

APES TEST REVIEW

I. Earth Systems & Resources (10-15%)

A. Earth Science Concepts:

1. Geologic time scale eras & periods & general distinction between the eras
2. Earth layers and plate tectonics: types of plate movement, influence on tsunamis, earthquakes, volcanoes (example of each),
3. Explain causes of seasons

B. The Atmosphere

1. Layers of Atmosphere and characteristics of each layer
2. Weather vs. climate
3. Wind patterns: direction of, convection cells and Coriolis effect
4. Influence of wind on ocean currents: surface vs. deep currents vs. upwelling
5. ENSO: cause, effect, downwelling

C. Global Water Resources and Use

1. Hydrosphere % of earth
2. Freshwater distribution
3. Aquifer: composition, mechanics of how it is created
4. Uses of water: agriculture, industrial, domestic
5. Surface & groundwater water issues: saltwater intrusion, subsidence, desertification, groundwater pollution, irrigation problems, examples of lack of freshwater, benefits and drawbacks to solutions
6. Water quality: pH, turbidity, D.O., B.O.D., Temperature, Nitrogen, Phosphorus, salinity, etc

D. Soil and Soil Dynamics

1. General rock cycle and example of each type of rock
2. Soil formation
3. Soil profile: horizons, types of soil, nutrients (macro and micronutrients) within soil
4. Soil conservations: problems with agriculture, industry/mining, urbanization (causes & effects of desertification, erosion)

II. The Living World (10-15%)

A. Ecosystem Structure

1. Organization from organism to biosphere
2. Define and example of a niche
3. Define and example of Generalist vs. Specialist, Keystone, Indicator, Predator, Prey, Competition (interference, exploitation, resource partitioning), Symbiosis (parasitism, mutualism, commensalism), native vs. non-native, species diversity and edge effect, species diversity and ecosystem stability
4. Terrestrial Ecosystems: characteristic climate, location, limiting factors, animal and plant adaptations, products and functions they provide (Tundra, taiga, temp. deciduous forest, temperate rain forest, tropical rain forest, savanna, temperate grasslands, desert)
5. Aquatic Ecosystems: characteristic abiotic factors of temp, salinity, etc., location, limiting factors, animal and plant adaptations, products and functions they provide (epipelagic, abyssal/benthic, estuary, freshwater lake, rocky intertidal).

B. Energy Flow

1. Photosynthesis: overall reaction, type of organisms that perform this, location in cell, light dependent vs. light independent, base of the food web

2. Cellular Respiration: overall reaction, type of organisms that perform this, location in cell, glycolysis vs. Citric Acid Cycle v. ETC, role in the food web
3. Fermentation: overall reaction, type of organisms that perform this, location in cell, role in the food web
4. Trophic level order, 10% rule, food chain vs. web, interpreting a food web, role of the decomposers

C. Ecosystem Diversity

1. Types of biodiversity and importance: ecological vs. biodiversity vs. genetic
2. Natural selection major ideas
3. Example of how natural selection can influence a population: directional vs. stabilizing vs. disruptive, physical attributes (camouflage, warning coloration, aposematic coloration, mimicry), physiological attributes (biochemistry within bacteria), homologous structures vs. analogous structures
4. How new populations can result: geographic isolation, reproductive isolation (timing, mechanical, behavioral, gamete incompatibility)
5. Importance of minimum viable population

D. Natural Ecosystem Change:

1. Causes: El Nino vs. La Nina, geologic with volcanic eruptions, fires, flooding, drought
2. Effects: Migration, ecological succession: primary vs. secondary

E. Natural Biogeochemical Cycles

1. Nitrogen, Carbon, Phosphorus, Water, Sulfur

III. Population (10-15%)

A. Population Concepts

1. Types of population density: uniform, clustered, random, exponential growth tendency (lag, log, stable), carrying capacity, density dependent and independent factors limiting carrying capacity.
2. R vs. K strategist characteristics, survivorship curves, ability to adapt

B. Human Population

1. Historically from hunter-gatherer to current day industrialized
2. Determining growth rate and doubling time
3. Factors influencing birth rate and death rate
4. Know the population demographic transition graph with BR, DR, overall population
5. Age structure diagrams
6. Impacts/effects of increased population: food, disease, economics, resources
7. Benefits and drawbacks to controlling population growth: antinatalist, family planning, social and economic incentives, laws

IV. Land and Water Use (10-15%)

A. Agriculture

1. Feeding a Growing Population:

- a. Human nutritional requirements: calories, and 5 nutrients and why we need them
- b. Health disorders with lack of nutrients
- c. Solutions & drawbacks to reducing global undernourishment: Genetic engineering, high input, food aid.
- d. Effects of increased agriculture and livestock is deforestation. Effects of this? Solutions?
- e. Undernourished vs. malnourished and examples of each
- f. Types of agriculture, benefits & drawbacks: subsistence, traditional intensive, high input monoculture
- g. Solutions to soil conservation: timing of different harvest times, leaving land bare after harvest, polyculture, agroforestry, etc.

2. Solutions to water conservation

B. Controlling Pests

1. 1st generation vs. 2nd generation pesticides & examples of each
2. bioaccumulation & biomagnification: what is it and to which type of substances is it applicable?
3. Integrated pest management
4. FIFRA

C. Forestry

1. Tree plantations - selective cutting, shelterwood cutting, seed-tree cutting, clear-cutting
2. Old growth forests – problems with harvesting and fire
3. Forest Fires – role in ecosystem
4. Forest management –national forests maintenance

D. Rangelands

1. Overgrazing – cause & effects & ways to reduce impact
2. Deforestation – cause & effects & ways to reduce impact
3. Desertification – cause & effects & ways to reduce impact
4. Legislation: Taylor Grazing Act

E. Other Land Uses

1. Urban land development
2. Transportation infrastructure
3. Public and federal lands
4. Land conservation
5. Sustainable use policies
 - a. Problems associated with urbanization: urban island heat effect, increased solid and hazardous waste, deforestation, water pollution, atmospheric pollution, noise pollution, heat pollution in water
 - b. Ways human impact can be reduced/remediated: preserves, parks, integrated waste management, legislation, etc.

F. Mining

1. Types of mining and their effects
2. Global reserves of minerals (esp. fossil fuels) and depletion time
3. SMRCA, CERCLA, RCRA
4. Depletion time

- G. Fishing
 1. Describe and benefits & drawbacks to different fishing techniques: purse-seine, trawling, drift net fishing, hook and line, pole and line, dredging
 2. Overfishing: tragedy of the commons, give specific examples, effects
 3. Endangered Species Act, Marine Mammal Act
 - H. Global Economics
- V. Energy Resources and Consumption (10-15%)
- A. Energy Concepts
 1. Define energy and different forms: kinetic vs. potential, chemical, heat
 2. Laws of thermodynamics
 3. Energy calculation problems with BTU or kWh
 - B. Energy Consumption
 1. Breakdown of energy use in U.S. and world
 2. How the industrial revolution played a role in energy consumption
 3. Energy crisis we are currently facing: causes and possible effects
 - C. Fossil Fuel Resources and Use
 1. nonrenewable
 2. Formation of each type (coal, natural gas, petroleum), energy quality, reserve locations, benefits, drawbacks
 - D. Nuclear Energy
 1. Nonrenewable
 2. Fission vs. fusion
 3. Diagram of light water nuclear reactor
 4. Benefits & drawbacks (include a specific health effect)
 5. Countries that currently use nuclear power
 - E. Hydroelectric Power
 1. Benefits & drawbacks
 2. Locations that currently use this
 - F. Energy Conservation
 1. Define energy efficiency and what form does most of the energy inefficiency get lost as?
 2. CAFÉ standards (corporate average fuel economy)
 3. How do hybrid cars work in general? Benefits & drawbacks.
 4. How do hydrogen fuel cell cars work in general? Benefits and drawbacks.
 - G. Renewable Energy: benefits, drawbacks, currently where used
 1. Solar energy
 2. Biomass
 3. Wind
 4. Wave
 5. Tidal
 6. Geothermal
- VI. Pollution (25-30%)
- A. Pollution Types
 1. Air Pollution
 - a. List Primary and Secondary pollutants, sources, effects
 - b. How do photochemical smog, tropospheric ozone, and acid deposition form?
 - c. Causes and effects of heat island effect
 - d. Causes and effects of temperature inversion

- e. Indoor air pollution: 4 common pollutants, sources, effects; why so important to look at; sick building
- 2. Noise Pollution: 8 hrs 85dbA or higher a day
- 3. Water Pollution
 - a. 8 main categories: sources, effects
 - b. Cultural eutrophication: causes, effects
 - c. Groundwater pollution: causes, effects
 - d. Water treatment process: primary, secondary, tertiary
 - e. Clean Water Act, Safe Drinking Water Act
- 4. Solid Waste Pollution
 - a. Municipal solid waste diagram
 - b. Integrated waste management system
 - c. Other methods of disposing of solid waste
- B. Impacts on the Environment and Human Health (addressed above)
- C. Economic Impacts (addressed above)

VII. Global Change (10-15%)

A. Stratospheric Ozone

- 1. How is stratospheric ozone formed?
- 2. Causes of ozone depletion? Reaction + types of chemicals involved
- 3. Effects of ozone depletion.
- 4. Ways to reduce ozone depletion: Montreal Protocol

B. Global Warming

- 1. What is the greenhouse effect? Why important?
- 2. List source of greenhouse gases
- 3. Causes and effects of global warming
- 4. Kyoto Protocol

C. Loss of Biodiversity

- 1. Loss of biodiversity: genetic, species, ecological, functional
- 2. Endangered Species Act: endangered, threatened, vulnerable