



Community Ecology

ENE-4.A.1

The structure of a community is measured and described in terms of species composition and species diversity.



Community Ecology

ENE-4.B.1

Communities change over time depending on interactions between populations.

RELEVANT EQUATION

Simpson's Diversity Index—

$$\text{Diversity Index} = 1 - \sum \left(\frac{n}{N} \right)^2$$

n = the total number of organisms of a particular species

N = total number of organisms of all species



Community Ecology

ENE-4.B.2

Interactions among populations determine how they access energy and matter within a community

ENE-4.B.3

Relationships among interacting populations can be characterized by positive and negative effects and can be modeled. Examples include predator/prey interactions, trophic cascades, and niche partitioning.



Community Ecology

ENE-4.B.4

Competition, predation, and symbioses, including parasitism, mutualism, and commensalism, can drive population dynamics.

ENE-4.C.1

Cooperation or coordination between organisms, populations, and species can result in enhanced movement of, or access to, matter and energy

AP BIO INSTA-REVIEW

TOPIC

8.5



**There's 4 different species.
What's the species richness?**

A. 2

B. 3

C. 4

D. 5

AP BIO INSTA-REVIEW

TOPIC

8.5

There's **4** different species. What's the species richness?

c. 4



Species richness is the number of different species in an area.

There are 4 different species so the species richness is 4.

AP BIO INSTA-REVIEW

TOPIC

8.5



**In Simpson's Index formula,
what does "backward E" mean?**

- A. Equilibrium**
- B. Exponential**
- C. Factorial**
- D. Summation**

AP BIO INSTA-REVIEW

TOPIC

8.5

In Simpson's Index formula, what does "backward E" mean?

D. Summation



The " Σ " means summation. You will add all the individual numbers together.



As predator population increases, prey population...

- A. Decreases**
- B. Increases**
- C. Stay the Same**

AP BIO INSTA-REVIEW

TOPIC

8.5

As predator population increases, prey population...

A. Decreases



**The predator consumes the prey.
If there are more predators,
they will be consuming more
prey so the prey population will
decrease.**

AP BIO INSTA-REVIEW

TOPIC

8.5



**As prey population increases,
predator population...**

- A. Decreases**
- B. Increases**
- C. Stay the Same**

AP BIO INSTA-REVIEW

TOPIC

8.5

As prey population increases, predator population...

B. Increases



The predator consumes the prey. If the prey population increases, there will be more food available for the predator so the predator population will increase.

AP BIO INSTA-REVIEW

TOPIC

8.5



In a trophic structure of four organisms, what is the effect on the last one?

All 3 organisms have a negative effect on the organism below them in the chain

- A. Negative**
- B. No effect**
- C. Positive**

@APBIOPENGUINS

AP BIO INSTA-REVIEW

TOPIC

8.5

In a trophic structure of four organisms, what is the effect on the last one?

All 3 organisms have a negative effect on the organism below them in the chain

A. Negative



River



juvenile steelhead



damselfly nymph



midge larva



Cladophora

Each of the organisms has a negative impact on the organism below in the trophic structure, so overall there will be a negative effect. If there's two negative impacts, the overall impact will be positive. If there's three negative impacts, the overall impact will be negative.



Describe the interaction:
Competition

A. +/-

B. -/+

C. +/+

D. -/-

AP BIO INSTA-REVIEW

TOPIC

8.5

**Describe the interaction:
Competition**

D. -/-



Competition is negative for both parties as both populations or species will be negatively impacted with less resources.

AP BIO INSTA-REVIEW

TOPIC

8.5



**Describe the interaction:
Predator/Prey**

A. +/-

B. -/+

C. +/+

D. -/-

AP BIO INSTA-REVIEW

TOPIC

8.5

**Describe the interaction:
Predator/Prey**

A. +/-



The predator is benefited (received nutrients) while the prey is harmed (it is consumed by the predator).



Describe the interaction:

Mutualism

A. +/-

B. -/+

C. +/+

D. -/-

AP BIO INSTA-REVIEW

TOPIC

8.5

**Describe the interaction:
Mutualism**

C. +/+



**Mutualism is both
populations/species are
benefited.**

**example: termites &
microorganisms in gut**



**Describe the interaction:
Host/Parasite**

A. +/-

B. -/+

C. +/+

D. -/-

AP BIO INSTA-REVIEW

TOPIC

8.5

**Describe the interaction:
Host/Parasite**

B. -/+



The host is negatively impacted (the parasite steals nutrients or harms the host) while the parasite is positively impacted (obtains nutrients from the host)

AP BIO INSTA-REVIEW

TOPIC

8.5



What is cooperation?

AP BIO INSTA-REVIEW

TOPIC

8.5

What is cooperation?



**Interaction between organisms,
populations, community to
enhance movement of/access to
matter and energy**



What is a species?

- A. Group of individuals that live in same area
- B. Group of individuals that mate
- C. Group of individuals able to mate and produce fertile, viable offspring
- D. Group of individuals that look the same

What is a species?

C. Group of individuals able to mate and produce fertile, viable offspring



The biological species concept refers to two individuals are from the same species if they are able to interbreed and produce fertile, viable offspring.



What is species richness?

- A. The number of different species**
- B. The number of individuals in a species**
- C. The total species that exist on Earth**
- D. The total money that's the species is worth**

What is species richness?

**A. The number of
different species**



Species richness is the number of species in an area. The more species, the more rich the area. The less species, the less rich the area.

AP BIO INSTA-REVIEW

TOPIC

8.5



Solve with Simpson's Index

Penguins = 10

Monkeys = 5

RELEVANT EQUATION

Simpson's Diversity Index—

$$\text{Diversity Index} = 1 - \sum \left(\frac{n}{N} \right)^2$$

n = the total number of organisms of a particular species

N = total number of organisms of all species

AP BIO INSTA-REVIEW

TOPIC

8.5

Solve with Simpson's
Index

Penguins = 10

Monkeys = 5



$$1 - [(10/15)^2 + (5/15)^2]$$

$$1 - [(0.44) + (0.11)]$$

$$1 - 0.55$$

$$0.45$$

AP BIO INSTA-REVIEW

TOPIC

8.5



**Two species are able to survive
with the exact same niche**

- A. True**
- B. False**

AP BIO INSTA-REVIEW

TOPIC

8.5

Two species are able to survive with the exact same niche

B. False



The competitive exclusion principle states that two species cannot survive with the exact same niche. It is favorable for the two species to undergo resource partitioning to divide up the resources to ensure both species are successful.



Interaction in which both organisms are harmed.

- A. Competition**
- B. Cooperation**
- C. Mutualism**
- D. Parasitism**

AP BIO INSTA-REVIEW

TOPIC

8.5

Interaction in which both organisms are harmed.

A. Competition



Competition is -/- as both individuals are harmed since they are competing for the same resource.

Cooperation is +/+

Mutualism is +/+

Parasitism is +/-



**Interaction in which both species
are benefited**

- A. Competition**
- B. Cooperation**
- C. Mutualism**
- D. Parasitism**

Interaction in which both species are benefited

C. Mutualism



Mutualism is $+/+$ as both individuals are benefited since they are providing a service or resource to each other.

Competition is $-/-$

Cooperation is $+/+$

Parasitism is $+/-$



Interaction in which one species benefits and other is harmed

- A. Competition**
- B. Cooperation**
- C. Mutualism**
- D. Parasitism**

AP BIO INSTA-REVIEW

TOPIC

8.5

Interaction in which one species benefits and other is harmed

D. Parasitism



Parasitism is +/- as one is benefited (parasite) while the other is harmed (host) due to the parasite taking resources from the host.

Competition is -/-

Cooperation is +/+

Mutualism is +/+

AP BIO INSTA-REVIEW

TOPIC

8.5



What type of interaction is predator/prey?

- A. +/+**
- B. +/-**
- C. +/0**
- D. -/-**

AP BIO INSTA-REVIEW

TOPIC

8.5

What type of interaction is predator/prey?

B. +/-



The predator is positively impacted because it obtains nutrients (and food) while the prey is negatively impacted because it dies (and is consumed by the predator).



Predict the result if you separate two obligate mutualistic organisms.

- A. No response**
- B. Organism 1 grows, organism 2 dies**
- C. Both organisms increase growth**
- D. Both organisms decrease growth**

AP BIO INSTA-REVIEW

TOPIC

8.5

Predict the result if you separate two obligate mutualistic organisms.

D. Both organisms decrease growth



Obligate mutualistic organisms CANNOT survive without the other organism. If you were to isolate either of these organisms, neither organism will survive.

AP BIO INSTA-REVIEW

TOPIC

8.5



Why would both organisms decline if obligate mutualistic organisms are separated?

AP BIO INSTA-REVIEW

TOPIC

8.5

Why would both organisms decline if obligate mutualistic organisms are separated?



I always tell my students they are obligated to be together.

They are unable to survive without the other. An example of this would be the microorganisms that live in the gut of a termite. If you kill the microorganism in their gut, the termite will no longer be able to digest cellulose thus it will starve as it only eats wood.

AP BIO INSTA-REVIEW

TOPIC

8.5



**If two organisms share a niche,
how do they both survive?**

- A. Competitive exclusion**
- B. Resource partitioning**

If two organisms share a niche, how do they both survive?



B. Resource partitioning

Resource partitioning is a process where species will divide up the resources. This allows the species to co-exist in the same area without the competitive exclusion principle which states that two species cannot share the same niche.