

## AP Summer Assignment

### Course: AP Environmental Science

<b>Assignment title</b>	Introduction, review and exposure to content
<b>Date due</b>	1 <sup>st</sup> day of class
<b>Estimated time for completion</b>	10 hours
<b>Resources needed to complete assignment</b>	<input type="checkbox"/> Textbook assigned by school <input type="checkbox"/> Book(s) supplied by student <input checked="" type="checkbox"/> Other supplies: __ Internet _____
<b>How the assignment will be assessed</b>	Test grade: assigned by course teacher
<b>Purpose of assignment</b>	<input checked="" type="checkbox"/> Review foundational material/concepts/skills. <input checked="" type="checkbox"/> Expose students to required material/concepts/skills/texts that cannot entirely be covered during the academic year. <input checked="" type="checkbox"/> Have students study material that will be discussed or used in class at the beginning of the year.



# APES Summer Assignment Instructions

## Part I: Laws

- Handwritten flash cards shall be created, one for each environmental law, act or treaty included in the document titled 'AP environmental science law review'. Each shall contain the following information
  - o Name of law
  - o Whether it is international or national
  - o Function of the law & environmental topic affected
  - o Agency that enforces/oversees the law
  - o A graphic that represents the law or affected area (may be hand drawn or printed)

## Part II: Matter, Energy & Life

- Twelve short videos will be studied, each video has an associated notes sheet that you need to print and fill with your own detailed notes.
  - o These videos are from the Crash Course YouTube channel ecology playlist, a link to the playlist has been provided on each notes sheet.
- [http://www.youtube.com/watch?v=sjE-Pkjp3u4&list=PL8dPuuaLjXtNdTKZkV\\_GilYXpV9w4WxbX](http://www.youtube.com/watch?v=sjE-Pkjp3u4&list=PL8dPuuaLjXtNdTKZkV_GilYXpV9w4WxbX)
  - o The notes sheets should be kept together for future reference and study purposes

## Part III: Math

- Complete the APES math review
  - o A link to worked solutions is provided to help if you get stuck with one question but a full knowledge of all the concepts included in the review is expected and required.

## Assessment:

- The three parts listed above will form the first test grade of the semester and will be due, fully completed on the first day of class as you enter.

## Note:

- The following documents required to complete this assignment are provided as links
  - o AP environmental science laws review
  - o Crash Course Ecology note sheets
  - o APES mathematics review

# APES Mathematics Review

The APES Examination will require you to do mathematical calculations. Occasionally these calculations may be somewhat esoteric, and you may find it possible to do them in your head; nonetheless, it is mandatory to show all work for all calculations on the free-response section of the APES exam. This worksheet is designed help to prepare you for the type of calculations you may encounter on this year's APES exam.

**Use a separate piece of paper, show every step of your work, and cancel of all units. No Calculators!!**

**Scientific Notation** — All APES students should be able to work comfortably with numbers in scientific notation

Place the following numbers into scientific notation.

- one billion
- twenty three thousand
- 70 trillion

Do the following calculations in scientific notation.

- five hundred billion times thirty five thousand
- six thousand divided by 300 billion
- one ten thousandth of three million

**Unit conversions** — All APES students should be able to convert from one system of units to another.

➤ Given: 1 square mile = 640 acres, 1 hectare = 2.5 acre, 1 km = .6 mi

- A 100 square mile area of national forest is how many acres? How many hectares?
- If a tectonic plate moved 25 km in a million years, how cm does it move each year?
- The speed limit is 50 km/hr but your speedometer only reads in mph. How fast can you legally travel in mph?

**Percentages** — All APES students should be able to work comfortably with percentages.

- A natural gas power plant is 60% efficient. If one cubic meter of natural gas provides 1000 BTUs of electricity. How many BTUs of waste heat were produced?
- If 35% of a natural area is to be developed, leaving 500 acres untouched, how many acres are to be developed?
- If the concentration of mercury in a water supply changes from 65 ppm to 7 ppm in a ten-year period, what is the percentage change of the mercury concentration?

**Energy** — The APES exam always has questions about energy use. Be prepared!

➤ Given: 1 barrel of oil = 150 L, 1 kWh = 3,400 BTU

- A city that uses ten billion BTUs of energy each month is using how many kilowatt-hours of energy?
- If a barrel of crude oil provides six million BTUs of energy, how many BTUs of energy in one liter of crude oil?
- For crude oil, if 150 pounds of CO<sub>2</sub> is released per million BTUs of energy, how much CO<sub>2</sub> is produced by each barrel of crude oil? (use information from the previous problem)

**Population** — The APES exam always has questions about population. Be prepared!

- Calculate the percentage growth rate for a country with a population of 6 million: in a year in which it had 100,000 births, 70,000 deaths, 30,000 immigrants, and 50,000 emigrants.
- If a town's growth rate is 1% and the population size is 10,000, how long until the population to grows to 40,000?
- If it took a country 40 years to double its population, what was its growth rate?

**Half-life** — All APES students should be able to work comfortably with half-life.

Half-lives elapsed	0	1	2	3	4	5	6	7	8	9	10
Fraction remaining	1/1	1/2	1/4	1/8	1/16	1/32	1/64	1/128	1/256	1/512	1/1024
Percentage remaining	100%	50%	25%	12.5%	6.25%	3.12%	1.56%	0.78%	0.4%	0.2%	0.1%

- Radium has a half-life of 1500 years. How long will it take for 250kg of Radium to decay down to less than 10kg?
- The half-life of Pa-234 is 6.75 hr. How much of a sample of this isotope remains after 20.25 hr?
- Plutonium-239 has a half life of 24,000 years and is considered safe only when its radioactivity has dropped to 1% of the original level. Approximately how long must the Pu-239 be stored securely to be considered safe?

Link to worked answer video: <http://www.youtube.com/watch?v=-7B5WLW8TXk>

## **AP Environmental Science Law Review**

### **Environmental Legislation/Agreements**

#### **Antiquities Act**

Allows the President of the United States to create National Monuments; no involvement of Congress is required, allowing for a fast method of conservation. 01.02

#### **Comprehensive Environmental Response, Compensation Liability Act (CERCLA)**

The Superfund law was created to protect people, families, communities and others from heavily contaminated toxic waste sites that have been abandoned.. There are currently 1,240 sites listed on the Superfund National Priority List, an additional 317 have been delisted, and 61 new sites have been proposed. The Superfund law paid for toxic waste cleanups at sites where no other responsible parties could pay for a cleanup by assessing a tax on petroleum and chemical industries. The chemical and petroleum fees provide incentives to use less toxic substances. Superfund also provides broad federal authority to clean up releases or threatened releases of hazardous substances that may endanger public health or the environment. 10.02

#### **Antarctic Treaty—Madrid Protocol**

The Treaty and related agreements regulate international relations with respect to Earth's only continent without a native population. It set aside this continent as a scientific preserve, established freedom of scientific investigation and banned military activity on that continent. This was the first arms control agreement established during the Cold War. 02.04

#### **Clean Air Acts**

('62 '65 '70 '77 '90) Set standards for six ("The Six") criteria pollutants (National Ambient Air Quality Standards) Particulates (PM), Sulfur dioxide (SO<sub>2</sub>), Carbon Monoxide (CO), Nitrogen Oxides (NO<sub>x</sub>)\*, Ozone (O<sub>3</sub>), and Lead (Pb).

Set Limits on SO<sub>2</sub> Emitted by coal-fired (burning) power plants. Established SO<sub>2</sub> pollution permits sold on the Chicago Board of Trade.

\*NO= Nitrogen Oxide, N<sub>2</sub>O= Nitrous Oxide

NO<sub>2</sub>= Nitrogen Dioxide. 01.02, 01.03, 06.01

#### **Clean Water Act**

The act is the primary federal law in the United States governing water pollution of the nation's waterways (not drinking water; see Safe Drinking Water Act). The act established the symbolic goals of eliminating releases to water of toxic amounts of toxic substances, eliminating additional water pollution by 1985, and ensuring that surface waters would meet standards necessary for human sports and recreation by 1983. 01.02, 01.03, 08.01

#### **Convention of Climate Change and the Kyoto Protocol**

An amendment to the international treaty on climate change, assigning mandatory emission limitations for the reduction of greenhouse gas emissions to the signatory nations.

The objective of the protocol is the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." 01.02, 06.04

#### **Convention of Ozone Depletion and the Montreal Protocol**

An international treaty designed to protect the ozone layer by phasing out the production of a number of substances believed to be responsible for ozone depletion. 06.05

### **Convention on International Trade in Endangered Species of 1973 (CITES)**

An international agreement between governments drafted as a result of a resolution adopted in 1963 at a meeting of members of the World Conservation Union (IUCN). Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival and it accords varying degrees of protection to more than 33,000 species of animals and plants. 01.02, 01.07

### **Convention on the Law of the Sea of 1982 (UNCLOS) (or Law of the Sea Convention, LOSC)**

Referred to by its opponents as the Law of the Sea Treaty (LOST), is the international agreement that set rules for the use of the world's oceans, which cover 70 percent of the Earth's surface. 03.03

### **Declaration of the Conference on the Human Environment of 1972 (Stockholm Declaration)**

The United Nations Conference on the Human Environment having considered the need for a common outlook and for common principles to inspire and guide the peoples of the world in the preservation and enhancement of the human environment. 01.07, 10.4

### **Emergency Planning & Community Right-To-Know Act (EPCRA)**

Its purpose is to encourage and support emergency planning efforts at the state and local levels and to provide the public and local governments with information concerning potential chemical hazards present in their communities. 09.03

### **Endangered Species Act**

(1973, '82, '85, '88)

This act forbids Federal Agencies from authorizing, funding or carrying out actions which may "jeopardize the continued existence of" endangered or threatened species. It forbids any government agency, corporation, or citizen from taking (i.e., harming, harassing, or killing) endangered animals without a permit. Once a species is listed as threatened or endangered, the act also requires that "critical habitat" be designated for that species, including areas necessary to recover the species. 01.02, 01.07

### **Energy Policy Act**

(1992, 2002)

The act originally publicized radiation protection standards for the Yucca Mountain repository. The Yucca Mountain site has been designated by the Federal government to serve as the permanent disposal site for used nuclear fuel and other radioactive materials from commercial nuclear power plants and U.S. Department of Defense activities. The update attempts to combat growing energy problems, provides tax incentives and loan guarantees for energy production of various types. 01.02, 05.01

### **Federal Food, Drug, and Cosmetic Act 1938, 1954, 1958 (FFDCA)**

A set of laws passed by Congress giving authority to the Food and Drug Administration (FDA) to oversee the safety of food, drugs, and cosmetics. 09.02

### **Federal Insecticide, Fungicide and Rodenticide Act 1972, 1988 (FIFRA)**

The primary focus of this act was to provide federal control of pesticide distribution, sale, and use. EPA was given authority to not only to study the consequences of pesticide usage but also to require users (farmers, utility companies, and others) to register when purchasing pesticides. 07.05

### **Food Quality Protection Act of 1996 (FQPA)**

With the enactment of this Act, Congress presented EPA with an enormous challenge of implementing the most comprehensive and historic overhaul of the Nation's pesticide and food safety laws in decades. The act amended the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food Drug, and Cosmetic Act (FFDCA) by fundamentally changing the way EPA regulates pesticides. Some of the major requirements include stricter safety standards, especially for infants and children, and a complete reassessment of all existing pesticide tolerances. 07.04

### **International Conference on Population and Development**

The conference delegates achieved consensus on the following four qualitative and quantitative goals:

Universal education by 2015

Reduction of infant and child mortality

Reduction of maternal mortality

Access to reproductive and sexual health services including family planning. 04.02

### **Lacey Act (1900)**

This a conservation law prohibited the transportation of illegally captured or prohibited animals across state lines. It was the first federal law protecting wildlife, and is still in effect, though it has been revised several times. Today the law is primarily used to prevent the importation or spread of potentially dangerous non-native species. 01.07

### **Marine Mammal Protection Act**

United States citizens are prohibited from the take, capture or harassment of marine mammals.

Exceptions are provided for Native American tribal cultures and educational institutions. 01.07

### **Migratory Bird Hunting Stamp Act (1934)**

The act requires the purchase of a stamp by waterfowl hunters. Revenue generated is used to acquire important wetlands. Since its inception, the program has resulted in the protection of approximately 4.5 million acres (18,000 km<sup>2</sup>) of waterfowl habitat. 02.04

### **NEPA (National Environmental Policy Act)**

The act was one of the first laws ever written that establishes the broad national framework for protecting our environment. Its basic policy is to assure that all branches of government give proper consideration to the environment prior to undertaking any major federal action that significantly affects the environment.

Its requirements are invoked when airports, buildings, military complexes, highways, parkland purchases, and other federal activities are proposed. Environmental Assessments (EAs) and Environmental Impact Statements (EISs), which are assessments of the likelihood of impacts from alternative courses of action, are required from all Federal agencies and are the most visible requirements. 01.02, 01.07

### **Occupational Safety and Health Act (OSHA)**

The act was created to protect worker and health. Its main aim was to ensure that employers provide their workers with an environment free from dangers to their safety and health, such as exposure to toxic chemicals, excessive noise levels, mechanical dangers, heat or cold stress, or unsanitary conditions. 09.02

### **Oil Pollution Act of 1990 (OPA)**

The Oil Pollution Act was passed by the United States Congress to prevent further oil spills from occurring in the United States. It was made after the Exxon Valdez oil spill. It stated "A company cannot ship oil into the United States until it presents a plan to prevent spills that may occur. It must also have a detailed containment and cleanup plan in case of an oil spill emergency."

It was an example of a rare case in which all members of both houses of Congress support a bill. 05.03

### **Resource Conservation and Recovery Act of 1976 and 1989 (RCRA)**

The Environmental Protection Agency (EPA) states that this act's goals are:

to protect the public from harm caused by waste disposal

to encourage reuse, reduction, and recycling

to clean up spilled or improperly stored wastes. 10.03

### **Safe Drinking Water Act of 1974, 1984, and 1996 (SDWA)**

It is the main federal law that ensures safe drinking water for Americans. With this act, the Environmental Protection Agency (EPA) is allowed to set the standards for drinking water quality and oversees all of the states, localities, and water suppliers who implement these standards.

This act applies to every public water system in the United States. There are currently more than 160,000 public water systems providing water to almost all Americans at some time in their lives. 08.03

### **Surface Mining Control and Reclamation Act of 1977**

This act is the primary federal law that regulates the environmental effects of coal mining in the United States. This act created: one program for regulating active coal mines, a second program for reclaiming abandoned mine lands and the Office of Surface Mining, an agency within the Department of the Interior, to promulgate regulations, to fund state regulatory and reclamation efforts, and to ensure consistency among state regulatory programs. 05.02

### **Toxic Substances Control Act**

The act was enacted by Congress to give EPA the ability to track the 75,000 industrial chemicals currently produced or imported into the United States. EPA repeatedly screens these chemicals and can require reporting or testing of those that may pose an environmental or human-health hazard. EPA can ban the manufacture and import of those chemicals that pose an unreasonable risk.

Also, EPA has mechanisms in place to track the thousands of new chemicals that industry develops each year with either unknown or dangerous characteristics. EPA then can control these chemicals as necessary to protect human health and the environment. 09.03

### **Wild and Scenic Rivers Act (1968)**

Selected rivers in the United States are preserved for possessing outstandingly, remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. Rivers, or sections of rivers, so designated are preserved in their free-flowing condition and are not dammed or otherwise improved.

Designation as a wild and scenic river is not the same as designation as a national park, and does not generally does not confer the same level of protection as a Wilderness Area designation. Instead of enacting strict and mandatory conservation measures, the goal is often to preserve the character of a river. 01.02, 01.03, 02.04



**Wilderness Act (1964)**

To preserve large expanses of pristine lands. 01.02, 02.04

**Public Rangelands Improvement Act**

This act requires the United States Forest Service (USFS) and Bureau of Land Management (BLM) to develop management guidelines for public lands. 01.03

**Coastal Zone Management Act**

This act establishes marine sanctuaries in the United States to protect the habitat of marine animals and plants from pollution and development. 01.03