

Name:
Period:

Date:
AP Environmental Science

APES Abridged

1. **Ionizing radiation**: enough energy to knock electrons from atoms forming ions, capable of causing cancer (gamma, X-rays, UV)
2. **High Quality Energy**: organized & concentrated, can perform useful work (fossil fuel & nuclear)
3. **Low Quality Energy**: disorganized, dispersed (heat in ocean or air wind, solar)
4. **First Law of Thermodynamics**: energy is neither created nor destroyed, but may be converted from one form to another
5. **Second Law of Thermodynamics**: when energy is changed from one form to another, some useful energy is always degraded into lower quality energy (usually heat)
6. **Natural radioactive decay**: unstable radioisotopes decay releasing gamma rays, alpha & beta particles
7. **Half life**: the time it takes for $\frac{1}{2}$ the mass of a radioisotope to decay
8. **Estimate of how long a radioactive isotope must be stored until it decays to a safe level**: approximately half-lives
9. **Nuclear Fission**: nuclei of isotopes split apart when struck by neutrons
10. **Nuclear Fusion**: 2 isotopes of light elements (H) forced together at high temperatures till they fuse to form a heavier nucleus. Expensive, break even point not reached yet
11. **Ore**: a rock that contains a large enough concentration of a mineral making it profitable to mine
12. **Organic fertilizer**: slow acting & long lasting because the organic remains need time to be decomposed
13. **Best solution to Energy shortage**: conservation and increase efficiency
14. **Surface mining**: cheaper & can remove more mineral, less hazardous to workers
15. **Humus**: organic, dark material remaining after decomposition by microorganisms
16. **Leaching**: removal of dissolved materials from soil by water moving downwards
17. **Illuviation**: deposit of leached material in lower soil layers (B)
18. **Loam**: perfect agricultural soil with equal portions of sand, silt, clay
19. **Conservation**: allows the use of resources in a responsible manner
20. **Preservation**: setting aside areas & protecting them from human activities
21. **Parts of the hydrologic cycle**: evaporation, transpiration, runoff, condensation, precipitation, infiltration
22. **Aquifer**: any water bearing layer in the ground
23. **Cone of depression**: lowering of the water table around a pumping well
24. **Salt water intrusion**: near the coast, overpumping of groundwater causes saltwater to move into the aquifer
25. **ENSO**: El Nino Southern Oscillation, see-sawing of air pressure over the S. Pacific
26. **During an El Nino year**: trade winds weaken & warm water sloshed back to SA
27. **During a Non El Nino year**: Easterly trade winds and ocean currents pool warm water in the western Pacific, allowing upwelling of nutrient rich water off the West coast of South America

28. **Effects of El Nino**: upwelling decreases disrupting food chains, N US has mild winters, SW US has increased rainfall, less Atlantic Hurricanes
29. **Nitrogen fixing**: because atmospheric N cannot be used directly by plants it must first be converted into ammonia by bacteria (rhizobium)
30. **Ammonification**: decomposers convert organic waste into ammonia
31. **Nitrification**: ammonia is converted to nitrate ions (NO_3^-)
32. **Assimilation**: inorganic N is converted into organic molecules such as DNA/amino acids & proteins
33. **Denitrification**: bacteria convert ammonia back into N
34. **Phosphorus does not circulate as easily as N because**: it does not exist as a gas, but is released by weathering of phosphate rocks
35. **Sustainability**: the ability to meet humanity's current needs without compromising the ability of future generations to meet their needs
36. **Excess phosphorus is added to aquatic ecosystems by**: runoff of animal wastes, fertilizer, discharge of sewage **Photosynthesis**: plants convert atmospheric C (CO_2) into complex carbohydrates (glucose $\text{C}_6\text{H}_{12}\text{O}_6$)
37. **Aerobic respiration**: oxygen consuming producers, consumers & decomposers break down complex organic compounds & convert C back into CO_2
38. **Largest reservoirs of C**: carbonate rocks first, oceans second
39. **Biotic/abiotic**: living & nonliving components of an ecosystem
40. **Producer/Autotroph**: photosynthetic life
41. **Fecal coliform/Enterococcus**: : indicator of sewage contamination
42. **Energy flow in food webs**: only 10% of the usable energy is transferred because usable energy lost as heat (2nd law), not all biomass is digested & absorbed, predators expend energy to catch prey
43. **Chlorine**: (good>disinfection of water)(bad>forms trihalomethanes)
44. **Primary succession**: development of communities in a lifeless area not previously inhabited by life (lava)
45. **Secondary succession**: life progresses where soil remains (clear cut forest, fire)
46. **Cogeneration**: using waste heat to make electricity
47. **Mutualism**: symbiotic relationship where both partners benefit
48. **Commensalism**: symbiotic relationship where one partner benefits & the other is unaffected
49. **Parasitism**: relationship in which one partner obtains nutrients at the expense of the host
50. **Biome**: large distinct terrestrial region having similar climate, soil, plants & animals
51. **Carrying capacity**: the number of individuals that can be sustained in an area
52. **R strategist**: reproduce early, many small unprotected offspring
53. **K strategist**: reproduce late, few, cared for offspring
54. **Positive feedback**: when a change in some condition triggers a response that intensifies the changing condition (EX: warmer Earth - snow melts - less sunlight is reflected & more is absorbed, therefore warmer earth)
55. **Natural selection**: organisms that possess favorable adaptations pass them onto the next generation

56. **Malthus**: said human population cannot continue to increase..consequences will be war, famine & disease
57. **Doubling time**: rule of 70 70 divided by the percent growth rate
58. **Replacement level fertility**: the number of children a couple must have to replace themselves (2.1 developed, 2.7 developing)
59. **World Population is**: 6 1/2 billion
60. **US Population**: 300 million
61. **Preindustrial stage**: birth & death rates high, population grows slowly, infant mortality high
62. **Transitional stage**: death rate lower, better health care, population grows fast
63. **Industrial stage**: decline in birth rate, population growth slows
64. **Postindustrial stage**: low birth & death rates
65. **Age structure diagrams**: (broad base, rapid growth)(narrow base, negative growth)(uniform shape, zero growth)
66. **1st & 2nd most populated countries**: China & India
67. **Most important thing affecting population growth**: low status of women
68. **Ways to decrease birth rate**: family planning, contraception, economic rewards & penalties
69. **Percent water on earth by type**: 97.5% seawater, 2.5% freshwater
70. **Salinization of soil**: in arid regions, water evaporates leaving salts behind
71. **Ways to conserve water**: (agriculture, drip/trickle irrigation)(industry,recycling)(home, use gray water, repair leaks, low flow fixtures)
72. **Point vs non-point sources**: (Point, from specific location such as pipe)(Non-point, from over an area such as runoff)
73. **BOD**: biological oxygen demand, amount of dissolved oxygen needed by aerobic decomposers to break down organic materials
74. **Eutrophication**: rapid algal growth caused by an excess of N & P
75. **Hypoxia**: when aquatic plants die, the BOD rises as aerobic decomposers break down the plants, the DO drops & the water cannot support life
76. **Minamata Disease**: mental impairments caused by mercury
77. **Primary air pollutants**: produced by humans & nature (CO,CO₂,SO₂,NO,hydrocarbons, particulates)
78. **Negative feedback**: when a changing in some condition triggers a response that counteracts the changed condition (EX: warmer earth - more ocean evaporation - more stratus clouds - less sunlight reaches the ground - therefore cooler Earth)
79. **Particulate matter (source,effect,reduction)**: (burning fossil fuels & diesel exhaust) (reduces visibility & respiratory irritation) (filtering, electrostatic precipitators, alternative energy)
80. **Nitrogen Oxides**: (**Source**: auto exhaust) (**Effects**: acidification of lakes, respiratory irritation, leads to smog & ozone) (**Equation for acid formation**: $\text{NO} + \text{O}_2 = \text{NO}_2 + \text{H}_2\text{O} = \text{HNO}_3$) (**Reduction**: catalytic converter)
81. **Sulfur oxides**: (**Source**: coal burning) (**Effects**: acid deposition, respiratory irritation, damages plants) (**Equation for acid formation**: $\text{SO}_2 + \text{O}_2 = \text{SO}_3 + \text{H}_2\text{O} = \text{H}_2\text{SO}_4$) (**Reduction**: scrubbers, burn low sulfur fuel)

82. **Carbon oxides:** (**Source:** auto exhaust, incomplete combustion) (**Effects:** CO binds to hemoglobin reducing blood's ability to carry O, CO₂ contributes to global warming) (**Reduction:** catalytic converter, emission testing, oxygenated fuel, mass transit)
83. **Ozone:** (**Formation:** secondary pollutant, NO₂+UV=NO+O O+O₂=O₃, with VOC's) (**Effects:** respiratory irritant, plant damage) (**Reduction:** reduce NO emissions & VOCs)
84. **Radon:** radioactive gas, formed from the decay of Uranium, causes lung cancer and is a problem in the Reading Prong
85. **Photochemical smog:** formed by chemical reactions involving sunlight (NO, VOC,O)
86. **Acid deposition:** caused by sulfuric and nitric acids resulting in lowered pH of surface waters
87. **Greenhouse gases:** (**Examples:** H₂O, CO₂, O₃, methane (CH₄), CFC's) (**EFFECT:** they trap outgoing infrared (heat) energy causing earth to warm)
88. **Effects of global warming:** rising sealevel (thermal expansion), extreme weather, droughts (famine), extinctions
89. **Ozone depletion caused by:** CFC's, methyl chloroform, carbon tetrachloride, halon, methyl bromide all of which attack stratospheric ozone
90. **Effects of ozone depletion:** increased UV, skin cancer, cataracts, decreased plant growth
91. **Love Canal, NY:** chemicals buried in old canal and school & homes built over it causing birth defects & cancer
92. **Municipal solid waste is mostly:** paper and most is landfilled
93. **True cost / External costs:** harmful environmental side effects that are not reflected in a products price
94. **Sanitary landfill problems and solutions:** (leachate, liner with collection system) (methane gas, collect gas and burn) (volume of garbage, compact & reduce)
95. **Incineration advantages:** volume of waste reduced by 90% & waste heat can be used
96. **Incineration disadvantages:** toxic emissions (polyvinyl chloride—dioxin), scrubbers & electrostatic precipitators needed, ash disposal (contains heavy metals)
97. **Best way to solve waste problem:** reduce the amounts of waste at the source
98. **Keystone species:** species whose role in an ecosystem are more important than others, ex sea otter
99. **Indicator species:** species that serve as early warnings that an ecosystem is being damaged ex trout
100. **Most endangered species:** have a small range, require large territory or live on an island
101. **In natural ecosystems, 50-90% of pest species are kept under control by:** predators, diseases, parasites
102. **Major insecticide groups and examples:** (chlorinated hydrocarbons, DDT) (organophosphates, malathion) (carbamates, aldicarb)
103. **Pesticide pros:** saves lives from insect transmitted disease, increases food supply, increases profits forfarmers
104. **Pesticide cons:** genetic resistance, ecosystem imbalance, pesticide treadmill, persistence, bioaccumulation, biological magnification
105. **Natural pest control:** better agricultural practices, genetically resistant plants, natural enemies, biopesticides, sex attractants

106. **Electricity is generated by:** using steam (from water boiled by fossil fuels or nuclear) or falling water to turn a generator
107. **Petroleum forms from:** microscopic aquatic organisms in sediments converted by heat & pressure into a mixture of hydrocarbons
108. **Pros of petroleum:** cheap, easily transported, high quality energy
109. **Cons of petroleum:** reserves depleted soon, pollution during drilling, transport and refining, burning makes CO₂
110. **Steps in coal formation:** peat, lignite, bituminous, anthracite
111. **Major parts of a nuclear reactor:** core, control rods, steam generator, turbine, containment building
112. **Two most serious nuclear accidents:** (Chernobyl, Ukraine) (Three Mile Island, PA)
113. **Alternate energy sources:** wind, solar, waves, biomass, geothermal, fuel cells
114. **LD50:** the amount of a chemical that kills 50% of the animals in a test population
115. **Mutagen, Teratogen, Carcinogen:** causes hereditary changes, Fetus deformities, cancer
116. **Endangered species:** North spotted Owl (loss of old growth forest), Bald Eagle (thinning of eggs caused by DDT), Piping Plover (nesting areas threatened by development)
117. **LI Exotic species:** gypsy moth, Asian Longhorned Beetle
118. **Garret Hardin & The Tragedy of the Commons:** Freedom to breed is bringing ruin to all. Global commons such as atmosphere & oceans are used by all and owned by none
119. **Volcanoes and Earthquakes occur:** at plate boundaries (divergent, spreading, mid-ocean ridges) (convergent, trenches) (transform, sliding, San Andreas)
120. **Sources of mercury:** burning coal, Compact Fluorescent bulbs
121. **Major source of sulfur:** burning coal
122. **Threshold dose:** the maximum dose that has no measurable effect

LAWS, LAWS & MORE LAWS

MINING

1. **Surface Mining Control & Reclamation Act:** requires coal strip mines to reclaim the land
2. **Madrid Protocol:** Moratorium on mineral exploration for 50 years in Antarctica

WATER

3. **Safe Drinking Water Act:** set maximum contaminant levels for pollutants in drinking water that may have adverse effects on human health
4. **Clean Water Act:** set maximum permissible amounts of water pollutants that can be discharged into waterways..aim to make surface waters swimmable and fishable
5. **Ocean Dumping Ban Act:** bans ocean dumping of sewage sludge & industrial waste in the ocean

AIR

6. **Clean Air Act:** Set emission standards for cars, and limits for release of air pollutants
7. **Kyoto Protocol:** controlling global warming by setting greenhouse gas emissions targets for developed countries
8. **Montreal Protocol:** phaseout of ozone depleting substances

WASTE

9. **Resource Conservation & Recovery Act:** controls hazardous waste with a cradle to grave system
10. **Comprehensive Environmental Response, Compensation & Liability Act:** Superfund, designed to identify and clean up abandoned hazardous waste dump sites
11. **Nuclear Waste Policy Act:** US government must develop a high level nuclear waste site (Yucca Mtn)

LIFE

12. **Endangered Species Act:** identifies threatened and endangered species in the US, and puts their protection ahead of economic considerations
13. **Convention on International Trade in Endangered Species:** lists species that cannot be commercially traded as live specimens or wildlife products
14. **Magnuson- Stevens Act:** Management of marine fisheries
15. **Food Quality Protection Act:** set pesticide limits in food, & all active and inactive ingredients must be screened for estrogenic/endocrine effects

GENERAL

16. **National Environmental Policy Act:** Environmental Impact Statements must be done before any project affecting federal lands can be started
17. **Stockholm Convention on Persistent Organic Pollutants:** Seeks to protect human health from the 12 most toxic chemicals (includes 8 chlorinated hydrocarbon pesticides / DDT can be used for malaria control)