is about a singular organism, but the particular habitat but lacks a claim about survival chances there	The topic does not focus on a singular organism and/or does not make a claim about survival chances in a particular habitat	The topic lacks focus in the organism(s) and/or habitat(s) selected and does not include a claim about survival chances
Topic Details	The details (**evidence**) support the topic, are accurate, and include: Non-living and living factors in the habitat that affect that organism's survival chances (food, water, shelter, clean air) How the organism's physical and/or behavior traits influence its survival chances (If applicable) How changes in the habitat affected the organism's survival	The details may include two or fewer inaccuracies in: Non-living and living factors Physical and/or behavior traits of the organism How changes in the habitat may affect survival chances	There may be two or more inaccuracies or missing information about: Factors in the habitat Physical/behavior traits of the organisms; Survival chances due to habitat changes	There many missing or inaccurate details concerning the: Habitat features Physical/behavior traits of the organism Survival chances due to habitat change

Organization	The topic and claim are introduced at the beginning of the report/ presentation. Details include linking words, such as *and, also, but, another, more, for example*, to connect ideas within categories of information. There is a conclusion statement or section about the topic and claim.	The topic is introduced at the beginning. Most details include linking words The conclusion statement supports the claim of the topic.	There is reference to the topic and/or claim but it is not at the beginning There are few linking words There is a brief conclusion that may or may not support the claim.	The topic is not introduced at the beginning of the report/presentation. The details lack linking words. There is no conclusion.
Grammar and spelling	Spelling and grammar are correct	There are two or fewer mistakes	There are three or more mistakes	There are four or more mistakes
Visual graphics	The ABCD graphic is Accurate, Big, Colorful and Detailed. The details support the author's claim of the organism's survival chances in the habitat.	The graphic accurately supports the author's claims, but may lack a few specific details	The graphic has a few details to support the claim but may have some inaccuracies. It may lack sufficient color or size of details.	The visual details in the graphic are hard to understand and many do not support the claims made by the author
Presentation	During the oral presentation, the speaker will speak clearly at an understandable pace.	The speaker speaks clearly but the pace may be slightly too fast or slow	The listener has to ask the speaker to change pace or to speak clearer for understanding	The speaker does not adjust pace or volume to help the listener

Day One: What makes a good home for a critter?

Science 3-LS4-3
Students will evaluate if a habitat meets the basic needs of an organism

E/LA
Students will use details from texts to describe how populations coexist in a habitat.
Students will use experiences and print resources to support an opinion with evidence that a particular habitat is/isn't a good home for a particular organism.

Learning Target/Goal	Learning Experiences	Assessment	Materials/Resources
STEM 3-LS4-3 S will observe characteristics of the organisms and habitats and make inferences about how the physical needs of an organism are met in the habitat	**Wonderful, Wiggly Worms:** Observe worms in a container of soil. Where do they prefer to stay? Why? Allow students to make predictions and inferences about why. Students will design investigations to answer questions about worms and where they live.	Students' investigations include a conclusion about how soil meets the needs of worms.	-earthworms -Per Team: work tray, paper towels, bottle with mister nozzle, water, investigation logs, hand lenses, metric rulers, cardboard to cover ½ tray, timers, local soil (no potting soil) -background information for teachers
"Survivor" Simulation Model **3-LS4-3** 3.MD.B.3 S will collect data to infer how the needs of the organisms and characteristics of the resources in its habitat can affect the organism's survival S will create and	**Hop to it Habitat**: (See attached directions) Discuss how students know a rabbit is a living thing. Ask and discuss what a rabbit needs to survive. Go over the game directions and how data from each round will be recorded. Play three-six rounds of the game. Use data to create graph. Through a series of "more than" and "less than" questions and statements,	Graphs are accurate and students make inferences and form conclusions about the relationship of presence of basic needs and an organism's survival chances in an environment, based on the data collected and graphed.	-laminated color cards: blue=water; green=food; brown=shelter -rabbit cards -hula hoop -white board/chart paper -markers -graph paper

interpret a scaled picture graph and interpret it by answering "more than" and "less than" questions.	students will draw conclusions about the relationship of resources and the survival of a species in its habitat.		
Language Arts Connections: W 3.1 SL 3.4 S will tell and give examples of organisms and their basic needs. S will evaluate if the habitats they observed meet each organism's basic need. RI 3.1 Student can use details from a text to define and give an example of a population of organisms S will be able to identify and describe or explain how different populations are all part of the same community. W 3.1 S will write an opinion piece with supporting details from the text to support an argument that **a**	(Mentor text: **Life on a Log** by Wendy Pfeffer**)** Review through a think-pair-share what students have learned about living things and basic needs. Follow up with Criteria for a Living Thing: http://www.nsta.org/elementaryschool/connections/201403Roghaar.pdf Review **Hop To It Habitat** and **Wonderfully Wiggly Worms**. Discuss habitat/basic needs. In response to questions from an anchor text about the interaction of organisms (such as **A Log's Life** by Wendy Pfeffer), students generate a list of organisms (including plants and animals) and describe or explain how each organism is part of its population (i.e. squirrels with squirrels or beetles with beetles – this could also include different life stages of the same organism – i.e. larva and adult insects). **Writing craft assignment:** First model, and then have students use their animal cards to write an opinion piece in which they include a topic sentence and create an organizational structure that lists	**Assessment:** *Who can live in a fallen log?* Each student picks an organism from the generated list and writes it on a card without other students seeing it. Students use their card from the mentor text to find members of their own populations. Students use their same cards to establish communities that live in different habitats (e.g. fallen log habitat-worms and termites/living tree habitat-squirrels and woodpeckers/ etc.) Students define a community based on the groups/ populations living in the same habitat	**A Log's Life** by Wendy Pfeffer, index cards

fallen log is/isn't a suitable habitat for an organism based on evidence from their morning's experience and details from the book.	reasons to support the opinion that a **fallen log is/isn't a good home for their animal**. They will use linking words (because, so) and phrases to connect opinions and reasons, and provide a concluding statement. Students will share their opinion pieces with a small group.		

Day Two: What makes a good home for critters?

Science
Students will model and construct an argument with evidence that organisms in an ecosystem depend on the system to provide energy necessary for survival. 3-L4-3

E/LA
Students will use informational texts to describe the relationship between components in an ecosystem. RI 3.1, RI 3.2

Students will use experiences, print, and digital sources to research how an organism depends on the components in its habitat for survival. W3.2

Learning Target/Goal	Learning Experience	Assessment	Materials/Resources
STEM Survivor Simulation (Model) S will trace the source of energy for organisms in a habitat. S will discuss the survival chances of other organisms if any one of the living factors in the energy chain were removed.	Hungry Fox Relay (See attached)	S will summarize the activity and answer cause and effect questions about the role of the various organisms in food chains.	-tray -"chips" -Name Cards: fox, thistle, blackbird, grasshopper

Language Arts connections S will use print and digital sources to choose a topic to research for the purpose of writing an informational text. (RI 3.1 and 3.5)	Ask: "How do the components in an ecosystem make it a good home for an organism?" Revisit **A Log's Life** to generate energy flow charts of some of the organisms (dead leaves, pill bugs, salamanders). What physical features of the organisms helped them get the energy they needed for survival? Review the book for **evidence** that at various times in the log's life, it was a suitable habitat for some organisms, but not for others. What food sources did they find there? Find evidence in the book that some organisms had to move away from the log while others moved in. What caused these moves? What would happen to the organism if it had not moved? Introduce the research topic for ***Natural History Museum Walk*** culminating activity on Friday: **Construct an argument with evidence that in a particular habitat an organism can survive well, less well, or not survive at all.**	Students will answer discussion questions, using evidence from the model text, about how the communities of organisms moved out and moved in as the log continued to decay. Students will assist in customizing the rubric for final assessment. Students select an organism and make a **claim** about its survival chances in a particular habitat.	***A Log's Life,*** Natural History Museum Walk activity sheet

	Define and discuss **argument** as a **claim supported by evidence.** Evidence can come from experiences and research. Show the print resources and the technology available to research organisms. Explain to students that they will choose an organism, research it and its habitat and decide if a particular habitat is a good home for it. They will work on this assignment the rest of the week and give a presentation about it on Friday afternoon. Show and discuss the **prompt**. (See attached) Define and show a rubric based on A-D of W3.2. With student input, develop a rubric for the final project. Students use remaining time to research organisms and select one for study, using the prompt and rubric to guide research.		

Day Three: What makes critters good hunters and hiders?

Science: Students use experiences, print, and digital sources to determine how organisms avoid predators (or hunt prey) in their environment.

E/LA: Students continue researching their selected organism and create illustrations to show how an organism's coloration can increase its survival chances in a habitat.

Learning Target/Goal	Learning Experience	Assessment	Materials/ Resources
STEM Students will create a scaled bar graph to represent a data set with several categories. Solve one and two step "how many more" and "how many fewer" problems using information presented in scaled bar graphs.	**Hiding in Plain Sight** (See attached) Students will hunt for tricolored pasta to simulate how coloration protects organisms in a habitat. Students will analyze collected data and draw conclusions.	Using collected data represented on bar graphs, students write conclusion sentences about the relationship between coloration and chances of hiding or hunting.	-Newspaper poster with newspaper 'moths' attached -camouflage material w/ yarn 'insects' (inside) or tri-colored pasta (outside) -graph paper
Language Arts connections S will use print and digital sources to create an illustration with supporting details to aid in comprehension of his/her selected research topic.	Review the STEM lesson. Discuss how coloration and camouflage increase an organism's survival chances in its habitat. Using information they locate in books or digitally, students will determine and explain how the organisms they chose for their research use coloration or camouflage to avoid predators or to hunt prey. Explain an ABCD Illustration (see attached project prompt/Writing	Students continue their research. Conference with students to assess the connections between their claims and evidence.	Reference books, iPADs or computers, drawing paper, colored pencils

	Checklist.) Students will make an illustration of the organism in its habitat. This illustration will be expanded on or used to plan and create a 3-D display of the organism in its native habitat.		

Day Four: What happens when a critter's habitat changes?

Science
Students construct and support an argument with evidence that changes in a particular habitat affect the survival of organisms. (Cause and effect)

E/LA
Students will use Writing Checklists and Rubrics during the writing process.

Activity/Learning Target	Lesson Summary	Assessment	Materials/Resources
STEAM (Art) S will create a visual representation of their selected organism in its habitat that will accurately depict its survival in that habitat.	Expanding on illustrations from previous E/LA lesson: Based on the research they conducted thus far, students will list components necessary for their organism to survive in its habitat and work on a **graphic medium** (such as a diorama**)** for their project.	Student will follow the ABCD Illustration guide on the project checklist.	-materials for diorama—small cardboard boxes, scissors, glue, construction paper, etc.
Language Arts connections S will develop a topic sentence (claim) for their research project, based on the rubric, and develop facts (evidence) to support their claim.	Reading/Listening: **The Wolves are Back** by Jean Craighead George-Read and discuss the importance of species, such as wolves, that help create balance in an ecosystem. Discuss; Are there any species in your organism's habitat that are key for its survival? What might happen if that species were removed? Discuss. **Writer's Workshop:** Using the Writing Checklist and Rubric, revisit the Opinion piece from Day One (A fallen log is/isn't a good habitat for a …). Is there a claim at the beginning? Do the facts (evidence) listed support the claim? Is there a conclusion, etc. Is this writing an argument? Discuss.	Observe/conference with students as they work to assess if they are using the prompt and rubric to guide their research and draft.	***The Wolves are Back*** by Jean Craighead George Writing Checklist and Rubric

	Research Project: Most students should be finished with research and should be drafting reports by now. Review the Writing Checklist and post it as an anchor chart. As students approach the publishing stage, the rubric and Writing Checklist should guide their revising and editing.		

Day Five: What makes a good home for a critter?

Science
Students construct and present an argument with evidence that in a particular habitat an organism can survive well, less well, or not at all.

E/LA
Students present arguments with evidence that in a particular habitat an organism can survive well, less well, or not at all.

Learning Target/Goals	Lesson Summary	Assessment	Materials/Resources
Art S accurately depicts their selected organism in its habitat. The graphic includes the living and nonliving factors that support the survival of the organism.	S will complete illustration/diorama/etc. for presentation.	The graphic meets the criteria of the ABCD rubric	Materials to complete diorama (see above)
"Survivor" Simulation Model S will play a simulation game to model how limiting factors affect the number of hatchlings that reach the ocean.	**Hurtles for Baby Turtles:** (See attached game direction) Read and discuss the dangers sea turtle hatchlings encounter on a beach habitat. Play a variation of Turtle Hurtles (pp 172-176 in Project WILD Aquatic). Create bar graphs to compare turtle eggs with turtle babies that made it safely to sea.	S use data collected during the game to make inferences and draw conclusions about the affects of limiting factors on the survival of hatchlings.	-green space for game area -**Turtle, Turtle Watch Out!** By April Pulley Sayre or **One Tiny Turtle** by Nicola Davies -100 linker cubes -whiteboard/chart paper -graph paper -pencils
Language Arts connections	Reading/Listening: What happens to organisms that live/grow in habitats that pose dangers for survival? (This lesson can serve as a bridge to 3-LS4-4) Discuss the survivor game and the dangers hatchlings faced. What were some of the limiting factors? Which factors were natural?	S argument and presentation matches the prompt and rubric	***Lucky Ducklings***, by Eva Moore

	Which were mad-made? How do humans affect organisms' survival chances? How can humans reduce their impact? Read and discuss **Lucky Ducklings**, by Eva Moore **Writing Workshop:** Model peer conversations about writing using the rubric. Visit teams as they engage in peer conversations about their work. Students then complete writing arguments for their presentations. **Presentation:** Set up displays. One half the class stands by their displays while the other half tours the natural history displays and listens to the individual presentations of their arguments (museum style). After 20 minutes, have students change roles.		

Wonderful Wiggly Worms-How do organisms respond to stimuli? (Adapted from **Critters**, AIMS Education Foundation, 1992, pp39-56)

Duration: One or more 45-minute sessions.

Supporting Standard: LS1.D Information Processing

Objectives: Students will observe and describe how an earthworm responds to its environment to enhance its chances of surviving.

Materials: Earthworms dug from existing garden areas or obtained from a local retail source; Per team-work tray, paper towels, bottle with mister nozzle, water, investigation logs, hand lenses, metric rulers, piece of cardboard to cover ½ of tray, timers; local soil (not potting soil); background information for the teacher about earthworms such as http://kids.discovery.com/tell-me/animals/bug-world/worm-world/the-earthworm

Engage: Warming up to worms- Give each team a work tray lined with paper towel. Instruct teams to moisten the paper towel with a spritz of water from the spray bottle. Provide each team of three students two or three worms on a work tray. Have them list observations about the worms and write questions they may have about them.

Explore: How do worms react to stimuli? Teams review the questions they developed. How might they answer them? Provide them materials to answer questions such as: How worms react to touch or light.

Explain: After students complete their investigations they will come to the gathering place and join with other teams to discuss investigations and findings. Teams share investigation discoveries with the class. Share information about worms from accepted sources.

Elaborate: Which home does an earthworm prefer? Teams work together to discuss and then find an appropriate place to release their worm based on their observations.

Evaluate: *Give Me Five*-From each group, one volunteer each answers one of these five questions:

1. What was your initial reaction to working with a worm? How did your reaction change during the investigations?
2. What was the most significant worm concept you learned from this activity?
3. How did today's lesson help you learn about animals' reactions to stimuli?
4. What's still wiggly in your thinking about worms?
5. Think of another animal's reaction to one of the stimuli you presented to the worm. How might it differ?

Questions students may choose to investigate--

A. **Getting to know your worms.**

1. Describe the colors, shapes, and sizes.
2. How does the skin feel?
3. Describe the topside and its bottom side. How do they compare?
4. How can you tell the front end from the back end?
5. What sensory organs do you observe?

Possible investigations and attention to variables

Reaction to Light: Cover ½ of tray with a piece of cardboard. Put worms on the uncovered side of the tray and time them for one minute. After the minute, where are the worms? Repeat this test two more times.

Test Number	How many on covered side	How many on uncovered side
1		
2		
3		
Total		
Average		

Conclusion:

Reaction to Touch: Remind students to be gentle. While worms are on the damp paper towel, students can touch each section of a worm with a dry finger and record the response. Repeat with the other worms on your tray.

Section Touched	Response Worm One	Response Worm Two	Response Worm Three	Conclusion
Posterior				
Middle				
Anterior				

Discussion Questions: Would it make a difference if you touched them with a damp finger instead of a dry finger? How could you gather data on this question? What other questions might you investigate about touch?

Hop To It Habitat (Survivor Game)

Objectives: Students will collect data on the number of rabbits in a population for each round of game play. The number of rabbits depends on the basic needs resources collected by team members each round. Students will use the data they collect to create and interpret picture graphs by answering "more than" and "less than" questions.

Materials: Laminated colored cards (blue=water, green=food, brown=shelter), rabbit cards, hula hoop, white board or chart paper and markers, graph paper

Procedure:

1. For round one, record the number of players (rabbits). During a timed period, "Rabbits" hop to a hula-hoop containing colored cards (green = food, blue = water, brown = shelter). Taking only one card at a time, they take a card back to their den. For each complete set, a new rabbit is born.
2. At the end of the round, exchange each player's complete set of basic need cards with a rabbit card. Record the number of rabbits at the end of the round.
3. For the next round the player has to gather enough cards for all of the collected rabbits. If not enough cards are collected for each of the previously collected rabbits, those rabbits with incomplete needs die and their cards are removed from the den. Record number of rabbits at the end of each round.
4. During at least one round of the game, manipulate resources so mostly water is available and there are fewer cards for food or shelter.
5. If time allows, play the game for at least six rounds.
6. After game, review the collected data. Create a scaled picture graph and discuss how/why the population changed over time. Use "more than" and "less than" in discussions and have students write conclusions statements based on their experiences and group discussions.
7. Reflection writing: What happened to the rabbits when there was too little food or shelter? Why?

Hungry Fox Relay

One student volunteers to be the sun. Divide the rest of the group into teams of four. Team members choose one of these roles: fox, thistle, blackbird, and grasshopper. (You may make name cards for players to place on their food trays.) Go to the game area.

Game Directions:

1. The sun stands in the middle of the game area and holds a basket of plastic chips. The chips represent energy. Two teams are on one side of the sun and two (or more) teams are on the other side of the sun, or radiating around the sun. Team members stand one behind the other about four giant steps between each team member.
2. The goal of the game is to get energy to the fox. The plants' energy comes from the sun, so when "Go" is called, the plant will go to the sun to collect a chip and run back to his place. When he places his energy chip on his tray, he goes back to the sun to collect another chip. Repeat this step as often as necessary to complete the game.
3. After the plant has collected four chips, then the grasshopper may come and collect a chip from the plant's tray. The grasshopper continues to get chips from the plant as the plant replenishes his tray. Grasshoppers can only collect a chip if four are on the tray. (Plant keeps going back to the sun for more as in step 2.)
4. After the grasshopper has four chips then the blackbird may come and collect one. (Continue going back to the grasshopper when the grasshopper has enough chips to take more.)
5. When the blackbird has four chips, then the fox may come and collect one from him. When the fox has four chips he sits and all of the other team members may sit down to show they fox has been fed and has energy needed to sustain life.

Discussion: Go back to discussion area. Discuss which team members did the most "work" during the game. Why did they work as hard as they did? What surprised you about the amount of work the fox did? Where did the fox's energy come from? (Begin with the sun) Why do you think organisms had to have four chips before the next organism could "eat"? (Populations need energy to carry out life functions, including reproduction. If all the chips are taken at one time the organism doesn't have enough energy, dies, etc…) Read and discuss **Who Eats What** by Patricia Lauber.

Extension: Draw an energy chain in your journal. (Remind students to start with the sun. Arrows point from the source to the receiver of energy.) Discuss: What would happen to the fox if there were no grasshoppers? What other organisms eat plants? How might this affect the organisms living in the ecosystem?

Hiding in Plain Sight

Objectives: Students will practice spotting camouflaged animals and make inferences about the survival of animals based on their physical adaptations.

Materials: Newspaper poster with newspaper "moths" attached, camouflage material and yarn "insects" (if activity is done indoors) or tri-colored pasta to do this activity outside, graph paper

Engage: Entrance slip: How do you hide from someone in a game? Discuss

Explore: How do prey hide from predators? Show newspaper poster/moths for 20 seconds. How many moths did you spot? Which moths had the best chance for survival? Why? Discuss

Divide class into four teams. Give instructions for the simulation game:
Each group gives themselves a bird name. They select two students for a "special job". Direction for game: These two students are baby birds for the flock and must be fed to ensure they will survive. The role of the other birds is to feed them as many insects as possible. Give each team a tweezers to use as a beak. Scatter the colored yarn on the camouflage cloth (indoors) or pasta on the grass (outdoors). Birds can only carry one "insect" at a time back to the baby birds in the nest. Flocks must share the beak so that only one member at a time can hunt. Allow three minutes for feeding time.

Explain: Back in the classroom: Teams record number of insects found by color. On the chart paper/board, record the number of insects found. Then record the number found by color. Students create bar graphs with data and discuss. Have students share inferences about why there was more of one color found than another. Discuss the role in camouflage in protecting an animal so it can reach adulthood and reproduce.

Elaborate/Evaluate: Using data on bar graphs, students write conclusion sentences for findings.

Hurtles for Baby Turtles

Objectives: Students will collect data, graph it, and interpret the graph to compare the ratio of birthed hatchlings to those who make it to the ocean. Students will make inferences and draw conclusions about the effect of limiting factors on the survival of hatchlings on a beach habitat.

Materials: Green space for the game area; **Turtle, Turtle Watch Out!** By April Pulley Sayre or **One Tiny Turtle** by Nicola Davies; 100 linker cubes (hatchlings), white board or chart paper to record data, graph paper, and pencils

Procedure:

1. Building background-Review or introduce concept of Limiting Factors. Discuss how predator species are limiting factors. Read and discuss the book. Discuss the limiting factors (hurtles) for the population of newly hatched turtles as they travel from the nest to the ocean.
2. Game directions: The objective is to move as many hatchlings as possible from the nest to the ocean.
   a. Scatter the linker cubes in the nest area (one side of the game area). Mark the opposite boundary as the horizon/ocean. Show these areas to the students.
   b. Assign some students to be turtle movers and others to be limiting factors (crabs, raccoons, frigate birds, and bright lights)
   c. Turtle movers go the nest sight, gather five cubes (hatchlings) and wait for the signal to start. Count and record the number of hatchlings that will be moved for this round. Turtles move very slowly, so when the "go" signal is given, players can only take baby steps as they move toward the horizon. If they are tagged by a limiting factor, they must give the tagger one of their cubes.
   d. Predators and other limiting factors position themselves along the route from nest to horizon. When predators tag a turtle mover, they take one cube and count to ten as they "eat" their catch and before they can hunt again.
   e. When turtle movers reach the horizon, they can no longer be tagged. Count and record the number of hatchlings that made it to the ocean for this round.
   f. Repeat the rounds until all 100 linker cubes have been moved from the nest area. Players can change roles as the teacher chooses.
   g. Discuss the data collected from each round. Discuss how limiting factors affected the success of the turtle movers in their missions. Decide how to best graph the data. Students create graphs and write conclusion statements about the ratio of hatchlings to survivors.