

FROZEN STIFF CONNECTION

Performance Standard 12B/11A.E

Students will apply the process of scientific inquiry to categorize organisms by their energy relationships in their environments accordingly:

- *Knowledge*: Identify and describe the adaptations of predators and prey in ecosystems.
- *Application*: Correlate the factors for success for predators and prey in their habitats.
- *Communication*: Generalize the interrelationships of adaptations of predators and prey with their habitats.

Procedures

1. ***In order to know and apply concepts that describe how living things interact with each other and with their environment (12B) and the concepts, principles and processes of scientific inquiry (11A)***, students should experience sufficient learning opportunities to develop the following:
 - Construct a scientific inquiry hypothesis from research of different ecosystem inhabitants with a focus on predator-prey adaptations and relationships in ecosystems.
 - Collect information about habitat conditions, relationships and adaptations of animals that live there.
 - Role-play the processes involved in finding shelter, food and safety in the “Quick Frozen Critters” game.
 - Analyze ratios of responses according to various factors.
 - Make inferences about the successes of predators and prey and limiting wildlife populations.

Note to teacher: This activity relates to knowledge associated with standard 12B, while addressing the performance descriptors for stage E within standard 11A. This activity was produced originally through Project WILD and shared with ISBE in collaboration with the Illinois Department of Natural Resources. More information about this resource is available from Randi Wiseman rwiseman@dnrmail.state.il.us and through the Office of Land Management and Education, 1 Natural Resource Way, Springfield, IL 62702; phone: 217-524-4126 and the web site: <http://dnr.state.il.us/lands/education/classrm/wild/intro.htm>
2. Have students review and discuss the assessment task and how the rubric will be used to evaluate their work.
3. Provide background information and directions to enact the Quick Frozen Critters simulation. Students will be divided into predators and prey; they will alternate roles. Following the simulation, provide time for students to interpret their results in small groups and eventually for individual reflections. Discuss the ways they escaped capture when they were prey—which ways were easiest? Most effective? What means did they use as predators to capture prey? Which were the best? What did the predators do in response to a prey animal that “froze”? In what ways are adaptations important to both predator and prey? How do predator/prey relationships serve as natural limiting factors affecting wildlife?
4. Assign one or more of the following assessment choices:
 - Choose a predator and its prey. Describe the adaptations of both in their habitats. What are their limiting factors?
 - Draw an imaginary animal that can escape: A quick flying predator: A stalking predator: A pouncing predator. Explain its adaptations.
 - Write about a predator that can capture: A well-camouflaged specie: A species with excellent eyesight, a species that has body armor or quills. Explain its adaptations.
 - Create an instruction manual for predators or prey. Use actual animal adaptations.
5. Evaluate each student’s work using the Science Rubric as follows and add the scores to determine the performance level:
 - *Knowledge*: The identification and descriptions of the relationships that exist among predators and prey were complete and correct.
 - *Application*: The explanations for responses and adaptations were complete and accurate.
 - *Communication*: The reflections were well-detailed and accurately explained the predator/prey relationship.

BACKGROUND INFORMATION

- Predator: an animal that kills and eats other animals for food.
- Prey: an animal that is killed and eaten by other animals for food.
- Limiting factors: Factors (e.g., disease, climate, pollution, accidents, shortages of food) that affect an animal when they exceed the limits of tolerance of that animal (predators are limiting factors for prey; prey are limiting factors for predators.)
- Animals display a variety of behaviors in predator/prey relationships. These are adaptations to survive.
- Some prey behaviors are signaling to others, flight, posturing in a fighting position, scrambling for cover and even “freezing” on the spot to escape detection or capture by predators. The kind of behavior exhibited partly depends on how close the predator is when detected by the prey. Each animal has a threshold for threat levels. If a predator is far enough away for the prey to feel some safety, the prey may signal to others that a predator is near. If the predator comes closer, the prey may try to run away. If the predator is too close to make running away feasible, the prey may attempt to scurry to a hiding place. If the predator is so close that none of these alternatives is available, the prey may freeze in place. The closer the predator comes to the prey animal, the more likely it is that the prey will ‘freeze’ in place. This ‘freezing’ occurs as a kind of physiological shock in the animal. (Shelter or camouflage also may make them invisible to the predator when they freeze.)
- Too often people who come upon animals quickly and see them immobile infer that the animals are unafraid when, in reality, the animals are ‘frozen’ or as the adage goes, “frozen stiff”.
- The main purpose of this activity is for students to recognize the importance of adaptations to both predators and prey and to gain insight into limiting factors affecting wildlife populations.

PROCEDURE:

1. Select any of the following pairs of predators/prey: coyotes/cottontails; hawks, ground squirrels; cougar, deer; foxes, quail. Identify students as either “predators” or “prey” for a version of “freeze tag” with approximately one predator per every four to six prey.
2. Using available space (gymnasium or playing field), identify one end as the “food source”; and the other end as “shelter”.
3. Place 4-5 circles (hula hoops, string circles, chalk on asphalt, etc.) on the open area between the “shelter” and the “food.” These represent additional shelter or “cover” for the prey and can be distributed randomly.
4. Food tokens are placed in the “food source” zone on the ground. Allow three food tokens for each prey animal.
5. Clearly identify predators using safety vests or other means.
6. Use a whistle or signal to start each round. When a round begins, have the prey start from their “shelter.” The task of the prey animals is to move from the permanent shelter to the food source, collecting one food token each trip and returning to the permanent shelter. To survive, prey must obtain three food tokens. Their travel is hazardous, however. If they spot a predator, they can use various appropriate prey behaviors, including warning other prey that a predator is near. Preys have two ways to prevent themselves from being caught by predators: They may “freeze” any time a predator is within five feet of them, or they may run for cover (with at least one foot within the hula hoops). Frozen prey may blink, but otherwise should be basically still without talking. Prey can have bandannas in their pockets which when removed by predator represents predation. Prey can also be assigned different modes of locomotion.
7. Predators start the activity anywhere in the open area between the ends of the field and thus are randomly distributed between the prey’s food and permanent shelter. Predators attempt to capture prey to survive, tagging only moving (not “frozen”) prey, by removal of bandanna. Predators must each capture two prey in order to survive. Captured preys are taken to the sidelines by the predator whom have captured them.
8. Establish ground rules for student behavior. Behave in ways that are not harmful to other students, even when simulating predator behavior.
9. Set a time limit of 5-7 minutes for each round. Remind prey that they can remain frozen as long as they like, but if they do not have enough food at the end of the activity, they will starve to death. In nature, an animal must balance the need to find food with the sometimes conflicting need for safety.
10. Play four rounds, allowing each student to be both prey and predator. Record the number of captures in each round. Have the students who are captured become predators, and have each predator that did not acquire enough food in a round become a prey animal in the succeeding round. This feature quickly develops the concept of dynamic balance as prey and predator populations fluctuate in response to each other.

Examples of Student Work not available

Time Requirements

- 20 minutes for overview and explanation of role-playing scenarios; 1 class period for 'freeze-tag' adaptation; 1 class period for discussion and reflections; additional time for creating final reports; 1 class period for presentations

Resources

- Food tokens (3 per student); vests or labeling devices for predators; 4 boundary markers for corners of 'habitat', 4-5 hula hoops for 'safe shelters'
- Data tables; timers (5-7 minute maximum periods)
- Science Rubric