**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 ½ 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 acquifer**   
**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-3)**   
**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 (CO2) into complex carbohydrates (glucose C6H12O6)**   
**36. Aerobic respiration: oxygen consuming producers, consumers & decomposers break down complex organic compounds & convert C back into CO2**   
**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. Salinazation of soil: in arid regions, water evaporates leaving salts behind**   
**67. Ways to conserve water: (agriculture, drip/trickle irrigation)(industry,recyling)(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,CO2,SO2,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 + O2 = NO2 + H2O = HNO3) (Reduction: catalytic converter)**   
**77. Sulfur oxides: (Source: coal burning) (Effects: acid deposition, respiratory irritation, damages plants) (Equation for acid formation: SO2 + O2 = SO3 + H2O = H2SO4) (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, CO2 contributes to global warming) (Reduction: catalytic converter, emission testing, oxygenated fuel, mass transit)**   
**79. Ozone: (Formation: secondary pollutant, NO2+UV=NO+O  O+O2=O3, 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: H2O, CO2, O3, methane (CH4), 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. Municpal 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 CO2**   
**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: Mangagement 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)**