

APES Study Guide

Semester 1 Final

Name:

Date:

Period:

For this final you should know your vocabulary; brush up on the terms we have used and studied this year because it will help you a lot! The test is a mix of broad, easy questions, and more difficult, concentrated questions on concepts we spent a lot of time on. I have outlined some of the topics that are definitely on the final; this is not a complete list. Fill in the outline as best you can with definitions, examples, diagrams and explanations to help you supplement your review of chapters 1-5, 8, 11-14, 22. The more thoroughly you do this the better prepared you will be. This will also benefit you by creating an excellent resource for later review prior to the semester 2 cumulative final and in preparation for the AP exam itself. Additionally, you should look over old notes, labs and class handouts and review answers to past guiding questions. The fall final is 100 multiple choice questions (60%) and 2 essay questions (40%).

Chapter 1: Science and Sustainability, An introduction to Environmental Science

1. Our Island Earth
 - a. Environment
 - b. Natural Resources
 - i. Renewable
 - ii. Nonrenewable
 - c. Ecosystem Services
2. Population Growth Amplifies Impact
 - a. Resource Consumption
 - i. Ecological Footprints
3. The Nature of Science
 - a. Observational / descriptive science
 - b. Hypothesis Driven Science
 - c. Scientific Method
 - i. Steps
 - ii. Controlled experiments
 - iii. Manipulative Experiments v. natural experiments
 - iv. Independent/dependent variables
 - v. Repeatability
4. Sustainability

Chapter 2: Earths Physical Systems, Matter, Energy, and Geology

1. Law of Conservation of Matter
2. Atoms and Elements
 - a. Atomic Structure
 - b. Ions and Isotopes

- c. Molecules and Compounds
 - d. Ionic Bonds, covalent bonds, hydrogen bonds
3. Properties of Water
4. Acid / Base chemistry
5. Organic compounds
- a. Monomers /polymers
 - b. Proteins
 - c. Nucleic acids
 - d. Carbohydrates
 - e. Lipids
6. Energy
- a. Potential / Kinetic
 - b. Laws of Thermodynamics (1st and 2nd)
 - c. Energy Conversion Efficiency
 - d. Cellular Respiration / Photosynthesis
7. Geology
- a. Layers of the earth
 - b. Plate Tectonics
 - i. Plate boundaries
 - ii. Rock types / rock cycle
 - iii. Geologic and Natural Hazards

Chapter 3: Evolution, Biodiversity, and Population Ecology

1. Evolution
- a. Species, population
 - b. Mutations
 - c. Artificial Selection
 - d. Natural Selection
 - i. General Concept
 - ii. Convergent evolution
 - iii. Divergent Evolution

- e. Speciation

- 2. Extinction
 - a. Background Extinction Rate

 - b. Mass extinction Events

 - c. Extirpation

- 3. Levels of Ecological Organization

- 4. Population Ecology
 - a. Estimating Population Size

 - b. Population Density

 - c. Population Distribution

 - d. Sex Ratio and Age Structure

 - e. Survivorship
 - i. r-selected

 - ii. K-selected

 - f. Population Growth
 - i. Exponential

 - ii. Logistic Growth

- Limiting Factors (density dependent / density independent)

- Carrying Capacity

Chapter 4: Species Interactions and Community Ecology

- 1. Competition
 - a. Intraspecific

 - b. Interspecific
 - i. Competitive Exclusion / Species coexistence

 - ii. Niches (fundamental v. realized)

iii. Resource partitioning and character displacement

c. Exploitative Interactions

d. Symbiotic Relationships

2. Ecological Communities

a. Trophic Levels (producers, consumers, Decomposers)

b. Food Chains and Food Webs

c. Energy / Biomass pyramids

d. Keystone Species

e. Trophic Cascade

3. Response to Disturbance

a. Primary Succession vs. Secondary Succession

i. Pioneer species

ii. Climax communities

iii. Phase / regime shift

b. Introduced and Invasive Species

i. Effects of zebra mussels

4. Biomes

a. Climate and global distribution of biomes

b. Localized influences on biome distribution

i. Proximity to oceans

ii. Elevation

- iii. Rain shadow effect
- c. Terrestrial biomes (10)

Chapter 5: Environmental Systems and Ecosystem Ecology

1. Systems approach
 - a. System
 - b. Positive feedback
 - c. Negative feedback
 - d. Homeostasis
 - e. Emergent properties
2. Earths Systems (lithosphere, atmosphere, hydrosphere, biosphere)
 - a. Interactions between systems
 - i. Eutrophication and hypoxic zones
3. Energy and Biomass
 - a. Primary production
 - i. Net Primary production
 - ii. Gross Primary Production
 - iii. Calculations
 - b. Secondary Production
 - c. Biomes and Productivity
 - i. Effects of Sunlight and Nutrients
4. Biogeochemical Cycles
 - a. Water (Reservoirs, Fluxes, Anthropogenic Effects)
 - b. Carbon (marine and terrestrial) (Reservoirs, Fluxes, Anthropogenic Effects)

- c. Nitrogen (Reservoirs, Fluxes, Anthropogenic Effects)

- d. Phosphorous (Reservoirs, Fluxes, Anthropogenic Effects)

Chapter 8 : The Human Population

- 1. Basic Concepts
 - a. Populations
 - i. World population size

 - ii. U.S. Population Size
 - b. Species
 - c. Demographics
 - i. Crude rate v. % rate

 - ii. Birth rate, death rate, immigration rate, emigration rate

 - iii. Intrinsic rate of increase / rate of natural increase

 - iv. Biotic potential

 - v. Calculating birth rate, death rate, growth rate

 - vi. Sex ratios

 - vii. Fertility rates (replacement level fertility)

 - viii. Life expectancy

 - ix. Infant mortality
- 2. Growth Models
 - a. Exponential Growth
 - i. Conditions and implications

 - ii. Calculating

 - iii. Doubling time

- b. Logistic growth
 - i. Variations in growth rate and causes

 - ii. Carrying capacity
 - 1. What is it?
 - 2. How to identify?
 - 3. Anticipated value for humans?

- 3. Population and Affluence
 - a. Developed v. developing world differences and concerns

 - b. $I = PATS$

- 4. Age Structure Diagrams
 - a. Pyramid
 - b. Column
 - c. Inverted Pyramid
 - d. Column with a bulge

- 5. Demographic Transition
 - a. Definition
 - b. Stages (causes / effects in each, changes in growth birth, death and growth rates in each)
 - i. Pre-industrial

 - ii. Transitional

 - iii. Industrial

 - iv. Post-industrial

- 6. Slowing Population Growth
 - a. Family Planning

 - b. Delaying age of first child birth

 - c. Empowering Women

 - d. Increasing Affluence

Chapter 13: The Urban Environment, Creating Sustainable Cities

- 1. Environmental Factors influencing Location
 - a. Site:

- b. Situation:
- 2. Sprawl
 - a. Causes

 - b. Problems associated with Sprawl
- 3. Creating Livable Cities
 - a. Urban Planning
 - i. Zoning

 - ii. Urban Growth Boundaries

 - iii. Smart Growth

 - iv. Transit Options

 - v. Park lands

 - vi. Green Buildings
- 4. Urban Microclimates
 - a. How cities alter temperature
 - i. Urban Heat Islands

 - ii. Albedo

 - b. Changes in Hydrology
 - i. Evaporation

 - ii. Runoff (rate and volume)

 - iii. Precipitation

 - iv. Flooding

Chapter 14: Environmental Health and Toxicology

- 1. Environmental Health Hazards
 - a. Physical

 - b. Chemical

 - c. Biological

- i. Chronic Diseases
 - ii. Infectious / epidemic disease
- d. Cultural

2. Toxicology

- a. Indoor Health Hazards
 - i. Radon
 - ii. Asbestos
 - iii. Cigarette Smoke
 - iv. Lead
 - v. Mold
- b. Toxicants (effects of each and example(s))
 - i. Carcinogens
 - ii. Mutagens
 - iii. Teratogens
 - iv. Neurotoxins
 - v. Allergens
 - vi. Pathway inhibitors
 - vii. Endocrine Disruptors
- c. Why Individuals Vary in the response to toxicants
- d. Toxicants in the Environment
 - i. Airborne
 - ii. Accumulation In Water
 - iii. Persistence
 - iv. Bioaccumulation and Biomagnification
- e. Risk assessment
 - i. Hazard identification
 - ii. Dose response Analysis
 - 1. %, ppm, ppb, mg / kg, and mg/l
 - 2. ED50 / TD50
 - 3. Threshold
 - iii. Exposure assessment

- iv. Risk management

- f. Challenges of Toxicology
 - i. Synergistic effects

 - ii. Precautionary Principle

 - iii. Innocent until proven guilty

Chapter 22: Managing Our Waste

- 1. The waste stream
 - a. Components of waste

 - b. Amounts of Waste

 - c. Types of Waste
 - i. Municipal Waste

 - ii. Industrial Solid Waste

 - iii. Hazardous Waste

- 2. Municipal Waste Management
 - a. Goals

 - b. Sanitary Landfills
 - i. Legislation

 - ii. Design

 - iii. Concerns

 - c. Incineration
 - i. Design

 - ii. Benefits

 - iii. Concerns

 - d. Reduce, reuse, recycle

3. Industrial Solid Waste
 - a. Industrial Ecology
 - i. Examples
 - ii. Life-cycle analysis
4. Hazardous Waste
 - a. Categories
 - b. Synthetic Organic compounds
 - c. Heavy metals
 - d. E-waste
 - e. Radioactive Waste
 - f. Disposal
 - i. Secure Landfills
 - ii. Surface Impoundments
 - iii. Deep Well Injection
 - g. Failures
 - i. Love Canal, New York
 - ii. Times Beach, Missouri
 - h. Legislation
 - i. Resource Conservation and Recovery Act aka Cradle to Grave
 - ii. Comprehensive Environmental Response and Clean-up Act aka Superfund act

Chapter 11: Biodiversity and Conservation Biology

1. Biodiversity
 - a. Species diversity
 - b. Genetic diversity
 - c. Ecosystem diversity
2. Global Patterns of Biodiversity
 - a. Dominant groups of species

- b. Latitudinal gradients
 - c. Altitudinal gradients
3. Extinction and Biodiversity Loss
4. Natural Extinction
- a. Background Extinction rate
 - b. Mass Extinction events
5. Causes of Biodiversity Loss
- a. Habitat loss / fragmentation
 - b. Pollution
 - c. Overharvesting / poaching
 - d. Invasive Species
 - e. Climate Change
6. Benefits of Biodiversity
- a. Ecosystem Services
 - b. Food security
 - c. Medicines and drugs
 - d. Tourism and recreation
7. Conservation Biology
- a. Legislation
 - i. Endangered Species Act
 - ii. CITES
 - iii. Convention on Biological Diversity
 - b. Captive breeding / cloning / reintroduction
 - c. Forensics
 - d. Umbrella species and charismatic megafauna
 - e. Biodiversity hotspots

- f. Ecological restoration

Chapter 12: Forests, Forest Management and Protected Areas

1. Forest Ecosystems and Resources
 - a. Forest Biomes and Forest Types

 - b. Ecological Complexity and effects on biodiversity
 - i. Canopy

 - ii. Subcanopy

 - iii. Understory

 - iv. Successional changes / stages

 - c. Forest Ecosystem Services

 - d. Natural Resources of Forests

2. Deforestation (consider differences worldwide between developed and developing countries)
 - a. Clearing land for agriculture

 - b. Timber harvesting (paper and lumber)

 - c. Fuel wood collection

 - d. Concessions

 - e. Solutions
 - i. Conservation Concessions

 - ii. REDD: International Cap and Trade program

3. Forest Management
 - a. Maximum Sustainable Yield

 - b. Ecosystem Based management

 - c. Adaptive Management

 - d. National Forests

 - e. Plantation Forestry

 - f. Timber Harvesting
 - i. Clear-cutting

- ii. Shelterwood
 - iii. Seed Tree
 - iv. Selection Systems
 - v. Salvage logging
 - g. Evolution of Forest management
 - h. Fire and Pests
 - i. Effects of global warming
 - ii. Bark beetles
 - iii. Catastrophic wildfires v. prescribed/controlled burns
 - i. Forest Certification
- 4. Parks and Protected Areas (intentions, restrictions, legislations for each)
 - a. National Parks
 - b. National Wildlife Refuges
 - c. Wilderness Areas
 - d. Opponents
 - e. Park design
 - i. Insights from island biogeography
 - ii. SLOSS Dilemma
 - iii. corridors