

## APES REVIEW

### 118 WAYS TO GO APE

PUT THESE FACTS ON INDEX CARDS. THE RED GOES ON ONE SIDE, THE BLACK ON THE OTHER. WHEN I APPROACH YOU, I WILL SAY WHAT IS IN RED. YOU HAVE A SECOND OR LESS TO REPLY WITH WHAT IS IN BLACK. GOOD LUCK & MAY THE FORCE BE WITH YOU!

1. **Ionizing radiation**: enough energy to knock electrons from atoms forming ions, capable of causing cancer (gamma-Xrays-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 10 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  
**Preservation**: setting aside areas & protecting them from human activities
20. **Parts of the hydrologic cycle**: evaporation, transpiration, runoff, condensation, precipitation, infiltration
21. **Aquifer**: any water bearing layer in the ground
22. **Cone of depression**: lowering of the water table around a pumping well
23. **Salt water intrusion**: near the coast, overpumping of groundwater causes saltwater to move into the aquifer
24. **ENSO**: El Nino Southern Oscillation, see-sawing of air pressure over the S. Pacific
25. **During an El Nino year**: trade winds weaken & warm water sloshed back to SA  
**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
26. **Effects of El Nino**: upwelling decreases disrupting food chains, N US has mild winters, SW US has increased rainfall, less Atlantic Hurricanes
27. **Nitrogen fixing**: because atmospheric N cannot be used directly by plants it must first be converted into ammonia by bacteria (rhizobium)
28. **Ammonification**: decomposers covert organic waste into ammonia
29. **Nitrification**: ammonia is converted to nitrate ions (NO<sub>3</sub>)
30. **Assimilation**: inorganic N is converted into organic molecules such as DNA/amino acids & proteins
31. **Denitrification**: bacteria convert ammonia back into N
32. **Phosphorus does not circulate as easily as N because**: it does not exist as a gas, but is released by weathering of phosphate rocks
33. **Sustainability**: the ability to meet humanities current needs without compromising the ability of future generations to meet their needs
34. **Excess phosphorus is added to aquatic ecosystems by**: runoff of animal wastes, fertilizer, discharge of sewage
35. **Photosynthesis**: plants convert atmospheric C (CO<sub>2</sub>) into complex carbohydrates (glucose C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>)
36. **Aerobic respiration**: oxygen consuming producers, consumers & decomposers break down complex organic compounds & convert C back into CO<sub>2</sub>
37. **Largest reservoirs of C**: carbonate rocks first, oceans second
38. **Biotic/abiotic**: living & nonliving components of an ecosystem
39. **Producer/Autotroph**: photosynthetic life
40. **Fecal coliform/Enterococcus**: : indicator of sewage contamination
41. **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

42. **Chlorine:** (good>disinfection of water)( bad>forms trihalomethanes)

43. **Primary succession:** development of communities in a lifeless area not previously inhabited by life (lava)

**Secondary succession:** life progresses where soil remains (clear cut forest, fire)

44. **Cogeneration:** using waste heat to make electricity

45. **Mutualism:** symbiotic relationship where both partners benefit

46. **Commensalism:** symbiotic relationship where one partner benefits & the other is unaffected

47. **Parasitism:** relationship in which one partner obtains nutrients at the expense of the host

48. **Biome:** large distinct terrestrial region having similar climate, soil, plants & animals

49. **Carrying capacity:** the number of individuals that can be sustained in an area

50. **R strategist:** reproduce early, many small unprotected offspring

**K strategist:** reproduce late, few, cared for offspring

51. **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)

52. **Natural selection:** organisms that possess favorable adaptations pass them onto the next generation

53. **Malthus:** said human population cannot continue to increase..consequences will be war, famine & disease

54. **Doubling time:** rule of 70 70 divided by the percent growth rate

55. **Replacement level fertility:** the number of children a couple must have to replace themselves (2.1 developed, 2.7 developing)

56. **World Population is:** 6 1/2 billion

**US Population:** 300 million

57. **Preindustrial stage:** birth & death rates high, population grows slowly, infant mortality high

58. **Transitional stage:** death rate lower, better health care, population grows fast

59. **Industrial stage:** decline in birth rate, population growth slows

60. **Postindustrial stage:** low birth & death rates

61. **Age structure diagrams:** (broad base, rapid growth)(narrow base, negative growth)(uniform shape, zero growth)

62. **1st & 2nd most populated countries:** China & India

63. **Most important thing affecting population growth:** low status of women

64. **Ways to decrease birth rate:** family planning, contraception, economic rewards & penalties

65. **Percent water on earth by type:** 97.5% seawater, 2.5% freshwater

66. **Salinization of soil:** in arid regions, water evaporates leaving salts behind

67. **Ways to conserve water:** (agriculture, drip/trickle irrigation)(industry,recycling)(home, use gray water, repair leaks, low flow fixtures)

68. **Point vs non point sources:** (Point, from specific location such as pipe)(Non-point, from over an area such as runoff)

69. **BOD:** biological oxygen demand, amount of dissolved oxygen needed by aerobic decomposers to break down organic materials

70. **Eutrophication:** rapid algal growth caused by an excess of N & P

71. **Hypoxia:** when aquatic plants die, the BOD rises as aerobic decomposers break down the plants, the DO drops & the water cannot support life

72. **Minamata Disease:** mental impairments caused by mercury

73. **Primary air pollutants:** produced by humans & nature (CO,CO<sub>2</sub>,SO<sub>2</sub>,NO,hydrocarbons, particulates)

74. **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)

75. **Particulate matter (source,effect,reduction):** (burning fossil fuels & diesel exhaust) (reduces visibility & respiratory irritation) (filtering, electrostatic precipitators, alternative energy)

76. **Nitrogen Oxides:** (Source: auto exhaust) (Effects: acidification of lakes, respiratory irritation, leads to smog & ozone) (Equation for acid formation: NO + O<sub>2</sub> = NO<sub>2</sub> + H<sub>2</sub>O = HNO<sub>3</sub>) (Reduction: catalytic converter)

77. **Sulfur oxides:** (Source: coal burning) (Effects: acid deposition, respiratory irritation, damages plants) (Equation for acid formation: SO<sub>2</sub> + O<sub>2</sub> = SO<sub>3</sub> + H<sub>2</sub>O = H<sub>2</sub>SO<sub>4</sub>) (Reduction: scrubbers, burn low sulfur fuel)

78. **Carbon oxides:** (Source: auto exhaust, incomplete combustion) (Effects: CO binds to hemoglobin reducing bloods ability to carry O, CO<sub>2</sub> contributes to global warming) (Reduction: catalytic converter, emission testing, oxygenated fuel, mass transit)

79. **Ozone:** (Formation: secondary pollutant, NO<sub>2</sub>+UV=NO+O O+O<sub>2</sub>=O<sub>3</sub>, with VOC's) (Effects: respiratory irritant, plant damage) (Reduction: reduce NO emissions & VOCs)

80. **Radon:** radioactive gas, formed from the decay of Uranium, causes lung cancer and is a problem in the Reading Prong

81. **Photochemical smog:** formed by chemical reactions involving sunlight (NO, VOC,O)

82. **Acid deposition:** caused by sulfuric and nitric acids resulting in lowered pH of surface waters

83. **Greenhouse gases:** (Examples: H<sub>2</sub>O, CO<sub>2</sub>, O<sub>3</sub>, methane (CH<sub>4</sub>), CFC's) (EFFECT: they trap outgoing infrared (heat) energy causing earth to warm

84. **Effects of global warming:** rising sealevel (thermal expansion), extreme weather, droughts (famine), extinctions

85. **Ozone depletion caused by:** CFC's, methyl chloroform, carbon tetrachloride, halon, methyl bromide all of which attack stratospheric ozone

86. **Effects of ozone depletion:** increased UV, skin cancer, cataracts, decreased plant growth
87. **Love Canal, NY:** chemicals buried in old canal and school & homes built over it causing birth defects & cancer
88. **Municipal solid waste is mostly:** paper and most is landfilled
89. **True cost / External costs:** harmful environmental side effects that are not reflected in a products price
90. **Sanitary landfill problems and solutions:** (leachate, liner with collection system) (methane gas, collect gas and burn) (volume of garbage, compact & reduce)
91. **Incineration advantages:** volume of waste reduced by 90% & waste heat can be used
92. **Incineration disadvantages:** toxic emissions (polyvinyl chloride—dioxin), scrubbers & electrostatic precipitators needed, ash disposal (contains heavy metals)
93. **Best way to solve waste problem:** reduce the amounts of waste at the source
94. **Keystone species:** species whose role in an ecosystem are more important than others, ex sea otter
95. **Indicator species:** species that serve as early warnings that an ecosystem is being damaged ex trout
96. **Most endangered species:** have a small range, require large territory or live on an island
97. **In natural ecosystems, 50-90% of pest species are kept under control by:** predators, diseases, parasites
98. **Major insecticide groups and examples:** (chlorinated hydrocarbons, DDT) (organophosphates, malathion) (carbamates, aldicarb)
99. **Pesticide pros:** saves lives from insect transmitted disease, increases food supply, increases profits for farmers
100. **Pesticide cons:** genetic resistance, ecosystem imbalance, pesticide treadmill, persistence, bioaccumulation, biological magnification
101. **Natural pest control:** better agricultural practices, genetically resistant plants, natural enemies, biopesticides, sex attractants
102. **Electricity is generated by:** using steam (from water boiled by fossils fuels or nuclear) or falling water to turn a generator
103. **Petroleum forms from:** microscopic aquatic organisms in sediments converted by heat & pressure into a mixture of hydrocarbons
104. **Pros of petroleum:** cheap, easily transported, high quality energy
105. **Cons of petroleum:** reserves depleted soon, pollution during drilling, transport and refining, burning makes CO<sub>2</sub>
106. **Steps in coal formation:** peat, lignite, bituminous, anthracite
107. **Major parts of a nuclear reactor:** core, control rods, steam generator, turbine, containment building
108. **Two most serious nuclear accidents:** (Chernobyl, Ukraine) (Three Mile Island, PA)
109. **Alternate energy sources:** wind, solar, waves, biomass, geothermal, fuel cells
110. **LD50:** the amount of a chemical that kills 50% of the animals in a test population
111. **Mutagen, Teratogen, Carcinogen:** causes hereditary changes, Fetus deformities, cancer
112. **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)
113. **LI Exotic species:** gypsy moth, Asian Long Horned Beetle
114. **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
115. **Volcanoes and Earthquakes occur:** at plate boundaries (divergent, spreading, mid-ocean ridges) (convergent, trenches) (transform, sliding, San Andreas)
116. **Sources of mercury:** burning coal, Compact Fluorescent bulbs
117. **Major source of sulfur:** burning coal
118. **Threshold dose:** the maximum dose that has no measurable effect

**LAWS, LAWS & MORE LAWS** As an added bonus, recite the entire 17 laws by memory and earn 10 point on your 4th quarter average. I grouped them by topic to help you.

### 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)