

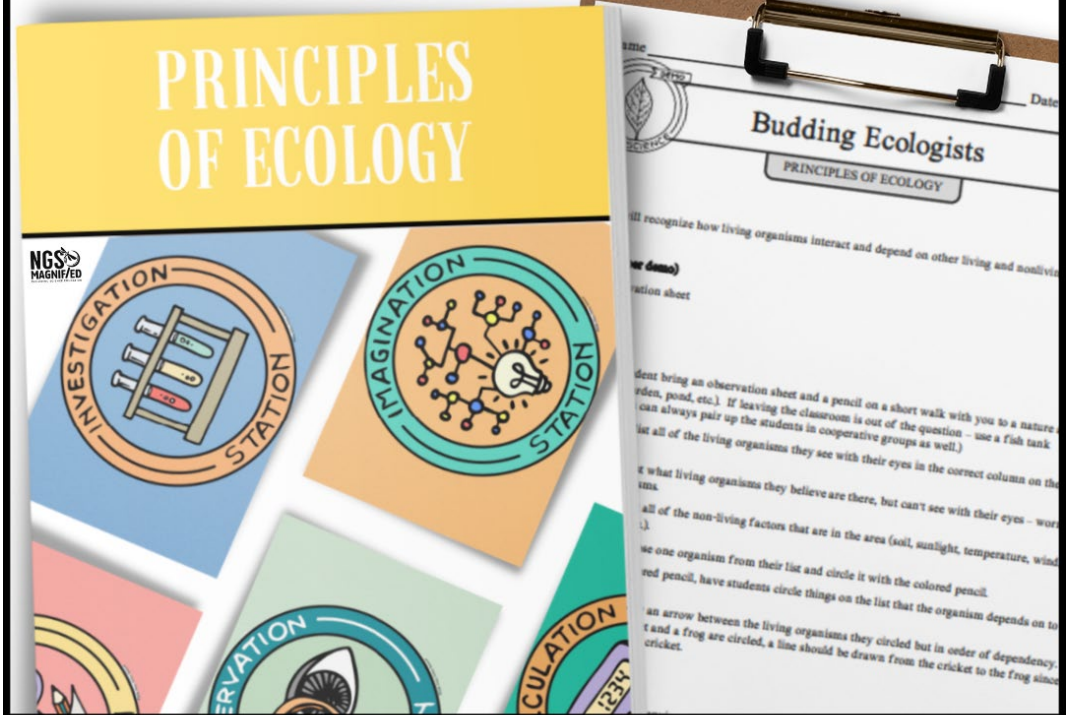


Demos, Labs, & Science Stations Feature:

- Hands-on Investigations
- STEM Challenge
- Scientific Literacy
- Inquiry Process Skills

LIFE SCIENCE - 5E

NGSS · TEKS



DEMOS, LABS, & SCIENCE STATIONS

HANDS-ON · STEM · CRITICAL THINKING



ENGAGING READING!

**GRAPHING,
WORD PROBLEMS &
MEASUREMENT!**

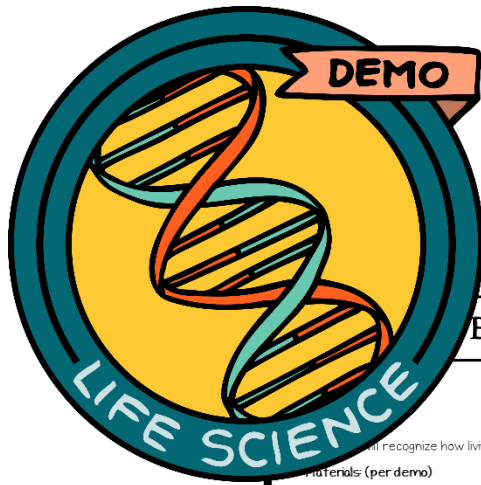
**INQUIRY SKILLS &
PROCESSES!**

HANDS-ON INVESTIGATIONS!

STEM CHALLENGES!

ALL Station Signage Included!!

Color & Black and White



Budding Ecologists

PRINCIPLES OF ECOLOGY

Students will recognize how living organisms interact and depend on other living and nonliving factors.

Materials: (per demo)

- observation sheet
- pencil

Demo:

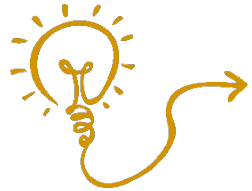
1. Have each student bring an observation sheet and a pencil on a short walk with you to a nature area nearby (park, garden, pond, etc.). If leaving the classroom is out of the question - use a fish tank ecosystem. (You can always pair up the students in cooperative groups as well.)
2. Have students list all of the living organisms they see with their eyes in the correct column on their observation sheet.
3. Have students list what living organisms they believe are there but can't see with their eyes - worms, microscopic organisms.
4. Have students list all the non-living factors in the area (soil, sunlight, temperature, wind, rocks, soil, water, etc.).
5. Have students choose one organism from their list and circle it with the colored pencil.
6. Using the same colored pencil, have students circle things on the list that the organism depends on to survive.
7. Ask students to draw an arrow between the living organisms they circled but in order of dependency. For example, if a cricket and a frog are circled, a line should be drawn from the cricket to the frog since the frog depends on the cricket.

What's Happening?

Students are observing an environment with both living and nonliving factors - this is an ecosystem. They are becoming ecologists by studying a community of organisms that live in a particular area, along with their nonliving surroundings.

This activity will also help teachers identify many misconceptions students have about their environment - common ones being that plants, mushrooms, moss, etc., are not alive. Also, nonliving factors such as rocks and the wind do not affect living organisms.

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Discussion questions and teacher set-up included!

Teacher guide and answer key offered for every lab!

Easy-to-get materials!



Name _____ Date _____



Predator-Prey Adaptations

PRINCIPLES OF ECOLOGY

Overview: Competition is the demand for resources that are in limited supply in an ecosystem. These resources include water, shelter, and food. In addition, for some organisms to survive, many animals in a community are in a predator-prey relationship, meaning that larger ones eat smaller ones to survive.

Successful predators have adaptations that allow them to catch prey, and prey has adaptations to avoid being caught and eaten by predators. Some adaptations of predators include keen senses, ultraviolet vision, speed, sharp teeth, claws, and camouflage to avoid being seen by prey. Animals avoid being prey using adaptations which include defense such as stinging, quills, or poison, traveling in large groups, and also camouflage to avoid being seen, stinging, quills or poison, traveling in large groups and also camouflage to avoid being seen.

Materials:

- 500 colored pieces (100 of each of 5 different colors - ex. plastic discs, toothpicks, pipe cleaner pieces, etc.)
- stopwatch
- pencil and paper for recording data
- UV light (blacklight)
- Colored pencils

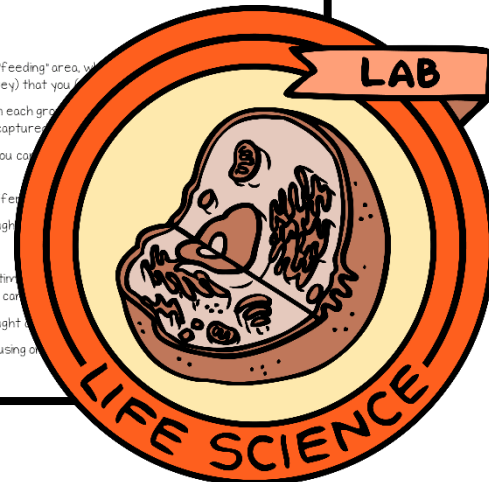
Procedure:

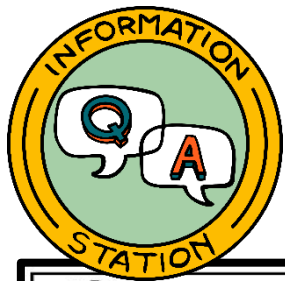
Part A

1. All groups are to stand around the designated "feeding" area, which the teacher has scattered as your food source (prey) that you will be eating.
2. After the initial signal is given, one person from each group will be designated as the predator and will capture in the allotted time. Prey can only be captured if it is seen.
3. Count the number of prey of each color that you captured and record the data.
4. Repeat steps 2 and 3 two more times with different predators.
5. Calculate the average of each color of prey caught.

Part B

1. You will now repeat steps 2 - 4. However, this time the predator will be using a flashlight, as used by many birds of prey who can see in the dark.
2. Calculate the average of each color of prey caught.
3. Make a bar graph of each colored prey caught using one of the colored pencils for Part B.





Group members will read a passage and then complete a task to help increase science literacy and deepen their understanding of the science concept.



Regaining Balance in Yellowstone

Imagine standing under the night sky in Yellowstone National Park. You are surrounded by millions of stars and immersed in nature's music. You hear the sound of a beaver tail slapping a warning on the pond and the hiss of Old Faithful in the distance. Perhaps you even hear the eerie howl of a wolf calling for his pack. This is a sound you would never have heard twenty-five years ago.

In the 1800s, westward expansion brought settlers into direct contact with wolves and their prey. As agriculture grew, the wolves' natural prey decreased. Found on alternative food sources—domestic livestock, settlers felt they needed to protect their livestock, so they eliminated the predators. In 1926, the last wolf pack in the park was killed.

When a top predator is eliminated it creates a ripple of consequences throughout the ecosystem. The absence of wolves created several problems. The elk population carrying capacity. Because the elk didn't have to run for their lives, their numbers increased, which depleted the willow trees. Willows couldn't survive. By 1945, only one rearing colony remained.

In 1995, the grey wolf was reintroduced into the park. Over ten wolves from Northwestern Montana were transported to the park, where they were released. With the wolves came a scientific laboratory for wilderness observation.

The reintroduction of the wolves created a trophic cascade in the elk population since wolves found their predators, aspens and willows were no longer headed off simply back, and their population increased significantly causing an increase in rodents which were a food source for bears also benefited by slowing wolf kills which helps.

People are starting to understand how complex ecosystems are. But, unfortunately, only 5% of our nation's wildlands are protected. If we don't take action, the world will be a very different place.

A

Why did settlers feel wolves were a threat in the early 1900's?

B

Identify two problems that occurred with the absence of wolves?

A. _____

B. _____

C. _____

D. _____

D

What does the title of the article mean when it states, 'Regaining Balance in Yellowstone'?

A

B

The forest pictured above was cleared by human called slash and burn, in order to make room for urban use.

C

Name _____ Date _____

AL _____

A2 _____

BL _____

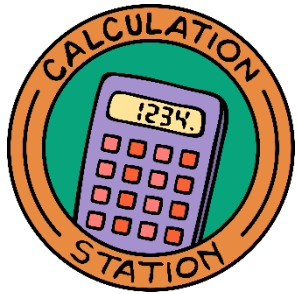
B2 _____

CL _____

C2 _____

Use the images above to identify the producer, first-order consumer, second-order consumer and decomposer. Which feeding relationship is pictured between the bird and the ladybug in picture C?

Group members will have images, illustrations, or actual samples at this station that show applications or processes of the science topic.



Group members use their math skills to complete the station challenge. Skills may include graphing, analyzing data, using models, measurement, and calculating formulas or word problems.



Penguin Predicament

Swedish 1912 biologists on the Antarctic Peninsula noted that they have observed a sharp decrease in temperatures on the island. This is a concern because the long and harsh winters of the Antarctic Peninsula mean that only a few species of plants can survive. During the winter, the only place where plants grow is on the rocky slopes. The plants are the only source of food for the animals, including seals, penguins, and birds.

As the island warms, the temperatures are rising and the snow is melting. This is a concern because the snow is the only source of food for the seals, penguins, and birds.

Graph the density of krill data from the 1982-1994 period in Table 2. Make sure to label the axes.

Table 1: Density of Krill (# per meter)			
Year	# / m ³	Year	# / m ³
1982	31	1992	11
1983	40	1993	11
1987	26	1997	22
1989	12	1998	40
1990	8	1999	4
1991	8	2000	6
1992	7	2001	21
1993	99	2002	7
1994	6	2003	9

2. Graph the number of breeding pairs of Adélie penguins using the data found in Table 2.

Giant Arctic Food Web

Challenge: As a class, complete a giant food web using organisms found in the Arctic.

Materials (per group):

- Envelope with animal cards/vocab cards
- Tape

System requirements:

- The entire class will complete this station. All the station groups arrive at the station number.
- Depending on your group size:
 - If you pick up an envelope, create a food chain and arrows represent flow of energy.
 - If you pick up an envelope, create a food web and arrows represent flow of energy.
- Use the giant food web and your answer sheet.

Testing:

Which groups need completed envelopes to check for answers?

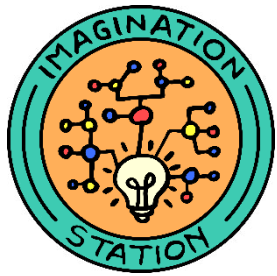
Name: _____ Date: _____

Data and Observations

- Create a giant Arctic food web and complete the missing level penguins.

- What trophic level represents the largest biomass in this ecosystem?
- What could be other explanations for the changes seen in the graph?

Group members will work together to solve a STEM (Science, Technology, Engineering, Math) challenge by creating models or designs that demonstrate their understanding of the science topic being taught.



This station makes science concepts relevant for students by asking them to imagine scenarios that will bring about discussion and critical thinking.

Design a Zoo Exhibit

Directions: Use your imagination to answer the statement below.

IMAGINE you were hired to design a new zoo exhibit for an endangered reptile called a Thorny Lizard.



Identify the _____
describe what _____
_____ placing in the exhibit.

I'm "Lichen" This Relationship

Problem: What is the symbiotic relationship as found in a lichen?

Lichens grow in places where few organisms can survive – usually on top of mountains. They can survive in this environment because of the symbiosis of the two organisms that make up lichen – fungus and cyanobacteria (or algae). The alga or cyanobacteria cells are green or blue-green and perform photosynthesis, providing the fungus with nutrients. The fungus, in turn, hangs around the alga with water and minerals.

Materials:

- lichen
- Petri dishes (Petri dishes)
- microscope
- slide
- coverslip
- water
- colored pencils

Procedures:

1. Tear a small piece of lichen off from the sample provided.
2. Tease the lichen piece apart using the forceps.
3. Prepare wet mounts using the lichen.
4. Observe the lichen under the microscope on low power.
5. Observe the lichen at high power and draw what you see in the area provided. Make sure to label the diagram and make observations.
6. Answer the questions below on your answer sheet.

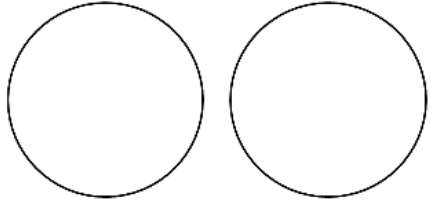
Analyze and Conclude:

1. Identify the symbiotic relationship that exists in lichen. Give evidence to support.
2. Lichens are pioneer species. What does this mean, and how do they affect the environment?

Name _____ Date _____

Data and Observations:

Low _____ High _____



Analyze and Conclude:

1. _____
2. _____

TEACHERS SAVE TIME:
Laminate station pages and reuse for each class and for years to follow!

Inquiry and Process Skills

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Demo
 Guided Inquiry Lab
 Science Stations

Inquiry-Based Science Unit: Principles of Ecology	Classifying	Communicating	Compare & Contrast	Creating Models	Gather/Organize Data	Generalizing	Identifying Variables	Inferring	Interpreting Data/Diagrams	Making Decisions	Manipulating Materials	Measuring	Observing	Predicting
Budding Ecologists		X	X			X							X	X
Predator-Prey Adaptations	X	X	X	X	X			X	X		X	X	X	
Information Station: Regaining Balance in Yellowstone	X				X	X			X					
Observation Station: Images & Questions	X	X	X			X		X	X	X			X	
Investigation Station: I'm "Lichen" This Relationship	X	X	X		X		X		X	X	X		X	
Calculation Station: Penguin Predicament	X		X		X		X		X					
Communication Station: Questions		X	X			X		X	X					
Creation Station: Giant Arctic Food Web		X		X	X		X			X	X	X	X	X
Imagination Station: Design a Zoo Exhibit		X				X				X				

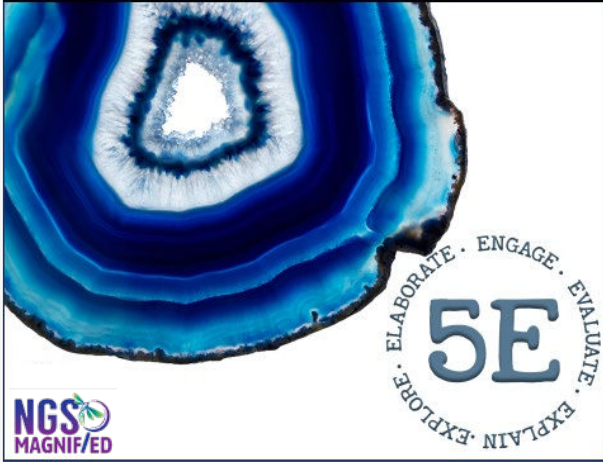
NGS Magnified promotes scientific inquiry throughout the curriculum. Students become more confident and effective learners while developing problem-solving and critical thinking skills. Process skills, such as planning, organizing, and evaluating, help students to complete projects and assignments. These skills allow students to independently gather information, analyze it, and draw their own conclusions.

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