

APES Unit 2 Study Guide

Ultimate Review Packet (2.1 - 2.3)

2.1 - Introduction to Biodiversity

- Define** genetic diversity and provide an example: the diversity or variance of genes or traits within individuals of a population; ex: diversity of fur thickness in elk or beak size in sparrows
- Explain** how high genetic diversity for the trait you identified in part (a) would be beneficial to the population: high diversity of fur thickness in elk would increase the likelihood that some of the elk would have thicker/lighter coats that would be advantages in cooling/warming climate in their habitat; high diversity of beak size in sparrows would increase the likelihood that some of the sparrows would be able to utilize bigger/smaller or harder/softer food sources in the event of environmental disturbance such as drought, decline of smaller/larger food source
- Explain** the difference between species richness and species evenness: richness is the number of different species found in an ecosystem, while evenness refers to how balanced the distribution of individuals between species is/how balanced the population sizes of diff. species are
- Define** ecosystem diversity: the variance in different ecosystems found in a given area
- Identify** the relationship between ecosystem diversity and species diversity: there is a direct relationship or a positive correlation between ecosystem diversity and species diversity

2.2 - Ecosystem Services

- Describe** provisioning services using an example from an ocean ecosystem: things provided to humans from nature that have value, such as fish we can catch in the ocean
- Describe** supporting services using an example from a grassland ecosystem: processes done by ecosystems that support valuable human actions, such as pollinators supporting agricultural profits or decomposers in the soil recycling nutrients that support crops
- Describe** regulating services using an example from a wetland ecosystem: the stabilizing of conditions like climate or water quality; wetland trees sequester CO₂, absorb excess stormwater, and filter pollutants out of ground water
- Describe** cultural services using an example from a tropical rainforest ecosystem: recreation or intellectual benefits from nature, such as the tourism revenue from resorts, boat rides, etc. near the tropical rainforest or studies conducted on rainforest plants/animals

2.3 - Island Biogeography

- Identify** the two rules of the Theory of Island Biogeography:
 - Islands closer to the mainland have higher species richness than islands further away
 - Larger Islands have higher species richness than smaller islands
- Explain** what accounts for each of these rules:
 - More species are able to migrate to islands that are closer to the mainland as it's easier to fly or swim a shorter distance
 - Larger Islands have higher ecosystem diversity, providing more food and habitat resources for a larger number of different species
- Explain** why islands generally have a higher percentage of specialist species: Islands provide a narrower range of food and habitat resources than mainland ecosystems, leading to conditions that select for a more narrow or specialized set of traits in the species on the island

APES Unit 2 Ultimate Review Packet (2.4 - 2.6)

2.4 - Ecological Tolerance

- a. **Define** each of the following zones:
- Optimal range: range of an environmental condition where an organism can survive, grow, and reproduce
 - Zone of physiological stress: range of environmental condition where an organism can survive, but with impaired growth or reproduction
 - Zone of intolerance: range of environmental condition where death occurs
- b. **Explain** the ecological range of tolerance a plant species has for soil moisture: the plant species will have an optimal range of tolerance for soil moisture where it can grow and reproduce. If the soil moisture moves below that range the plant may not have enough water to photosynthesize and may suffer stunted growth. If the soil moisture moves above the optimal range, the soil may become too saturated and the roots of the plant may not receive enough oxygen for growth.
- c. **Describe** how high genetic diversity in the plant population above would be advantageous in the event of a drought: with high genetic diversity in the population, there will be an increased chance that some of the plants will have a greater optimal range of tolerance for soil moisture, enabling some of the members of the population to still grow and reproduce in the drought conditions

2.5 - Natural Ecosystem Disruption

- a. **Identify** an example of a periodic, episodic, and random event: periodic (ocean tides, seasons), episodic (El Nino/La Nina, hurricanes, forest fires), random (meteorite strikes, volcanic eruptions)
- b. **Describe** one way that earth's orbit around the sun changes naturally over time
- Eccentricity - variation in shape/how circular earth's orbital path around the sun is
 - Axial precession - variation in how much earth wobbles on its axis during orbit
 - Obliquity - variation in how much earth is tilted on its axis toward or away from the sun
- c. **Explain** how variation in earth's orbit influence global climate: variations in earth's orbit such as eccentricity or obliquity bring earth closer/further from the sun or tilt it towards/away from the sun in its orbit, heating/cooling global climate
- d. **Identify** the relationship between global atmospheric temperature and sea level: positive correlation or direct relationship
- e. **Explain** one cause for the relationship you identified above: As global atmospheric temperature increases it causes:
- Melting of glacial/polar ice sheets which runoff into the ocean, raising sea level
 - Thermal expansion of water molecules in the ocean, raising sea level

2.6 - Adaptations

- a. **Define** adaptation: genetic mutation that increases an organism's chances of survival and reproduction
- b. **Describe** the selective pressure that selected for opposable thumb arrangement in *Homo habilis*: energy availability or food scarcity; since opposable thumb arrangement enabled tool use and increased energy availability for *H. habilis*, more members survived and passed on their genes for opposable thumb structure to offspring
- c. **Describe** an adaptation in a tundra species: Caribou/other tundra mammals have thick fur that keeps them warm enough to survive low tundra temperatures
Polar bear/arctic fox/hare/snowy owl have white fur that enables them to blend into the snow/ice of the arctic and avoid predators or hunt prey
Lichen are adapted to photosynthesize in freezing conditions, gaining nutrients in rocky or low nutrient soils, and absorbing water from ice and snow

APES Unit 1 Ultimate Review Packet (2.7)

2.7 - Ecological Succession

- a. **Describe** how moss and lichen are able to colonize bare rock: moss and lichen secrete acids that chemically weather rocks and release nutrients and minerals in them
- b. **Describe** the central process of ecological succession: rapidly growing pioneer species are replaced by slower-growing, larger species over time
- c. **Describe** the difference between primary and secondary succession: primary succession is the colonization of bare rock by moss and lichen, which form shallow-rocky soil through their growth and breakdown and the chemical weathering of rock, whereas secondary succession begins in a recently-disturbed ecosystem that already has soil present
- d. **Describe** the characteristics of pioneer species and provide an example: rapidly-growing, dispersed by wind/animals, sun-tolerant; ex: moss, lichen, weeds, grasses, wildflowers
- e. **Describe** the characteristics of climax community species and provide an example: slow-growing, shade-tolerant; large trees; ex: redwoods, sequoias, sugar maple, beach, oak
- f. **Define** keystone species: a species with an outsized or vital role in ecosystem stability whose removal leads to significant instability or collapse of its ecosystem
- g. **Identify** an example of a top predator keystone species and an ecosystem engineer keystone species:
 - i. Top predator: wolves, starfish, sharks, sea otters, grizzly bears
 - ii. Ecosystem engineers: mangroves, beavers
- h. **Describe** one example of how the removal of a keystone species could destabilize an ecosystem:
 - i. **Top predator examples:** loss of top predators leads to increases in herbivore populations which then overgraze on plants in the ecosystem leading to:
 1. Less food for other herbivores
 2. Less habitat for species that nest/build nests with the plants being overgrazed
 3. Increased soil erosion due to loss of vegetation
 - ii. **Ecosystem engineer examples:**
 1. Loss of mangroves destabilizes shoreline which can lead to loss of estuary habitats as land erodes into the ocean; can also remove vital habitat or breeding grounds for many shellfish/fish/aquatic species
 2. Loss of beavers remove beaver pond ecosystems that may be habitat/breeding grounds for amphibian, insect, or other aquatic species or drinking water source for mammals, or reduce habitat space for riparian plants