

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 (GAIA) 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 convert organic waste into ammonia
29. **Nitrification**: ammonia is converted to nitrate ions (NO₃)
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. **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,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. **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 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

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)