

## Formative Assessment

1. The big idea is to study the ecological relationships of organisms. This section explores the meaning of certain relationships and why they are important for each organisms survival and the maintenance of diversity on the planet. Biology is the study of life, this particular aspect studies the interactions of life.
2. (12) Science concepts. The student knows that interdependence and interactions occur within an environmental system. The student is expected to:
  - a. (A) interpret relationships, including predation, parasitism, commensalism, mutualism, and competition among organisms
3. The subject area is high school biology. Specifically, this concept explores the ecology aspect of biology. Ecology is the scientific study of the relations that living organisms have with respect to each other and their environment. These relationships can be separated and categorized based on the type of interaction going on between the organisms. The big idea encompassing these interactions is known as symbiosis or coexistence. Ecology is the branch of biology that studies organisms' abilities to coexist with each other and how that coexistence is different between different organisms.
  - a. Symbiosis is affected by several factors. There are biotic (living) factors such as parasites, and abiotic (nonliving) factors such as rainfall and temperature. Since this class has already discussed climate and abiotic factors, the assessment focuses on the biotic factors.
  - b. Predator-prey relationships involve a predator eating all or part of the prey. The significance of this relationship ties back to evolution since natural selection acts on both players in this interaction. Natural selection will favor prey that can develop tactics of avoidance and will favor predators that can develop tactics of optimal consumerism. The populations of predators and prey are completely reliant upon each other.
  - c. Parasitism is also an evolutionary phenomenon in which an organism lives in or on the hosting prey. A parasite obtains its nutrition from the host. Some parasites insert their young into a prey item so the offspring have a meal once they hatch/emerge. Parasites are important models of evolution since all parasites have at one time in history, been able to live without a host. The parasite had to co evolve with its host in order to occupy or feed on that very specific organism.
  - d. Commensalism is a relationship in which one organism gains benefits and the other organism is neither positively nor adversely affected. A common example is the relationship between a clown fish and a sea anemone. The clown fish has specialized morphological structures that allow it to live within the protective stinging capacities of the sea anemone. The sea anemone is neither negatively nor positively affected by the clown fish and the clown fish evades predators by living in an organism that can sting the approaching predator.

- e. Mutualism is a type of relationship in which both organisms benefit from the relationship. A simple example is the student-teacher relationship. Teachers give students the knowledge needed to go into the work force and without students, teachers would not be needed in the work force.
- f. Competition is a common practice in all populations. There is a limited number of resources for each population including food, mates, and living space. Therefore, the better competing organism is able to occupy a niche, obtain food, and reproduce. Those who are worse competitors in the population are most affected by the limitations and may not be able to survive thrive, or reproduce given the available resources. Competing has several layers of severity from simply occupying a space to physically fighting for a mate.

4. Fill in the blank

- a. An interaction between species in which one species, the predator, eats the other, the prey is known as \_\_\_\_\_.
- b. A symbiotic relationship in which one organism benefits but the other is neither helped nor harmed is defined as \_\_\_\_\_.
- c. A symbiotic relationship in which both participants benefit is \_\_\_\_\_.
- d. A symbiotic relationship in which one organism benefits at the expense of another, the host, by living either within or on the host is considered \_\_\_\_\_.
- e. The interaction that occurs naturally between living organisms which co-exist in the same environment who contend for water supplies, food, mates, and other biological resources is called \_\_\_\_\_.

5. Multiple Choice

Use the following information to answer

Predator ___/___ Prey	
+	Positive effect on survival and reproduction
-	Negative effect on survival and reproduction
0	No effect on survival and reproduction

Example: (+/-) positive effect on predator /negative effect on prey

1. Which of the following would have the outcome of (+/+)
  - a. Competition
  - b. Predation
  - c. Mutualism
  - d. Commensalism

i. Answer = C
2. Which of the following would have the outcome of (+/-)
  - a. Symbiosis
  - b. Parasitism
  - c. Commensalism

- d. Mutualism
  - i.
  - ii. Answer = B
- 3. Which of the following would have the outcome of (-/-)
  - a. Competition
  - b. Predation
  - c. Parasitism
  - d. Mutualism
    - i. Answer = A
- 4. The symbiotic relationship between a clown fish and a sea anemone is an example of what kind of relationship?
  - a. (+/+)
  - b. (+/-)
  - c. (-/-)
  - d. (+/0)
    - i. Answer = D
- 5. The symbiotic relationship of a cow grazing on grass is an example of what kind of relationship?
  - a. (+/+)
  - b. (+/-)
  - c. (-/-)
  - d. (+/0)
    - i. Answer = B
- 6. Parasites must inhabit the inside of their prey in order to reproduce and survive (False – just on or in the prey)
- 7. Herbivory is considered a type of commensalism (False – Predation)
- 8. Symbiosis includes the organism's interaction with the abiotic factors of the environment (true)
- 9. A herd of gazelles migrates into a territory where zebras have been grazing throughout the season. The population of predators in the area is currently low so there is a higher population of zebras than in neighboring territories. Eventually, the capacity of the area will diminish and no resources will be left for both herds to survive and reproduce. Predict one outcome of the community if the predator population rises and explain two reasons why the capacity of the area will reduce in time.
- 10. Explain symbiosis in terms of biological theory and ecology.
- 11. Identify one type of mutualistic relationship in nature and explain the significance of mutualism.