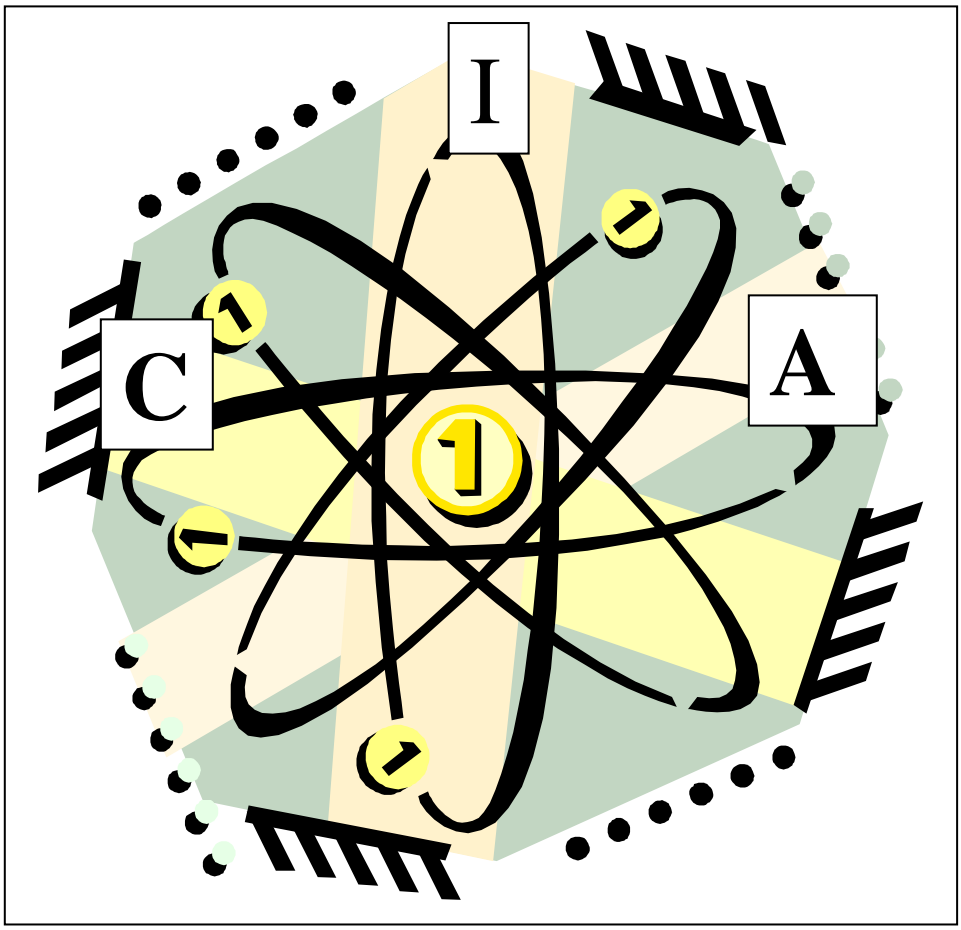
Curriculum, Instruction, Assessment (CIA) Alignment

Science, Grade 3
Unit 5: Interdependence of Organisms and Their Environment

Task Analysis and Hands-on Investigations



Ronald Blocker, Superintendent
Orange County Public Schools
Orlando, Florida

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Subject Area: Science
Strand G: How Living Things Interact with Their Environment
Grade: 3

Benchmarks

SC.B.1.2.1: The student knows how to trace the flow of energy in a system (e.g., as in an ecosystem).

SC.B.2.2.1: The student knows that some source of energy is needed for organisms to stay alive and grow.

SC.F.1.2.2: The student knows how all animals depend on plants.

SC.G.1.2.1: The student knows ways that plants, animals, and protists interact.

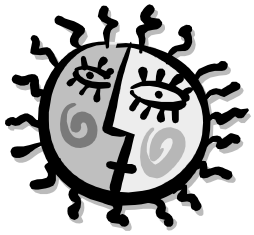
SC.G.1.2.5: The student knows that animals eat plants or other animals to acquire the energy they need for survival.

SC.G.2.2.2: The student knows that the size of a population is dependent upon the available resources within its community.

SC.G.2.2.3: The student understands that changes in the habitat of an organism may be beneficial or harmful.

TASK ANALYSIS **The student…**
INTERDEPENDENCE OF ORGANISMS AND THEIR ENVIRONMENT
• compares plants grown under various environmental conditions such as different temperatures, amounts of light, types of soil, etc.
• creates and analyzes food chains and food webs (sun, decomposers, producers, consumers, carnivores, herbivores, omnivores).
• experiences, through participation in simulations, that each habitat supports a limited population with the limit being set by the food, water, shelter, and space available.
• classifies and justifies changes in the habitat of an organism as beneficial or harmful.

YOU LIGHT UP MY LIFE



BENCHMARKS and TASKS

SC.B.2.2.1 The student knows that some source of energy is needed for organisms to stay alive and grow.

SC.G.2.2.3 The student understands that changes in the habitat of an organism may be beneficial or harmful.

- The student compares plants grown under various environmental conditions such as different temperatures, amounts of light, types of soil, etc.
- The student classifies and justifies changes in the habitat of an organism as beneficial or harmful.

KEY QUESTION

How does light affect the way plants grow?

BACKGROUND INFORMATION

Plants are affected by many environmental factors. Plants grow towards **light**. This movement is called phototropism (photo means light and tropism means movement). A buildup of a chemical, auxin, on the dark side of the stems causes cells to grow longer on the dark side. This forces the stem to bend toward light.

Seeds remain dormant until conditions are right for them to sprout. Different plants need different temperatures to grow. For example, bean seeds require warmth to grow. Few seeds sprout during the fall and winter months. Most lay dormant during the cold months of the year. They start to grow when the ground warms.

Plants **adapt** themselves to their **environment.** An example is the Venus flytrap plant. It grows in boggy areas that are nitrogen-poor. It traps and digests insects to supply the nitrogen that its environment does not provide. Dandelions and cacti are examples of other plants that have adapted to their environment.

KEY QUESTION

How does light affect the way plants grow?

MATERIALS

Per group

1 shoebox with lid
1 paper cup (must fit inside the shoe box)
3 pinto beans
potting soil
cardboard strips

Per class

chart paper and markers
1 potted plant
1 spray bottle or mister

scissors
tape
water

Per student
science journal

TEACHING TIPS

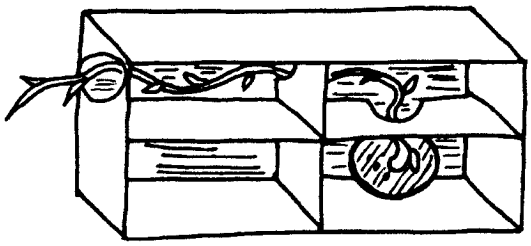
1. This lesson will take place over a period of time.
2. Write *Environmental Factors* at the top of one page of chart paper. Then divide the page in half vertically and label the columns *healthy plants* and *unhealthy plants*. Save the chart to use as a reference during the entire plant activity.

ENGAGE

1. Take the class on a walk around the campus. Have students observe plants that appear to be unhealthy or dead. Be sure they also observe plants that appear to be healthy and thriving.
2. Back in the classroom, record student responses on the *Environmental Factors* chart. Discuss:
   What environmental factors might cause the plants to be unhealthy?
   What environmental factors are more likely to result in healthy plants?

EXPLORE

1. Distribute materials to groups.
2. Have students fill the cup with potting soil and plant the bean seeds.
3. Students should moisten the soil and allow the beans to sprout. This will take about 5-7 days.
4. Demonstrate how to cut two cardboard pieces and tape them inside a shoebox to form a maze for the plants.



5. Have students prepare their own maze boxes. Then tell them to cut a hole in one end of the lid. (You may want to demonstrate this. A circle or rectangle a couple of inches wide allows enough light for this activity.)
6. Place the sprouted bean plant inside the shoebox at one end of the maze.
7. Place the lid on the box so that the hole is on the opposite end from the plant.
8. Ask: *What do you think will happen as the bean seeds sprout and begin to grow?*
9. Have students make written or pictorial entries in their science journals to explain what they have done to set up the investigation and to predict what they think will happen to the plants.
10. Have students open the lid daily to observe the plant growth. Observations should be recorded.
11. Have students spray a fine mist of water on the soil as needed.
12. Students will continue to make daily observations until the plants grow out through the holes in the shoebox lids.

EXPLAIN

As this activity progresses, ask:
What do you notice about the bean plant's growth?
What adaptations or changes do you see the plant making to reach the light exposed by the hole in the lid?
What did you notice about the bean plant's growth?
How does this compare to plants growing outdoors?

EXTEND/APPLY

Based on what they have observed in this lesson, ask students to predict what they think will happen if you place a plant next to the window for a short period of growing time and then turn it away from the window for a short period of growing time. (The plant will grow towards the window at first. After you rotate the plant, it will again grow towards the light.)

EXTENSION

Have students choose partners. Tell them they are going to adopt a plant to observe.

- Take the class outside. Have each pair find a plant they want to observe during a given amount of time.
- Have students observe and describe all they can about the habitat of their plants.
- Have them record the height, color, and flowers or fruit of their plant.
- Students should also include the name of the plant (this may require research), the location, and current date. Take students out periodically to record observations.

ASSESSMENT

Have students explain in their science journals how light affects plant growth.

SAMPLING THE SOIL

BENCHMARKS and TASKS

SC.B.2.2.1 The student knows that some source of energy is needed for organisms to stay alive and grow.

SC.G.2.2.3 The student understands that changes in the habitat of an organism may be beneficial or harmful.

- The student compares plants grown under various environmental conditions such as different temperatures, amounts of light, types of soil, etc.
- The student classifies and justifies changes in the habitat of an organism as beneficial or harmful.

KEY QUESTION

How does the type of soil affect seed growth?

BACKGROUND INFORMATION

Plants are affected by many **environmental** factors. Plant seeds remain dormant until conditions are right for them to sprout. Plants need soil to grow. Water and minerals are taken from the soil through the roots. Soil also provides support for the plant and an anchor for the roots. Decaying plants and animals leave behind minerals in the soil that are essential for plant growth.

Plants **adapt** to different soils along with other environmental factors. For example, a Venus Fly Trap is able to grow in boggy areas where the soil is nitrogen-poor. The Venus Fly Trap adapts to the poor soil by trapping and digesting insects to supply itself with the nitrogen it needs.

MATERIALS

Per group

12 bean seeds
paper towels
newspaper
4 clear 8-10 oz. plastic cups
1 spray bottle or mister for water
1 permanent marker
1 graduated cylinder
1 metric ruler
1 pencil

Per student

Sampling Soil Bean Seed Chart

Per class

4 large containers, each containing a different soil type (about 5 oz. of each per group): clay soil, sandy soil, potting soil, sand
1 scoop for each soil container

TEACHING TIPS

1. This activity takes about two weeks to complete.

2. The large containers should be labeled with the name of each soil type.

ENGAGE

1. Ask students if they have ever been to the beach. *Did you ever notice any plants growing in the sand? Describe them.*
2. Ask the students if they have ever seen plants growing in a marsh or in wetlands. Discuss what kinds of plants grow in that environment.
3. Ask: *Do the types of soil appear to be the same in each environment?* Explain to the students that different plants have adapted to different types of soil that are found in different environments.

EXPLORE

1. Have students spread newspaper to cover their work area.
2. Distribute cups and bean seeds to each group.
3. Explain to the students that they are going to investigate to discover which type of soil will be the best type for germinating bean seeds.
4. Have students fill each of the 4 plastic cups half full of soil. Each cup should contain a different type of soil - clay soil, sandy soil, potting soil, and sand.
5. Have students label each cup.
6. Next, students should add 30 mL of water to each of the 4 cups of soil.
7. Have students place three bean seeds in each cup by pushing the seed into the moist soil sample with a pencil. (The depth of each bean seed should be the same for all 12 of the bean seeds.)
8. One student volunteer from each group should use the spray bottle on a regular basis to keep the soil samples moist. (All four of the soil samples should receive identical amounts of water.)
9. Have students place all four of the soil samples where they will receive equal amounts of heat and light.
10. Direct students to the *Sampling Soil Bean Seed Chart* and have them circle the soil type in which they think the seeds will germinate the fastest.
11. Students will measure and record the growth of each seedling daily on the *Sampling Soil Bean Seed Chart* for a two-week period.
12. Have students illustrate the four cups on the back of the activity sheet before and again after the two-week period.

EXPLAIN

In which type of soil did the bean seeds sprout (germinate) the fastest?
What environmental factors in this experiment were kept the same?
(Water, light, temperature, and the amount of soil were controlled, or kept the same.)
What was the only environmental factor that was different?
(The type of soil was the only variable; each cup contained a different type of soil.)
Which soil had the poorest growth? Why?

EXTEND/APPLY

Have students create a graph of the data gathered on the *Sampling Soil Bean Seed Chart.*

NAME_____ DATE_____

SAMPLING SOIL BEAN SEED CHART

Directions:

- Circle the soil type in which you think the seeds will germinate the fastest.
- Measure the height of the seedling to the nearest centimeter and note any other changes.
- On the back of the sheet, draw a picture of each cup at the beginning of the investigation and again at the end.

	SANDY SOIL	CLAY SOIL	POTTING SOIL	SAND
Day 1				
Day 2				
Day 3				
Day 4				
Day 5				
Day 6				
Day 7				
Day 8				
Day 9				
Day 10				

THE CHAIN GANG

BENCHMARKS and TASK

SC.B.1.2.1 The student knows how to trace the flow of energy in a system (e.g., as in an ecosystem).
SC.F.1.2.2 The student knows how all animals depend on plants.
SC.G.1.2.1 The student knows ways that plants, animals, and protists interact.
SC.G.1.2.5 The student knows that animals eat plants or other animals to acquire the energy they need for survival.

- The student creates and analyzes food chains and food webs (sun, decomposers, producers, consumers, carnivores, herbivores, omnivores).

KEY QUESTIONS

How do living things depend upon one another to survive?
How does energy flow through a food chain?

BACKGROUND INFORMATION

Living things need food to give them **energy**. Energy passes from one living thing to another through **food chains**. A **food chain** is a simple way to look at how animals depend upon their **habitats** and other animals to survive. Every food chain begins with the **sun.** Green plants (**producers**) are responsible for making food that animals (**consumers**) eat. An animal that eats the plants is a primary consumer. (A grasshopper is a good example.) A secondary consumer (such as a lizard) eats the primary consumer. This relationship is often referred to as a **predator/prey** relationship, where the predator is the hunter and the prey is the victim.

Herbivores are animals, such as deer, that feed only on plants. **Carnivores** are animals, such as wolves, that feed on other animals. **Omnivores** are animals, such as raccoons, that feed on both plants and other animals. **Decomposers** are **organisms**, such as bacteria, which break down dead organisms and waste, returning important nutrients to the earth.

Food is just one of the things that living creatures need in order to survive. There are other necessities, called components of habitat that animals require for survival. These other components include water, shelter, and space. Without a sufficient amount of each of the four components, an animal may not survive long enough to reproduce and maintain the **population.**

MATERIALS

Per pair of students

1 paper plate (sun)
tape
index cards
crayons or markers

Teacher

magazines or books containing animals pictured in their habitats
25-40 pictures of various animals in a paper bag

TEACHING TIPS

1. Find 25-40 pictures of various animals (e.g., insects, carnivores, herbivores). Use your personal picture file, computer clip art, magazine pictures, etc. Place the pictures in a paper bag.
2. Display books and magazines about the animals represented in the pictures.

ENGAGE

Ask: *Where do we get the food we eat?* Record students' responses. Tell students you will return to the question at the end of the lesson.

EXPLORE

1. Initiate a grab bag activity. One student from each pair draws a picture of an animal out of the bag.
2. Student pairs should then work together to learn what kinds of foods the animal eats and whether or not it is prey for another animal.
3. Next, students should construct a food chain using the paper plate as the sun. The names of the animals or plants in the food chain should be written on index cards, illustrated (optional), and taped together, showing their connection to the original energy source (sun). An example would be: sun-grass-grasshopper–frog-snake. One link in the food chain needs to be the original picture drawn from the bag.
4. Allow time for each group to share the food chain they created.

EXPLAIN

What is the primary source for all food chains? (sun)
Discuss what might happen if sunlight couldn't reach the earth's surface.
Explain what might happen if all plant life were removed from the earth.
Were you able to discover a food chain that did not begin with a plant? Why?
Were there any animals in the food chains that eat only plants? (Explain that animals that eat only plants are called herbivores.)
Were there any animals in the food chains that eat only other animals? (Explain that animals that eat only other animals are called carnivores.)
Were there any animals in the food chains that eat both plants and animals? (Explain that animals that eat both plants and animals are called omnivores.)
What happens to dead organisms (plants and animals) that are not eaten? (Decomposers, such as bacteria, break them down and the nutrients are returned to the earth.)

EXTEND/APPLY

Have students try to combine several of their food chains to create a food web.

ASSESSMENT

Have students respond in their journals explaining how the living things in a food chain depend upon one another.

SITTING AROUND THE HABITAT

BENCHMARKS and TASKS

SC.G.2.2.2 The student knows that the size of a population is dependent upon the available resources within its community.

SC.G.2.2.3 The student understands that changes in the habitat of an organism may be beneficial or harmful.

- The student experiences, through participation in simulations, that each habitat supports a limited population with the limit being set by the food, water, shelter, and space available.
- The student classifies and justifies changes in the habitat of an organism as beneficial or harmful.

KEY QUESTIONS

What are the components of a habitat?
What is the significance of loss or change in a habitat?

BACKGROUND INFORMATION

An animal's **habitat** includes food, water, shelter, and adequate space in an arrangement appropriate to the animal's needs. If any of the components of the habitat are missing, or are affected significantly, the arrangement for the individual animal or **population** of animals will no longer be suitable. The impact will ultimately affect other populations as well.

All things are interrelated. When we look at a biological community, we find interrelationships and interdependencies between plants and plants, animals and animals, and between animals and plants.

MATERIALS

None

TEACHING TIP

Caution students to be very careful when they "sit down" on the knees of the person behind them.

ENGAGE

Ask:
What needs do animals have?
What would happen if one of those needs could not be met?
Discuss the basic needs animals must have satisfied in order to survive: food, water, shelter, and space.

EXPLORE (Part 1)

1. Have students form a large circle and number off from one to four. All students should be standing shoulder to shoulder, facing the center of the circle. All 1's are food, 2's are water, 3's are shelter, and 4's are space.
2. On your signal, all students should turn to the right, so they are looking directly at the back of the head of the person in front of them. Tell students to carefully place their hands on the waist of the student in front of them.
3. When you count to three, students will carefully "sit down" (just barely – not completely) on the knees of the person behind them, keeping their own knees together to support the person in front of them. (It would be wise to have several students demonstrate this before you

invite the whole class to participate.) You will also need to count to three to help them stand again almost immediately afterward.

EXPLAIN (Part 1)

1. Discuss how important it was for members of the class to work together as a team in order for the "lap sit" to work. Ask them to think about what would have happened had a member not cooperated or if a member had stepped away from the circle just before the "lap sit."
2. Discuss how all the components of habitat - food, water, shelter, and space - are needed in order to have a healthy habitat.

EXPLORE (Part 2)

1. Form the circle again – same order, same spacing.
2. Before counting to three this time, tell students there has been a drought this year and not all the water needed is available.
3. Have every other one of the "water" students step out of the circle, but **DO NOT** let students adjust the spacing in the circle. The spaces where the students stood should remain.
4. Ask students to **CAREFULLY** try to sit down again, which of course, they cannot do.

EXPLAIN (Part 2)

Discuss what happened when not enough water was available. *Why were you unable to sit down? What does this represent in the wild?* (All things are interrelated and any change, such as a lack of water, will affect the whole community. Food, water, shelter, and space - in an arrangement suitable to the needs of the population of animals – are all needed. Loss of any one of these elements of habitat will have an impact on the animals living there.)
What effect would a lack of water have on the habitat? (Some of the animals would die as a result.)
What are some other events/changes that may impact a habitat besides a drought? (development of the land, natural disasters)

EXTEND/APPLY

Have each group choose an endangered Florida animal (e.g., manatee, panther, American crocodile) and reflect on these ideas:
What is the biggest threat to the animal's survival?
How does human encroachment on their habitat affect the animals?
What can humans do to help increase the animal's chances of survival?

ASSESSMENT

Ask each student to respond thoughtfully to this question:
Which one would probably have a greater long-term impact on the wildlife living on a farm in Iowa – a severe winter which killed many animals or the development of part of the farm into a shopping center? Defend your answer.

PREY FOR ME

BENCHMARKS and TASK

SC.B.2.2.1 The student knows that some source of energy is needed for organisms to stay alive and grow**.**

SC.G.1.2.5 The student knows that animals eat plants or other animals to acquire the energy they need for survival.

SC.G.2.2.2 The student knows that the size of a population is dependent upon the available resources within its community.

- The student experiences, through participation in simulations, that each habitat supports a limited population with the limit being set by the food, water, shelter, and space available.

KEY QUESTION

How does the relationship between predator and prey affect wildlife populations?

BACKGROUND INFORMATION

Living things need food to give them **energy**. Energy passes from one living thing to another through **food chains**. A **food chain** is a simple way to look at how animals depend upon their **habitats** and other animals to survive. Every food chain begins with the **sun.** Green plants (**producers**) are responsible for making food that animals (**consumers**) eat. An animal that eats the plants is a primary consumer. (A grasshopper is a good example.) A secondary consumer (such as a lizard) eats the primary consumer. This relationship is often referred to as a **predator/prey** relationship, where the predator is the hunter and the prey is the victim.

Food is just one of the things that living creatures need in order to survive. There are other necessities, components of habitat, which animals require for survival. These other components include water, shelter, and space. Without a sufficient amount of each of the four components, an animal may not survive long enough to reproduce and maintain the **population.**

An animal's **environment** is often called its habitat. A habitat is the place where an animal finds its food, water, shelter, and space. Each habitat is capable of supporting a limited population of animals. The limit is set by the food, water, shelter, and space available. This limit is called the carrying capacity.

MATERIALS

Per class

flagging tape, ribbon strips, or construction paper strips (2 colors enough for the whole class)
4 hula hoops (or yarn circles) placed on the field to mark temporary shelters
3 chips per student for food tokens (or use paper squares) scattered on the field
blue chips for water tokens (see Extend and Apply)

TEACHING TIP

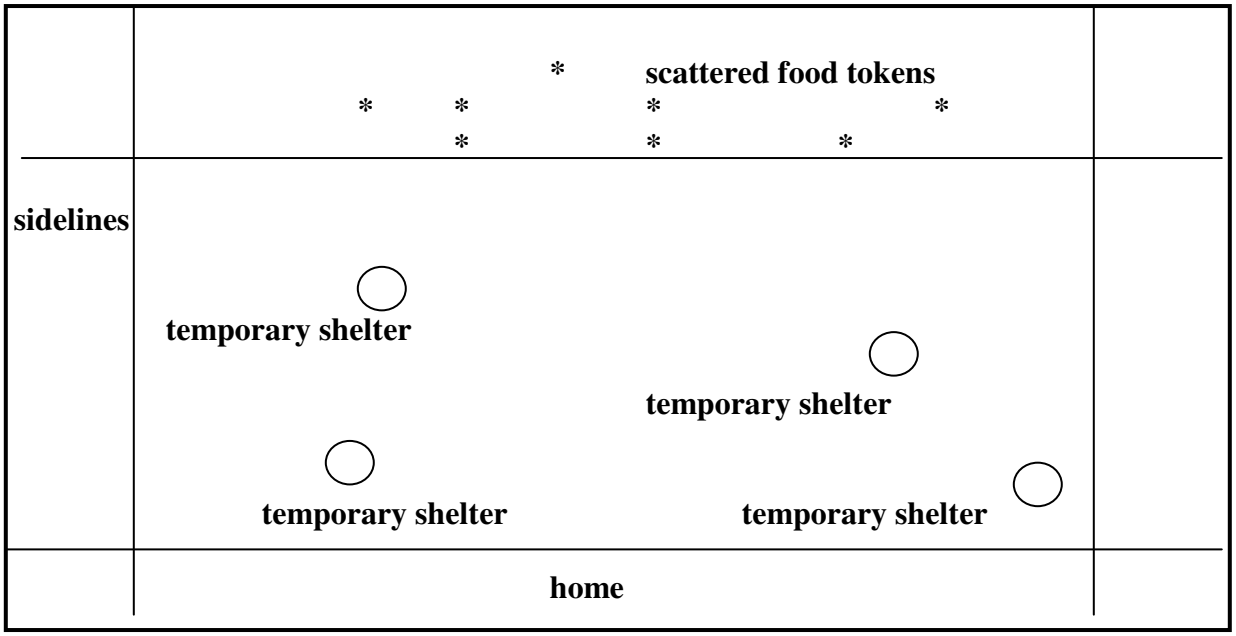
Locate a playing area for the activity and prepare the area before class.

ENGAGE

1. Have students listen to this story and then write a response in their science journals:
   You are a field mouse creeping around in the meadow. Your stomach is getting empty, so you start looking under leaves, crawling between branches and twigs, looking for food. Finally, you see a few good seeds a couple of feet away. Mmm! Do they look tasty! You look around to make sure there isn't anything waiting to grab you and then you dash over to the seeds. You know better than to eat them right then and there, so you pick them up and start back home. Suddenly, a fox comes out of nowhere and the chase is on! You wonder, "What do I do now?" You need to decide quickly! What should you do?
2. Have students share some of their responses. Discuss the merits of different decisions.

EXPLORE

1. Identify students as foxes or field mice. (There should be 1 fox for every 4-6 mice).
2. Distribute flagging tape (1 color for foxes, a different color for mice). Have students tie the tape around their arms or heads (somewhere easily seen) to identify which animal they represent.
3. Set up the playing field as follows:



4. Follow these game rules:
   - At an agreed upon signal (e.g., whistle, hand clap), the field mice need to travel from home to gather food.
   - They must carry only one piece of food at a time safely home before they travel back for more. In order to survive, field mice must successfully gather three food tokens.
   - Mice may use either of two methods to protect themselves from predators: seek temporary shelter or freeze where they are. In seeking temporary shelter, field mice may run to a temporary shelter, and they must have at least one foot inside the hoop. The mice may freeze whenever a fox is within five feet of them. (The idea of freezing in place is that the mice are less visible to the predator than when they are moving).

- Remind the mice that there is a time limit on the game, so staying in the shelter or freezing too long may not be good for them; they may not be able to collect enough food to survive!
- Foxes, the predators, may start the game anywhere in the food or playing field area.
- Foxes hunt by tagging *moving* field mice *gently* on the shoulder or upper back area.
- Foxes must have 2 prey in order to survive. Foxes capture prey by bringing them one at a time to the sidelines.
- Foxes may not tag "frozen" mice or mice in temporary shelters.

5. Allow 5-7 minutes for each round. At the end of each round, tally the number of mice and the number of foxes that were unable to collect enough food.
6. Play several games, allowing all students to be predator and prey at least once.

EXPLAIN

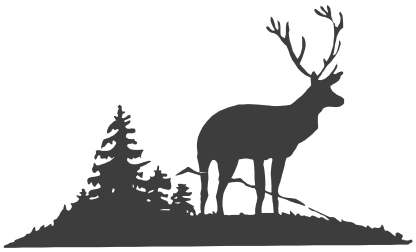
What is the difference in a predators and a prey? (The predator is the hunter and the prey is the victim.)
Can an animal be both predator and prey? (yes)
Which animals were the prey in this game? (mice)
Are mice ever predators? (Yes, they might eat ants or caterpillars.)
Which animals were the predators in this game? (foxes)
What other animals might be predators to mice? (snakes)
Are foxes ever prey? (yes) *What animals could we introduce to the game that would be predators to the fox?* (cougars or panthers)
What methods did predators use to capture prey?
Which escape methods were the most effective for the mice?
Why do animals eat each other? (They need food for energy in order to survive.)
How does this game simulate real life?
What might eventually happen to the foxes and mice that did not get enough food? (They might die or move to a new habitat where food was more plentiful.)

EXTEND/APPLY

1. Have students think of another predator/prey relationship. Ask students to describe the race for survival between the two animals.
   What behaviors could the prey use to survive?
   What behaviors would enable the predator to be successful?
2. Play the game again, but add water tokens to the playing field and require each animal to retrieve at least one.

ASSESSMENT

Explain what would happen if we had an unexpected decrease in predators in a habitat. Use the fox and mice habitat as an example. *If the foxes were not around to eat the mice, what results could you expect?*



DEER ME

BENCHMARK and TASK

SC.G.1.2.1 The student knows ways that plants, animals, and protists interact**.**

- The student experiences, through participation in simulations, that each habitat supports a limited population with the limit being set by the food, water, shelter, and space available.

KEY QUESTION

How many animals can a habitat support?

BACKGROUND INFORMATION

Living things need food to give them **energy**. Energy passes from one living thing to another through **food chains**. A **food chain** is a simple way to look at how animals depend upon their **habitats** and other animals to survive. Every food chain begins with the **sun.** Green plants (**producers**) are responsible for making food that animals (**consumers**) eat. An animal that eats the plants is a primary consumer. (A grasshopper is a good example.) A secondary consumer (such as a lizard) eats the primary consumer. This relationship is often referred to as a **predator/prey** relationship, where the predator is the hunter and the prey is the victim.

Food is just one of the things that living creatures need in order to survive. There are other necessities, called components of habitat, which animals require for survival. These other components include water, shelter, and space. Without a sufficient amount of each of the four components, an animal may not survive long enough to reproduce and maintain the **population.**

An animal's **environment** is often called its habitat. A habitat is the place where an animal finds its food, water, shelter, and space. Each habitat is capable of supporting a limited population of animals. The limit is set by the food, water, shelter, and space available. This limit is called the carrying capacity.

MATERIALS

Per class

data collecting chart

Round #	# of Deer
start	
1	
2	
↓	
↓	
15	

TEACHING TIPS

1. Create a data-collecting chart to record 15 rounds of play. (See above.)

2. Select a large, open area on the playground for this activity.

ENGAGE

Ask students to think about the essential components of habitats. Ask: *What do all animals need in order to survive?* As students share their ideas about components that are absolutely necessary for survival, try to direct the discussion toward four key components: food, water, shelter, and space. Ask: *What would happen if even one of these four components were missing?*

EXPLORE

1. Take the students and the recording chart outdoors to the area previously selected. Designate ¼ of the students to be deer for the beginning round of the game. All other students will be the components of habitat – food, water, shelter, and space.
2. Line up all deer shoulder to shoulder at one end of the playing area. Line up all other students shoulder to shoulder at the opposite end of the area. One line of students should be facing the other line of students across the playing area. (Be sure to record how many deer there are at the start of the game.)
3. Tell the students that are the components of habitat that they will get to decide what component to be for this round. They will show their choices by placing their hands a certain way. Demonstrate hand signals to both groups:
   food: place both hands on stomach
   water: place both hands over mouth
   shelter: place both hands on top of head
4. Tell students that, for this game, it is assumed all animals have the space they need to survive. No one will represent the component of space.
5. Students in both groups should now face away from each other (turn their backs). Each deer will make the hand signal of the component that it wants for this round. All other students will decide what component they want to be and make the appropriate signal, indicating food, water, or shelter. Remind students that once a signal is chosen, it must be kept for the whole round.
6. Ask students to turn around facing the other line while showing their signal.
7. When you make an agreed upon sound, such as a whistle or hands clap, the deer may go quickly (without running), collect a component of the habitat that matches their signal, and bring it back home. (Note: It is assumed for this activity that deer have met all their other needs except the one represented by their displayed hand signal.)
8. Deer who successfully collect the component needed are survivors. They remain deer in round 2. The component (student) they have collected also becomes a deer for round 2, representing a successful breeding season. Record the number of surviving deer and new deer for the end of round 1. Deer who could not meet their need become components of the habitat and join that group.
9. Continue recording data for approximately 15 rounds. If a round ends with no surviving deer, the game will end early. (That won't usually happen unless the habitat component students collaborate and all use the same signal one round!)

EXPLAIN

1. Return to the classroom. Create a graph using the data collected during the game.
2. Discuss results and patterns discovered by students:
   What do animals need to survive?

What are some of the limiting factors that affect their survival?
Who is most likely to survive?
What happened when resources got scarce?

3. Examining the data over a 15-year period (15 rounds) will usually provide students with evidence that there is a limit on the number of deer that can be supported by the food supply in a given environment. Ask students what the carrying capacity (limit determined by the amount of space, water, shelter, and food available) of the environment represented in this game seems to be. Rather than a specific number, students should give a *range* of numbers.

EXTEND/APPLY

Introduce a predator, such as a mountain lion, into the habitat. Deer will still have to meet their needs but will need to avoid predators.