



# AP<sup>®</sup> Environmental Science

## Syllabus

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### Course Description

AP Environmental Science is a laboratory and field-based course designed to provide students with the content and skills needed to understand the various interrelationships in the natural world, to identify and analyze environmental problems, and to propose and examine solutions to these problems. Since this is an online course the laboratory and field-based activities will be done virtually and via experiments that students can easily perform at home with common materials. The course is intended to be the equivalent of a one-semester college ecology course, which is taught over an entire year in high school. The course encompasses human population dynamics, interrelationships in nature, energy flow, resources, environmental quality, human impact on environmental systems, and environmental law.

**(PLEASE NOTE: Chemistry and Biology are prerequisites for this course).**

### Course Materials

#### Textbooks

Author: Daniel B. Botkin and Edward A. Keller

Title: *Environmental Science: Earth as a Living Planet* (7th ed.).

Publisher: John Wiley & Sons

Year: 2007

#### Supplemental Websites

URL: <http://apcentral.collegeboard.com>

Description: A compilation of resources, criticisms, suggestions, and texts that are helpful in teaching AP students.

### Course Goals

#### Students should be able to demonstrate:

- Use of scientific method in the field of environmental science as the process to understand the interconnections of the Earth's systems
- Recognize how natural systems change over time and space; also how human impact alters these natural systems
- Evaluate scientifically the risks of environmental problems; both natural and man-made
- Propose methods of preventing, reducing risk, managing, or solving environmental problems
- Experience laboratory activities to enhance scientific exploration of environmental science

# Course Outline - Semester 1

## Unit 1 - Introduction to Environmental Science and Scientific Method (approximately 2 weeks)

The first unit of the course will acquaint students with the general principles of the scientific method and a general overview of environmental science; it introduces much of the important theory, philosophy, rhetoric, and terminology, which will be used throughout the course.

### Activities:

- Min/Max Thermometer - Gizmo: An online simulation where students learn to read a min/max thermometer. (While observing a thermometer, the current, minimum, and maximum daily temperatures are determined in a quiz type setting.)
  - ◇ Note: All gizmos are online lab simulations. A formal lab report and/or set of analysis questions as well as a quiz are required for each lab.
- Triple Beam Balance - Gizmo: In this online simulation students learn how to determine the mass of an object using a triple beam balance. The mass of a variety of objects can be determined using this simulated version of a common real-world laboratory tool for measurement.
- Interdependence of Plants and Animals - Gizmo (see note below) (1 hour): Discover how animals, plants, and sunlight interact to maintain a balance of gases in Earth's atmosphere. Place aquatic plants and pond snails into sealed test tubes and incubate in a light or dark room. Measure concentrations of dissolved carbon dioxide using the indicator bromthymol blue, and use this information to infer oxygen levels as well.
  - ◇ Note: All gizmos are online lab simulations. A formal lab report and/or set of analysis questions as well as a quiz will be required for each lab.
- Tragedy of the Commons Activity (1 hour): A hands-on activity designed to simulate the tragedy of the commons.
- Dilution Lab (3 hours): A laboratory activity designed to familiarize students with the laboratory skills required to prepare a series of different concentrations of a solution. This skill will be used in later labs.
- Journal Activity: Students will answer summative questions about each subsection in a journal.
- Practice Problems: Students will be given practice problems to help check for understanding in each subsection of the unit.
- Lab quizzes: Lab quizzes will be given with each lab in the unit.
- Quizzes: Students will be given weekly or biweekly quizzes to check for understanding in each subsection.
- Test: There will be a topic test at the end of each sub-unit. This test is in multiple choice format.
- In-Class Essay: An AP-like practice essay to assist students as they prepare for their examination.
- End-of-Unit Exam: A 45-minute exam designed to assess each student's mastery of the unit content.  
(AP FORMAT) containing 25 multiple-choice questions with five possible answers and one essay.

## Resources:

- Environmental Science, Chapters 1, 2 and 27
- The Study of Environmental Science - Video Lecture
- Scientific Method - Scientific Inquiry - Video Lecture
- Scientific Method - Laboratory Tools & Safety - Video Lecture
- Scientific Method - Scientific Measurement - Video Lecture
- Scientific Method - Scientific Models - Video Lecture
- Scientific Method - Critical Thinking in Science - Video Lecture
- Scientific Method - Environmental Scientists and Ecologists Video Lecture
- Scientific Method - Careers in Environmental Science Video Lecture
- Systems of the Biosphere - Video Lecture (section on feedbacks only)
- Governments and Business - Video Lecture
- Environmental Ethics & Environmental Justice Lecture - Arguments for maintaining biodiversity, precautionary principal etc.
- Informed Policy - Video Lecture
- Impact of Policy - Video Lecture
- Milestones and Turning Points - Video Lecture
- Open and Closed Systems Lecture
- Tragedy of the Commons Lecture
- Gonick, and Outwater, The Cartoon Guide to the Environment, Chapter 1
- Brown, Plan B 2.0, Chapter 1
- Hardin, "The Tragedy of the Commons," Science, v163, December 13, 1968
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study.
- Video: Habitable Planet: Many Planets, One Earth

# Unit 2-4 - Life on Earth parts I–III

## (approximately 6 weeks)

The second, third, and fourth units of the course comprise a comprehensive overview of basic ecological principles. The units include the study of how living organisms interact with one another and with their surroundings, as well as the study of biogeochemical cycles, evolution, succession, and the Earth's biomes. Additionally, these units also introduce basic earth science concepts necessary for the course.

### Activities:

- Effect of Environment on New Life Form - Gizmo (see note below) (1 hour): Using the scientific method students will control the environmental conditions for a fictional alien organism in order to learn how the organism responds to changes in conditions. Sunlight, water, and temperature can be varied to determine their effects on the shape of the aliens.
- Food Chain - Gizmo (1 hour): In this ecosystem consisting of hawks, snakes, rabbits and grass, the population of each species can be studied as part of a food chain. Disease can be introduced for any species, and the number of animals can be increased or decreased at any time, just like in the real world.
- Natural Selection Peppered Moth - Gizmo (1 hour): In this online simulation students will assume the role of a bird hunting moths (both dark and light) that live on trees. As they capture the moths most easily visible against the tree surface, the moth populations change, illustrating the effects of natural selection.
- Rabbit Population - Gizmo (1 hour): Observe the population of rabbits in an environment over many years. The land available to the rabbits and weather conditions can be adjusted to investigate the effects of urban sprawl and unusual weather on wildlife populations
- Rainfall and Bird Beaks - Gizmo (1 hour): Study the thickness of birds' beaks over a five-year period as you control the yearly rainfall on an isolated island. As the environmental conditions change, the species must adapt (a real-world consequence) to avoid extinction.
- Estimating Population Size (1 hour) - Gizmo: An online lab simulation that allows students to estimate a population size using capture, tag and release method of estimating population size. Students will adjust the number of fish in a lake to be tagged and the number of fish to be recaptured. Use the number of tagged fish in the catch to estimate the number of fish in the lake.
- Seed Germination (1 hour) - Gizmo: Perform experiments with several seed types to see what conditions yield the highest germination (sprouting) rate. Three different types of seeds can be studied, and the temperature, water and light in the germination chamber can be controlled. No two trials will have the same result so repeated trials are recommended.
- Natural Selection Peppered Moth - Gizmo (1 hour): Students will again be using the Natural Selection gizmo seen earlier; however, the goal this time is to explain the adaptations of indigenous species to their respective ecosystems using peppered moths as examples.

- Photosynthesis Lab - Gizmo (1 hour): Study photosynthesis in a variety of conditions. Oxygen production is used to measure the rate of photosynthesis. Light intensity, carbon dioxide levels, temperature, and wavelength of light can all be varied. Determine which conditions are ideal for photosynthesis, and understand how limiting factors affect oxygen production.(Biology across curriculum material)
- Cell Energy Cycle - Gizmo (1 hour): Explore the processes of photosynthesis and respiration that occur within plant cells. The cyclical nature of the two processes can be constructed visually, and the photosynthesis and respiration equations can be balanced in a descriptive and numerical format (biology across curriculum material).
- Plate Tectonics - Gizmo (1 hour): Move the Earth's crust at various locations to observe the effects of the motion of the tectonic plates, including volcanic eruptions. Information about each of the major types of plate boundaries is shown, along with their locations on Earth.
- Water Cycle - Gizmo (1 hour): Control the path of a drop of water as it travels through the water cycle. Many alternatives are presented at each stage. Determine how the water moves from one location to another, and learn how water resources are distributed in these locations.
- Rock Cycle - Gizmo (1 hour): Play the role of a piece of rock moving through the rock cycle. Select a starting location and follow many possible paths throughout the cycle. Learn how rocks are formed, weathered, eroded, and reformed as they move from Earth's surface to locations deep within the crust.
- Carbon Cycle Lab
- Nitrogen Cycle Lab
- Phosphorus Cycle Lab
- Sulfur Cycle Lab
- Ecocolumn Lab: A laboratory activity in which students design and populate an ecosystem contained within stacked, two liter bottles. Students will monitor the physical properties and water quality in the ecocolumn throughout the school year.
- Species Diversity Lab
- Predator Prey Lab
- Journal Activity: Students will answer summative questions about each subsection in a journal.
- Practice Problems: Students will be given practice problems to help check for understanding in each subsection of the unit.
- Lab quizzes: Lab quizzes will be given with each lab in the unit.
- Quizzes: Students will be given weekly or biweekly quizzes to check for understanding in each subsection.
- Test: There will be a topic test at the end of each sub-unit. This test is in multiple choice format.
- In-Class Essay: An AP-like practice essay to assist students as they prepare for their examination.
- End-of-Unit Exam: A 45-minute exam designed to assess each student's mastery of the unit content. (AP FORMAT) containing 25 multiple-choice questions with five possible answers and one essay.

## Resources:

- Environmental Science, Chapters 3,5 and 10
- Ecology 101 - Video Lecture
- Ecology 102 - Video Lecture
- Trophic Levels and Food Webs - Video Lecture
- Adaptation - Video Lecture
- Organismal Relationships - Video Lecture
- Biodiversity - Video Lecture
- Land Habitats - Video Lecture
- Aquatic Habitats - Video Lecture
- Population Dynamics part 1 - Video Lecture
- Population Genetics - Video Lecture
- Determining Population Size - Video Lecture
- Measuring Populations - Vide Lecture
- Characteristics of Biomes - Video Lecture
- Desert and Desert-Scrub Biomes - Video Lecture
- The Chaparral - Video Lecture
- Alpine and Taiga Biome - Video Lecture
- The Tundra - Video Lecture
- Temperate, Wet and Aquatic Biomes - Video Lecture
- Deciduous Forests - Video Lecture
- The Rainforest - Video Lecture
- Freshwater and Marine Biomes - Video Lecture
- Pools, Ponds and Lakes - Video Lecture
- Streams and Rivers - Video Lecture
- Wetlands - Video Lecture
- Ocean Exploration - Video Lecture
- Salt Marshes and Mangroves - Video Lecture
- Coral Reefs - Video Lecture
- Issues Affecting Marine Ecosystems - Video Lecture
- Why Invasive Species Thrive - Global Connection Video
- Modeling Systems and Cycles - Video Lecture
- Systems of the Biosphere - Video Lecture (Geosphere, Hydrosphere, Atmosphere, and Biosphere)
- Patterns in Systems - Video Lecture
- Succession - Video Lecture
- Life and Earth's Crust - Video Lecture
- Plate - Tectonics - Video Lecture
- Weathering and Erosion - Video Lecture
- Energy Transfer - Video Lecture
- Photosynthesis in Plants
- Project - Defining your biome and/or biome travel brochure
- Gonick, and Outwater, The Cartoon Guide to the Environment, Chapter 2
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study
- Video: Strange Days on Planet Earth, “Invaders”
- Video: Strange Days on Planet Earth, “Predators
- Video: Planet Earth, “Pole to Pole”
- Video: Planet Earth, “Great Plains”

# Unit 5 - Human Population and Urban Environments (approximately 2 weeks)

This unit begins a transition that brings the course from the study of ecology and earth science (the manner in which the Earth's systems evolved to function) to the study of environmental science (environmental change, and the consequences of the interaction between humans and their environment). The unit includes the study of population dynamics, demographic transition, and characteristics of cities.

## Activities:

- Rabbit Population by Season Gizmo (1 hour): While this gizmo was used previously, this time students will look at the effects of development on natural populations.
- In-class Essay: An AP-like practice essay to assist students as they prepare for their examination.
- Quizzes: Short (2- to 5-minute) quizzes administered two to three times each week throughout the unit
- Population Growth in Yeast Lab (3 hours): A laboratory activity where students learn to use lab equipment as well as get more comfortable using math to examine population growth
- Population Problem Set: Students are given a problem set to practice solving population problems
- Journal Activity: Students will answer summative questions about each subsection in a journal
- Practice Problems: Students will be given practice problems to help check for understanding in each subsection of the unit.
- Lab quizzes: Lab quizzes will be given with each lab in the unit.
- Quizzes: Students will be given weekly or biweekly quizzes to check for understanding in each subsection.
- Test: There will be a topic test at the end of each sub-unit. This test is in multiple-choice format.
- In-class Essay: An AP-like practice essay to assist students as they prepare for their examination.
- End-of-Unit Exam: A 45-minute exam designed to assess each student's mastery of the unit content (AP FORMAT) containing 25 multiple-choice questions with five possible answers and one essay.

## Resources:

- Environmental Science, Chapters 4 and 30
- Population Size - Video Lecture Parts 2 and 3
- Doubling time/Rule of 70 lecture
- Human Events and the Environment - Video Lecture
- Urban Growth - Video Lecture
- Human Population, Demographic Transition Etc Lecture
- Limiting Factors and Humans - Video Lecture
- Humans and the Energy Cycle - Video Lecture
- Societal Consequences - Video Lecture
- The Environment and the Individual - Video Lecture

- Natural Events and the Environment - Video Lecture
- Sustainability - Video Lecture
- Effects of Technology - Video Lecture
- Success Stories - Video Lecture
- Changing Migratory Patterns - Global Connections Video
- Human Impact on Population Size - Global Connection Interactive Web Applet
- Gonick, and Outwater, The Cartoon Guide to the Environment, Chapter 8
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study.
- Video: NOVA, “The World in The Balance”
- Video Clip: “Population Explosion – ECU #156”

# Unit 6 – Soil, Food and Agriculture Environments (approximately 2 weeks)

This unit includes the study of soils, nutrition and food production, including the green revolution, soil conservation, pesticide use and irrigation practices.

## Activities:

- Porosity - Gizmo (1 hour): Pour water on a variety of sediment samples to find how much water can be absorbed by the sample (porosity) and how easily water flows through the sample (permeability).
- Soil Lab (1 hour): A laboratory activity in which students measure the physical and chemical properties of soil.
- Soil Salinization Lab (3 hours): A laboratory activity designed to assess the student's ability to design and perform an experiment.
- Pesticide Treadmill Simulation/Lab/Activity
- Math Problem Set - GPP & NPP
- Journal Activity: Students will answer summative questions about each subsection in a journal.
- Practice Problems: Students will be given practice problems to help check for understanding in each subsection of the unit.
- Lab quizzes: Lab quizzes will be given with each lab in the unit.
- Quizzes: Students will be given weekly or biweekly quizzes to check for understanding in each subsection.
- Test: There will be a topic test at the end of each sub-unit. This test is in multiple choice format.
- In-class Essay: An AP-like practice essay to assist students as they prepare for their examination.
- End-of-Unit Exam: A 45-minute exam designed to assess each student's mastery of the unit content (AP FORMAT) containing 25 multiple-choice questions with five possible answers and one essay.

## Resources:

- Environmental Science, Chapters 11 and 12
- What is Soil - Video Lecture
- Soil Formation - Video Lecture
- Soil Around the World - Video Lecture
- Soil and Agriculture - Video Lecture
- Diamond, "The Worst Mistake in the History of the Human Race," Discover, May, 1987.
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study.
- Video: Race to Save the Planet, "Save the Earth-Feed the World"
- Video: "King Corn"

# Unit 7 – Biodiversity and Land Use (approximately 4 weeks)

This unit includes the study of soils, nutrition and food production, including the green revolution, soil conservation, pesticide use and irrigation practices.

## Activities:

- Habitat Loss Lab (2 hours): A laboratory activity designed to allow students to evaluate the effect of habitat loss on species diversity.
- APES Debates (5 hours): Students prepare for then debate each other in structured debates on environmental issues relating to land use. These topics include:
  - Land use in the United States and the world, including laws to manage public lands [C4]
  - Managing forests sustainably
  - Managing tropical forests
  - Sustaining national parks
  - Urbanization
- Journal Activity: Students will answer summative questions about each subsection in a journal.
- Practice Problems: Students will be given practice problems to help check for understanding in each subsection of the unit.
- FisLab quizzes: Lab quizzes will be given with each lab in the unit.
- Quizzes: Students will be given weekly or biweekly quizzes to check for understanding in each subsection.
- Test: There will be a topic test at the end of each sub-unit. This test is in multiple choice format.
- In-class Essay: An AP-like practice essay to assist students as they prepare for their examination.
- End-of-Unit Exam: A 45-minute exam designed to assess each student's mastery of the unit content (AP FORMAT) containing 25 multiple-choice questions with five possible answers and one essay.

## Resources:

- Environmental Science, Chapters 13 and 14
- Human Use of Land - Video Lecture
- Land Management and Planning - Video Lecture
- The Importance of Trees - Video Lecture
- Rainforest Lost - Video Lecture
- Modern Forestry - Video Lecture
- Fire and Nature - Video Lecture
- Newfoundland Cod Fishery Collapse - Global Connection Video
- Muir, "A Paradise of Birds," The Wilderness World of John Muir.
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study.
- Video: Cane Toads: An Unnatural History

# Course Outline - Semester 2

## Unit 8 - Introduction to Environmental Science and Scientific Method (approximately 2 weeks)

This unit includes the effects environmental hazards have on human health, as well as on the health of the environment.

### Activities:

- Risk Lab (3 hours): A laboratory activity designed to provide students with insight into the psychology of risk assessment
- LD-50 Lab (90 minutes): Allows students to examine pesticides and LD-50
- In-class Essay: An AP-like practice essay to assist student's as they prepare for their examination
- Quizzes: Short (2- to 5-minute) quizzes administered two to three times each week throughout the unit
- End-of-Unit Exam: A 45-minute exam designed to assess each student's mastery of the unit content

### Resources:

- Environmental Science, Chapters 15 and 16
- Health and Toxicology lecture
- Risk and Risk Assessment lecture
- Other Influences on Personal Health - Video Lecture
- Current Events – Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study

# Unit 9 - Energy Resources and Energy Use (approximately 4 weeks)

This unit includes the study of fossil fuel use, as well as the study of potential replacements for fossil fuels along with characteristic advantages and disadvantages of each.

## Activities:

- Personal Energy Audit (2 hours): An activity in which students record and analyze their personal use of energy. This will allow students to closely examine how efficient their own practices are as well as practice mathematical calculations.
- Half-life Lab
- Solar Oven Project
- Math Practice Multiple Energy problem sets including conversion, half-life, etc.
- In-class Essay: An AP-like practice essay to assist students as they prepare for their exam
- Quizzes: Short (2- to 5-minute) quizzes administered two to three times each week throughout the unit
- End-of-Unit Exam: A 45-minute exam designed to assess each student's mastery of the unit content

## Resources:

- Environmental Science, Chapters 17–20
- What are Natural Resources - Video Lecture
- Nuclear Power - Video Lecture
- Resource Conservation - Video Lecture
- The Social Costs of Resource Use - Video Lecture
- Nuclear Fuel - Global Connection Interactive applet
- Fossil Fuels Lecture
- Alternative Fuels Lecture
- Current Events: Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study
- Video: Kilowatt Ours
- Video: Modern Marvels, "Coal"

# Unit 10 - Water Resources and Water Pollution (approximately 3 weeks)

This unit includes the study of water resources and distribution systems. The unit also includes the study of water quality and specific water pollutants.

## Activities:

- Water Pollution - Gizmo (1 hour): Get to know the four main types of pollution present in the environment, and then look at a variety of real-world examples as you try to guess what type of pollution is represented by each situation. All of the real-world situations can be viewed every day in different parts of the world.
- Water Cycle - Gizmo (1 hour): Control the path of a drop of water as it travels through the water cycle. Many alternatives are presented at each stage. Determine how the water moves from one location to another, and learn how water resources are distributed in these locations.
- Average residence time problem set - Math practice
- Water Use Audit (2 hours): An activity in which students measure, record, and analyze the use of water in and around their home
- Journal Activity: Students will answer summative questions about each subsection in a journal.
- Practice Problems: Students will be given practice problems to help check for understanding in each subsection of the unit.
- Lab Quizzes: Lab quizzes will be given with each lab in the unit.
- Quizzes: Students will be given weekly or biweekly quizzes to check for understanding in each subsection.
- Test: There will be a topic test at the end of each sub-unit. This test is in multiple-choice format.
- In-class Essay: An AP-like practice essay to assist students as they prepare for their exam
- End-of-Unit Exam: A 45-minute exam designed to assess each student's mastery of the unit content (AP FORMAT) containing 25 multiple-choice questions with five possible answers and one essay.

## Resources:

- Environmental Science, Chapters 21 and 22
- Water Management and Katrina - Global Connection Video
- Nonnative Species in Aquatic Ecosystems - Video Lecture
- Changing Waterways - Video Lecture
- The Water We Use - Video Lecture
- Water Pollution - Video Lecture
- Groundwater - Video Lecture
- Water Policy - Video Lecture
- Systems of the Biosphere - Video Lecture (Hydrosphere section only)
- Current Events: Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study
- Video: Flow - For the Love of Water

# Unit 11 - Atmospheric Dynamics, Climate Change, and Air Pollution (approximately 3 weeks)

This unit includes a brief introduction to the structure and characteristics of the Earth's atmosphere, followed by the study of air pollution including photochemical smog, the effect of specific air pollutants, stratospheric ozone depletion, and global warming.

## Activities:

- Greenhouse Effect - Gizmo (1 hour): Within this simulated region of land, daytime's rising temperature and the falling temperature at night can be measured, along with heat flow in and out of the system. The level of greenhouse gases present in the atmosphere at any given time can be adjusted, allowing the long-term effects to be investigated.
- Ozone Lab (2 hours): A laboratory activity in which students measure the ozone concentration in the air in and around their home using paper indicator strips they make in the lab
- Particulate Lab (2 hours): A laboratory activity in which students qualitatively monitor particulates in and around their home
- Air Quality Lab (90 minutes): A laboratory activity where students measure emissions from different types of cars
- Journal Activity: Students will answer summative questions about each subsection in a journal.
- Practice Problems: Students will be given practice problems to help check for understanding in each subsection of the unit.
- Lab Quizzes: Lab quizzes will be given with each lab in the unit.
- Quizzes: Students will be given weekly or biweekly quizzes to check for understanding in each subsection.
- Test: There will be a topic test at the end of each sub-unit. This test is in multiple-choice format.
- In-class Essay: An AP-like practice essay to assist students as they prepare for their exam
- End-of-Unit Exam: A 45-minute exam designed to assess each student's mastery of the unit content (AP FORMAT) containing 25 multiple-choice questions with five possible answers and one essay.

## Resources:

- Environmental Science, Chapters 23–25
- Atmospheric Pollution - Video Lecture
- Ozone - Video Lecture
- Lecture on indoor air pollution
- Air Quality - Video Lecture
- Climate and Change in Ecosystems - Video Lecture
- Global Change - Video Lecture
- A History of Global Climate Change
- Current Events: Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study
- Video: Race to Save the Planet, "Do You Really Want to Live This Way?"
- Video: Race to Save the Planet, "Only One Atmosphere"
- Video: Strange Days on Planet Earth, "The One-Degree Factor"

# Unit 12 - Solid Waste, Minerals, and Mining (approximately 2 weeks)

This unit is a collection of topics including solid waste, mineral resources, and mining practices, that will complete the study of environmental science.

## Activities:

- Cookie Mining Lab: Students will mine cookies and then do reclamation to learn about mining.
- Journal Activity: Students will answer summative questions about each subsection in a journal.
- Practice Problems: Students will be given practice problems to help check for understanding in each subsection of the unit.
- Lab Quizzes: Lab quizzes will be given with each lab in the unit.
- Quizzes: Students will be given weekly or biweekly quizzes to check for understanding in each subsection.
- Test: There will be a topic test at the end of each sub-unit. This test is in multiple-choice format.
- In-class Essay: An AP-like practice essay to assist students as they prepare for their exam
- End-of-Unit Exam: A 45-minute exam designed to assess each student's mastery of the unit content (AP FORMAT) containing 25 multiple-choice questions with five possible answers and one essay.

## Resources:

- Environmental Science, Chapters 26 and 29
- Minerals and Mining - Video Lecture
- Current Events: Other outside reading, usually newspaper or magazine articles from recent weeks or months that are relevant to the unit of study
- Video: Modern Marvels, "Garbage"
- Video: Recycled Life

# Unit 13 - APES Review (approximately 5 weeks)

This unit is a review of the topics studied during the course in preparation for the AP Environmental Science Exam.

## Activities:

- 1998 Released Exam
- 2003 Released Exam
- 2008 Released Exam
- Online quiz games such as quia
- Online discussion forum
- All released APES essays

## Resources:

- Environmental Science, All Chapters
- Princeton Review Book
- APES in a box (optional)