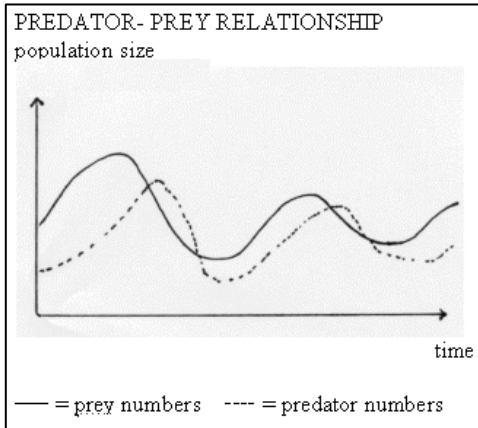


Unit 1 The Living World AP Exam Review

Predator Prey



- 1) Define Predator.
- 2) Define Prey.



- 3) Describe the trends from observations of the figure to the left:

Symbioses

- 4) Define Symbiosis.
- 5) Fill in the chart below on the different types of symbioses.

Symbiosis Type	Species 1 Interaction (Beneficial, Harmful, or Neutral)	Species 2 Interaction (Beneficial, Harmful, or Neutral)	Give a Real World Example

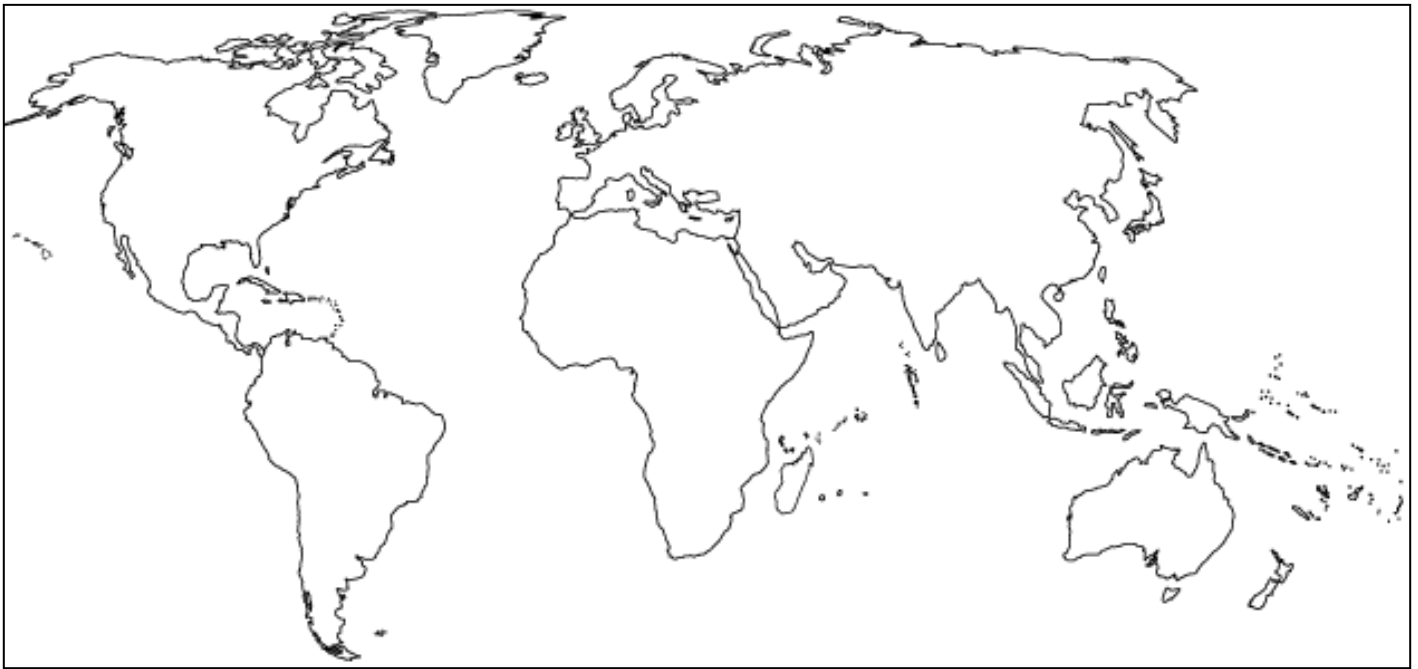
Competition and Resource Partitioning

- 6) What is competition?
- 7) How does competition sometimes lead to resource partitioning?
- 8) Compare interspecific to intraspecific competition.

Terrestrial Biomes

- 9) Define the term biodiversity.
- 10) Define the term biome.
- 11) Sketch and/or label the following on the map of the world below:
 - a. the equator
 - b. the tropic of Cancer and the tropic of Capricorn
 - c. the Mid-Atlantic Ridge
 - d. the location of suppressed upwelling characteristic of the occurrence of El Niño

e. the location of China, India, Ethiopia, Brazil, Bangladesh, and Fremont



12) Fill in the table below about the different terrestrial biomes of the world.

Type of Biome	Typical Location	Typical Climate	Characteristic adaptations for survival
Tropical Rain Forest			Plants – Animals –
Temperate Deciduous Forest			Plants – Animals –
Taiga (Boreal) Forest			Plants – Animals –
Tropical Grasslands (Savanna)			Plants – Animals –
Temperate Grassland (Prairie)			Plants – Animals –
Tundra (Cold Grassland)			Plants – Animals –
Desert			Plants – Animals –

13) For each of the following biomes, identify a specific country in which each biome occurs in relative abundance:

Taiga _____	Desert _____
Tropical rainforest _____	Temperate grassland _____
Tropical grassland _____	Coral reef _____
Temperate deciduous forest _____	Tundra _____

Aquatic Biomes

14) Fill in the table below about the different aquatic biomes of the world.

Type of Biome	Typical Location	Typical Climate	Characteristic adaptations for survival
Coral Reef			Plants – Animals –
Open Ocean			Plants – Animals –
Kelp Forest			Plants – Animals –
Estuary/Wetland			Plants – Animals –

Biogeochemical Cycles: Carbon Cycle, Phosphorus, Nitrogen and Water Cycles

15) Complete the following table for these biogeochemical cycles:

Trait	Carbon	Nitrogen	Phosphorus	Water
Importance to life				
Largest reservoir				
Methods of transport				
Cycle duration (long/short)				

Detailed Nitrogen Cycle

16) Identify the characteristic process associated with each of the following.

Nitrification: _____

Denitrification: _____

Assimilation: _____

Nitrogen Fixation: _____

Ammonification: _____

Food Chains

17) Identify three examples of biotic components of an ecosystem and three examples of abiotic components of an ecosystem.

(1) _____
Biotic: (2) _____
 (3) _____

(1) _____
Abiotic: (2) _____
 (3) _____

18) Diagram a simple food chain in the space below. Label the trophic levels and illustrate the Rule of 10 with each trophic level. Start with 1,000,000 kCal in the primary producer level.

19) What happens when a predator is removed from the food chain or web?

1st and 2nd Law of Thermodynamics

20) Define the First Law of Thermodynamics

-Example

21) Define the Second Law of Thermodynamics

-Example

Gross Primary Productivity and Net Primary Productivity

23) Define GPP

24) Define NPP

25) What biomes have high NPP? Low NPP? Why?

GPP and NPP Math

26) Perform the following calculation. Show all of your work. If the grasses on a 100-hectare area of grassland grow at an average rate of 1 cm/day, the average volume of grass that is added to the grassland each day is _____ m³. If the density of the grasses that grow in the grassland averages 400 kg/m³, the net primary productivity is approximately _____ g/day or _____ g/year. 1 hectare = 10,000 m²

Show work:

Sample FRQ's

27) Biogeochemical cycles describe the movement of certain elements (typically bound with other elements in compounds) through Earth's atmosphere, hydrosphere, biosphere, and lithosphere. These elements and their compounds are necessary components of all life, and because they cycle, they can be used repeatedly by new generations of organisms. Each biogeochemical cycle has different pathways with various reservoirs (sources and sinks) where elements may reside for days or millions of years.

(a) The atmosphere is one important carbon reservoir.

(i) Describe a biological process by which carbon is removed from the atmosphere and converted to organic molecules.

(ii) Describe a biological process by which carbon is converted from organic molecules to a gas and returned to the atmosphere.

(b) Oceans and terrestrial systems are also important carbon reservoirs.

(i) Explain how atmospheric carbon is incorporated into two oceanic sinks.

(ii) Identify one terrestrial sink, other than fossil fuels, that stores carbon for thousands to millions of years.

(c) The burning of fossil fuels has been shown to increase the concentration of carbon in the atmosphere. Discuss TWO other human activities that increase the concentration of carbon in the atmosphere.

(d) Identify an environmental problem that results from elevated atmospheric carbon concentrations. Discuss one consequence of the problem you identified.

(e) Phosphorus is another element important to all organisms.

i) Describe one major way in which the phosphorus cycle differs from the carbon cycle.

ii) Identify one reason that phosphorus is necessary for organisms.

28) After reading the following excerpt from an article about the interrelationships among organisms in an oak forest, answer parts (a), (b), and (c), which follow.

Chain Reactions Linking Acorns to Gypsy Moth Outbreaks and Lyme Disease Risk Oak trees (*Quercus spp.*) produce large autumnal acorn crops every two to five years, and produce few or no acorns during intervening years. Acorns are a critical food for white-footed mice (*Peromyscus leucopus*). Mice are important predators of the pupal stage of the gypsy moth (*Lymantria dispar*). This introduced insect periodically undergoes outbreaks that defoliate millions of hectares of oak forests, decreasing tree growth, survival, and acorn crop production. An abundance of acorns provides food for white-tailed deer (*Odocoileus virginianus*). Mice and deer are the primary hosts of the black-legged tick (*Ixodes scapularis*), which carries Lyme disease.

(a) In the space provided below, diagram a food web based on the interrelationships of the organisms identified in the excerpt.

(b) Design a controlled experiment that tests the relationship between acorn production and gypsy moth population. Include the hypothesis that the experiment tests.

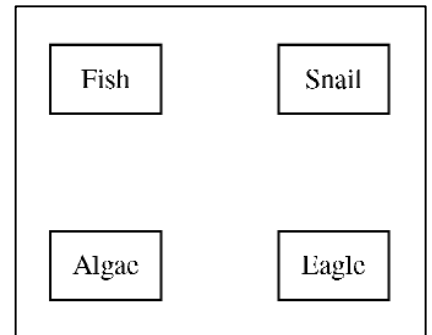
(c) Briefly describe a strategy that uses integrated pest management for the control of the black-legged tick population.

29) Wetlands were once considered to be wastelands. Over 50 percent of the United States original wetlands have been destroyed.

(a) Describe TWO characteristics that are used by scientists to define an area as a wetland.

(b) Wetlands are highly productive ecosystems with complex food webs.

(i) Complete the diagram of the wetland food web to the right by drawing arrows that show the direction of energy flow.



(ii) Explain why it takes many hectares of wetland to support a pair of eagles.

(c) Describe TWO economic benefits (other than those related to water quality) that wetlands provide.

(d) Describe one specific human activity that degrades wetlands.

Unit 1 The Living World Review Videos

Mr. Andersen, Bozeman Biology

[007 - Ecosystem Ecology](#)

[008 - Energy Flow in Ecosystems](#)

[009 - Ecosystem Diversity](#)

[010 - Natural Ecosystem Change](#)

[011 - Biogeochemical Cycles](#)

Amoeba Sisters

Carbon and Nitrogen Cycle:

<https://www.youtube.com/watch?v=NHqEthRCqQ4>

Ecological Relationships: <https://www.youtube.com/watch?v=rNjPI84sApQ>

Crash Course

Population Ecology - Crash Course Biology #2:

https://www.youtube.com/watch?v=RBOsqmBQBQk&list=PL8dPuuaLjXtNdTKZkV_GiIYXpV9w4WxbX&index=2

Community Ecology: Feel the Love Crash Course Ecology #4

https://www.youtube.com/watch?v=GxE1SSqbSn4&list=PL8dPuuaLjXtNdTKZkV_GiIYXpV9w4WxbX&index=4

Community Ecology II: Predators Crash Course Ecology #5:

https://www.youtube.com/watch?v=mFDiISqGB7M&list=PL8dPuuaLjXtNdTKZkV_GiIYXpV9w4WxbX&index=5

Ecological Succession: Change is Good Crash Course Ecology #6:

https://www.youtube.com/watch?v=jZKIHe2LDP8&list=PL8dPuuaLjXtNdTKZkV_GiIYXpV9w4WxbX&index=6

Ecosystem Ecology: Links in the Chain Crash Course Ecology #7:

https://www.youtube.com/watch?v=v6ubvEJ3KGM&list=PL8dPuuaLjXtNdTKZkV_GiIYXpV9w4WxbX&index=7

The Hydrologic and Carbon Cycles: Always Recycle Crash Course Ecology #8:

https://www.youtube.com/watch?v=2D7hZpIYCA&list=PL8dPuuaLjXtNdTKZkV_GiIYXpV9w4WxbX&index=8

Nitrogen and Phosphorus Cycles: Always Recycle Part Two Crash Course Ecology #9:

https://www.youtube.com/watch?v=leHy-Y_8nRs&list=PL8dPuuaLjXtNdTKZkV_GiIYXpV9w4WxbX&index=9

HHMI BioInteractive

Some Animals are More Equal Than Others: Trophic Cascades <https://www.youtube.com/watch?v=hRGg5it5FMI>

Khan Academy

Ecology Introduction: <https://www.youtube.com/watch?v=OfV3VNgjpvw&list=PLbjyLFA2XFZyvLJTz-oWEUURQtwnf32eP>

Ecosystems and Biomes: <https://www.youtube.com/watch?v=A495e31cDdE&list=PLbjyLFA2XFZyvLJTz-oWEUURQtwnf32eP&index=2>

Flow of Energy and Matter Through Ecosystems: <https://www.youtube.com/watch?v=TitRpMUtOI&list=PLbjyLFA2XFZyvLJTz-oWEUURQtwnf32eP&index=3>

Interactions Between Populations: <https://www.youtube.com/watch?v=q2zdiLn3gSE&list=PLbjyLFA2XFZyvLJTz-oWEUURQtwnf32eP&index=4>

Unit I: The Living World: Ecosystems:

6-8% of AP Exam

Unit Enduring Understandings:

1. Ecosystems are the result of biotic and abiotic interactions.
2. Energy can be converted from one form to another.

Learning Targets

- 1.1 Explain how the availability of resources influences species interactions.
- 1.2 Describe the global distribution and principal environmental aspects of terrestrial biomes.
- 1.3 Describe the global distribution and principal environmental aspects of aquatic biomes.
- 1.4 Explain the steps and reservoir interactions in the carbon cycle.
 - 1.5 Explain the steps and reservoir interactions in the nitrogen cycle.
 - 1.6 Explain the steps and reservoir interactions in the phosphorus cycle.
 - 1.7 Explain the steps and reservoir interactions in the hydrologic cycle.
- 1.8 Explain how solar energy is acquired and transferred by living organisms.
- 1.9 Explain how energy flows and matter cycles through trophic levels.
 - 1.10 Determine how the energy decreases as it flows through ecosystems.
 - 1.11 Describe food chains and food webs, and their constituent members by trophic level.

The Water Cycle: <https://www.youtube.com/watch?v=iFjI6y46QRk&list=PLbjyLFA2XFZyvLJTz-oWEUURQtwnf32eP&index=5>

Organism Life History and Fecundity: <https://www.youtube.com/watch?v=mAdUjImDx58&list=PLbjyLFA2XFZyvLJTz-oWEUURQtwnf32eP&index=6>

Nitrogen Cycle: <https://www.youtube.com/watch?v=DsCMYyQ0NWU&list=PLbjyLFA2XFZyvLJTz-oWEUURQtwnf32eP&index=7>

Biogeochemical Cycles: <https://www.youtube.com/watch?v=ccWUDIKC3dE&list=PLbjyLFA2XFZyvLJTz-oWEUURQtwnf32eP&index=8>

Exponential and Logistic Growth in Populations: <https://www.youtube.com/watch?v=KyAKEisg2PQ&list=PLbjyLFA2XFZyvLJTz-oWEUURQtwnf32eP&index=9>

Predator Prey Cycle: https://www.youtube.com/watch?v=NYq2078_xqc&list=PLbjyLFA2XFZyvLJTz-oWEUURQtwnf32eP&index=10

Ecological Succession: <https://www.youtube.com/watch?v=d7xbyNSxxrI&list=PLbjyLFA2XFZyvLJTz-oWEUURQtwnf32eP&index=11>

Population Regulation: https://www.youtube.com/watch?v=6IS_M6CX7FE&list=PLbjyLFA2XFZyvLJTz-oWEUURQtwnf32eP&index=12

Phosphorus Cycle: <https://www.youtube.com/watch?v=tm2LG5ScT1g&list=PLbjyLFA2XFZyvLJTz-oWEUURQtwnf32eP&index=13>

Carbon Cycle: <https://www.youtube.com/watch?v=dYkByQ9Kmg&list=PLbjyLFA2XFZyvLJTz-oWEUURQtwnf32eP&index=14>

Barron's Review Chapters, 7th Edition

Chapter 4: Ecosystems (Pg 91)

Chapter 5: Natural Biogeochemical Cycles (Pg 145)

Unit 1 The Living World Vocabulary

PCBs: Polychlorinated Biphenyls used in electronics. Chemical products banned in 1979. Polluted groundwater.

Quantitative Data: data that uses numbers

Qualitative Data: data that uses qualities and characteristics to describe

Experimental Design: set up of an experiment

Control: constant variable and unchanged throughout the course of the investigation.

Easter Island: an island owned by Chile where people died because of lack of natural resources

Ecology: study of living organisms in their nonliving world

Biotic factor: living item (ex: bacteria)

Abiotic factor: not living item (ex:

Ecological Hierarchy: species → population → community → ecosystem → biome → biosphere

Population: a group of individuals of the same species

Community: a group of populations interacting together

Ecosystem: a group of communities interacting together

Biosphere: another name for earth

Natural Selection: survival of the fittest

Chesapeake Bay Watershed: Where Potomac River dumps into Atlantic Ocean. Extremely polluted with sediments and nutrients.

Salinity: level of salt in the water

Brackish: medium levels of salinity. Often occurs in wetlands where salt and fresh water mix.

Potential Energy: The energy stored. $PE = mgh$

Kinetic Energy: The energy in movement: $KE = \frac{1}{2} mv^2$

1st Law of Thermodynamics: Energy is not created nor destroyed...changes forms

2nd Law of Thermodynamics: No reaction is 100% efficient. Entropy is created after every energy transformation.

Entropy: Disorder and chaos in a system.

Gaia hypothesis: organisms interact with their inorganic surroundings on Earth to form a synergistic self-regulating, complex system that helps to maintain and perpetuate the conditions for life on the planet

Ecological footprint: a measure of human impact on Earth's ecosystems. It's typically measured in area of wilderness or amount of natural capital consumed each year.

Carrion: the decaying flesh of dead animals

Phototrophs: organisms that use light to perform photosynthesis. Often plants and phytoplankton.

Chemotrophs: organisms that use chemicals to perform chemosynthesis. Often bacteria in deep sea vents.

Heterotrophs: organisms that consume to obtain energy. Often herbivores and carnivores.

Primary Consumer: first level heterotroph, eat primary producers

Secondary Consumer: organism that eats primary consumer

Tertiary Consumer: organism that eats secondary consumer

Saprotrophs: organism that eats dead organic materials (fungi and bacteria)

Food Chain: a series of who eats whom with one pp, one pc, one sc, one tc

Food Web: a diagram of who eats whom for all organisms

Gross Primary Productivity: the rate of photosynthesis taking place in an area

Net Primary Productivity: The biomass left over in a phototroph after photosynthesis and respiration takes place.

Nitrogen Fixation: Taking nitrogen in air (N_2) and changing to nitrite (NO_2) or ammonia (NH_3)

Nitrification: Take nitrite and turning it into nitrate NO_3

Assimilation: Organisms use nitrate and ammonium to make DNA and amino acids.

Ammonification: Taking NH_3 and turning it into NH_4 .

Denitrification: Taking nitrate and ammonium and turning it back into nitrogen (N_2) in the air.

Sink: a storage place of an element

Source: a process that releases an element.

Primary Succession: community change that occurs with new land formation: lichen → moss → small shrubs → small trees → large trees → climax community

Secondary Succession: community change that occurs with land already formed.

Bottleneck Effect: cut down of genetic diversity due to loss of individuals in a population.

Non-native species: a species that is not known historically in an area. Ex: cane toads in Australia

Species diversity: a count of how many species are in an area.

Ecotone: a transitional zone between two communities. Ex: intertidal zone.

Niche: an organism's job in a community.

Hybrid: the offspring of two different species.

Lichen: a symbiotic relationship of a fungus and an algae

Germination: sprouting of a seed

Mutualism: a symbiosis where two species benefit from the relationship. Ex: oxpecker and rhino

Commensalism: a symbiosis where one species benefits and the other is neutral in the relationship. Ex: cattle egret and cow

Parasitism: a symbiosis where one species benefits and the other is harmed in the relationship. Ex: tapeworm and human

Competitive Exclusion Principle: species with the same niche in the same area cannot coexist

Keystone Species: often a dominant predator whose removal allows a prey population to explode and often decreases overall diversity. Ex: sea otter

Predation: the preying of one animal on others.

Mimicry: the close external resemblance of an animal or plant (or part of one) to another animal, plant, or inanimate object

Interspecific Competition: competition between two different species.

Intraspecific Competition: competition the same species.

Aerobic: using oxygen

Anaerobic: using no oxygen