AP ES Chapters 8 & 9
Study Guide

<u>Chapter 8</u>: Earth Systems

AP Outline: Earth Systems and Resources (10–15%)

A. Earth Science Concepts
   Geologic time scale; plate tectonics, earthquakes, volcanism; seasons; solar intensity and latitude
B. Soil and Soil Dynamics
   Rock cycle; formation; composition; physical and chemical properties; main soil types; erosion and other soil problems; soil conservation

Make sure you can identify the rock cycle, the layers of soil (O, A, B, C), and the environmental impacts of each type of mining. These are topics that show up each year on the AP Exam.

Vocabulary: available on quizlet

Core
Mantle
Magma
Asthenosphere
Lithosphere
Crust
Hot spot
Plate tectonics
Subduction
Volcano
Divergent plate boundary
Seafloor spreading
Convergent plate boundary
Transform fault boundary
Fault
Fault zone
Earthquake
Seismic activity

epicenter
Richter scale
Rock cycle
Mineral
Igneous rock
Intrusive
Extrusive
Sedimentary rock
Metamorphic rock
Physical weathering
Chemical weathering
Acid rain
Erosion
Deposition
Soil
Parent material
O horizon
A horizon

Topsoil
E horizon
B horizon
C horizon
Cation exchange capacity
Base saturation
Soil degradation
Crustal abundance
Ore
Metal
Reserve
Strip mining
Taililngs (mine soils)
Open-pit mining
Mountaintop removal
Placer mining
Subsurface mining

Key Ideas:

After reading this chapter you should be able to:

- **Describe the formation of the Earth and the distribution of critical elements on Earth**
- **Define the theory of plate tectonics and discuss its importance to environmental science**
- **Describe the rock cycle and discuss its importance to environmental science**
- **Explain how soil forms and understand its importance and characteristics**
- **Explain how elements and minerals are extracted for human use and the consequences of mining.**

Checkpoints:

8.1 pages 207-217

1. How did the earth form?
2. What is the composition of each of Earth's layers?

3. What is the practical importance of how Earth's resources were distributed during Earth's formation?
4. What is the theory of plate tectonics?
5. What are the environmental consequences of the tectonic cycle?
6. What causes earthquakes and volcanos?

8.2 pages 217-226

1. What is the rock cycle?
2. What are the three types of rock and how do they form?
3. What is the difference between weathering and erosion? What is important about each?
4. How do soils form?
5. What are the roles of soils in ecosystems?
6. How do a soil's physical and chemical properties influence its role as a medium for plant growth?

8.3 pages 226-230

1. Why are economically valuable mineral resource distributed unevenly on the planet?
2. Describe the various types of surface mining operations.
3. What are the consequences of surface mining vs. subsurface mining? How has legislation tried to reduce those impacts?

Chapter 8 Skills:

Soil analysis techniques

Chapter 9: Water Resources

AP Outline I. Earth Systems and Resources (10–15%)

C. Global Water Resources and Use

Freshwater/saltwater; ocean circulation; agricultural, industrial, and domestic use; surface and groundwater issues; global problems; conservation

Key Ideas

Climate variation causes some regions of the world to possess abundant supplies of water, whereas other regions have very little water. Around the world, growing human populations are facing issues related to water availability.

After reading this chapter you should be able to

- ☐ identify Earth's natural sources of water.
- ☐ discuss the ways in which humans manage water distribution.
- ☐ describe the major human uses of water.
- ☐ identify the factors that will affect the future availability of water.

Chapter 9 Skills

- ☐ Locate significant oceans, seas, lakes, rivers, and dams on a world map.
- ☐ Calculate water use and water savings with conservation measures.
- ☐ Determine water quality index of a river based on habitat evaluation, stream flow, and chemical and physical tests (pH, dissolved oxygen, nitrates/nitrites, phosphates, BOD, temperature, and turbidity).

Vocabulary

aquifers
unconfined aquifers
confined aquifers
water table
groundwater recharge
springs
artesian wells
cone of depression
saltwater intrusion
floodplain
oligotrophic waters
mesotrophic waters
eutrophic waters
impermeable surfaces
levee
dikes
dam
reservoir
fish ladders
aqueducts
desalinization
hydroponic agriculture
gray water

Checkpoints

9.1 Reading pages 235-246

1. What are the primary repositories of fresh water on Earth?
   Which of these repositories is the largest?
2. What is the difference between a confined and an unconfined aquifer?
   How do their recharge rates differ?
3. How do human activities worsen the effects of droughts and floods?
4. How do levees, dikes, dams, and aqueducts differ from one another? What is the primary purpose of each?
5. Why is it necessary to desalinize water?

9.2 reading pages 246 - 253

1. What are the dominant uses of water by humans?
2. How do different irrigation methods influence water use?
3. Why does it require so much more water to produce 1 kg of beef than 1 kg of grain?
4. An older shower head uses 150 L for a 10 minute shower, whereas a reduced-flow shower head uses only 95 L.
5. If you take one shower per day, how many liters of water would you save in 1 year if you replaced your older showerhead?
6. Why is water ownership a complex issue?
7. What are some ways that humans can conserve water?
8. How does economic development influence water use?
9. An older toilet uses 27 L per flush, whereas a replacement toilet uses only 6 L per flush. If you flush the toilet four times per day, how many liters of water would you save in 1 year if you replaced your older toilet?
10. The Draper family of four wanted to find ways to live more sustainably. Dad recommended analyzing their water and energy usage. He noted that each person in the family showers twice a day with an average of 6 minutes per shower. The shower has a flow rate of 5.0 gallons per minute. Their standard hot-water heater raises the water temperature to 130 OF, which requires 0.2 kWh per gallon at a cost off $0.10/kWh.

Key Ideas Revisited – Chapter 9

Identify Earth's natural sources of water.

Most water on Earth resides in the oceans. Of the relatively small proportion that is fresh water, nearly three-fourths is tied up as ice and glaciers, leaving a small amount remaining in groundwater, streams, rivers, lakes, and wetlands. All of these sources of fresh water can be used by humans. Atmospheric water is an additional source of water, but its availability may vary seasonally as well as from year to year. Human activities can contribute to the negative effects of drought and flooding.

Discuss the ways in which humans manage water distribution.

Humans have created a variety of ways to store and divert water, including levees, dikes, dams, and aqueducts. Each of these water distribution technologies has important benefits, but can also have negative environmental impacts. Humans have also developed technologies for the desalination of salt water.

Describe the major human uses of water.

Water is used in agriculture, industry, and households. Agricultural uses of water include several different methods of irrigation as well as the developing field of hydroponic agriculture. Industrial uses of water include the generation of electricity, the refining of metals and paper, and the cooling of machinery. In households, water is used primarily in bathrooms for washing clothes. Per capita water use varies tremendously by country. Developed countries tend to use more water than developing countries, where many people have access to only a few liters of water per day.

Identify the factors that will affect the future availability of water.

The future of water availability depends on water ownership, water conservation, economic development, and global change. Water ownership is a highly complex issue that involves the market value of water and our need to ensure that adequate supplies are available. Water conservation efforts include improvements in agricultural irrigation techniques, the increased use of recycled water in industrial processes, more efficient household appliances, planting less water-demanding landscapes, and simple water collection devices that collect rainwater and allow recovery and reuse of gray water.