APES Review Worksheet

Modified from a document created by David Hong

1. Use the axes to the right for the following:
   a. Draw and label a line that represents linear growth.
   b. Draw and label a line that represents exponential growth.

2. List the four most populated countries in the world.
   (1) _____ (3) _____
   (2) _____ (4) _____
3. Define the term ecological footprint

_____

_____

_____

4. Write an equation for the rule of 70: _____
5. Perform the following calculations: (Show all of your work in a logical progression to the final answer.)
   a. A city has a population of 50,000 in 2012. If the population of the city grows at an annual rate of 2%, the year in which the population will reach 100,000 is _____ and the year it will reach 200,000 is _____.

   Show work:

   b. A country's population was 12 million in 1992 and in 2012 it is 24 million. If the population grew at a constant rate, that percent rate of growth was _____.

   Show work:

6. Complete the following table by writing "high" or "low" in each box below.

Characteristic	More Economically Developed Counties (MEDCs)	Less Economically Developed Countries (LEDCs)
per capita GDP		
degree of industrialization		
infant mortality rate		
per capita fossil fuel use		
ecological footprint		
greenhouse gas emissions		
risk from heart disease		
risk from infectious diseases		

7. Identify three examples of renewable resources and three examples of nonrenewable resources.

   Renewable: (1) _____ (2) _____ (3) _____

   Nonrenewable: (1) _____ (2) _____ (3) _____

8. Define the following:
   a. total fertility rate _____
   b. replacement level fertility _____
   c. infant mortality rate _____
   d. crude birth rate _____
   e. crude death rate _____
9. Describe the circumstances that will result in a Tragedy of the Commons.

_____

_____

_____

_____

10. Describe an example of a Tragedy of the Commons.

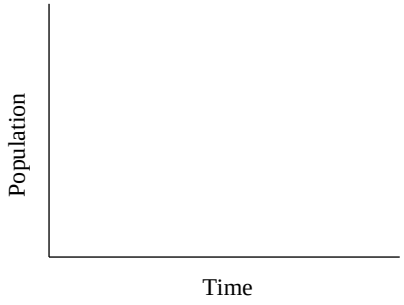
_____

_____

_____

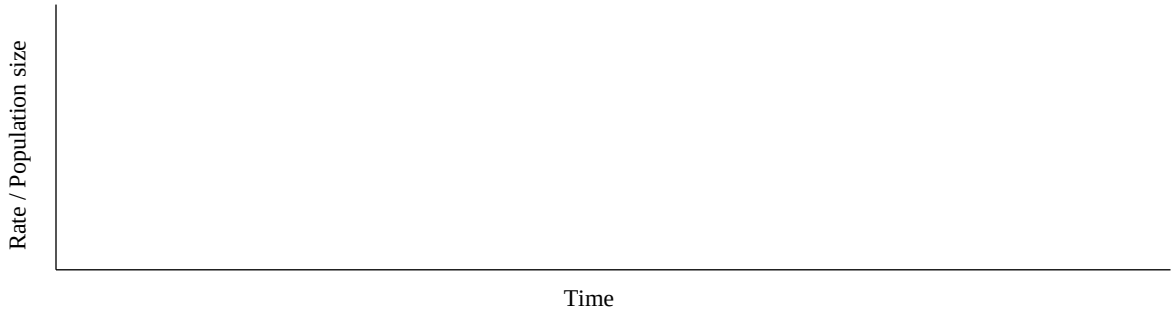
_____

11. On the axes to the right, draw a line showing a population that exemplifies logistic growth. (s-curve) and label the carrying capacity.
12. Perform the following calculation. Show all of your work. In a particular year a population has the following characteristics: the crude birth rate is 45, the crude death rate is 20, the immigration rate is 1%, and the emigration rate is 0.5%. The percent rate of growth for that year is _____.
Show work:



13. Describe an example of a positive feedback loop.

14. Use the axes below to draw and label lines representing the birth rate, death rate and total population size during the idealized demographic transition of a country. Include, written directly onto the graph, an explanation for each change in the birth rate, death rate and total population size.



15. On the axes below, draw and completely label four age-structure diagrams that represent slow growth, rapid growth, negative growth, and zero population growth (include labels on the x- and y-axes)

16. Describe an example of a negative feedback loop.

17. Arrange the following types of electromagnetic radiation in order from lowest to highest energy: **Ultraviolet**, **Microwave**, **Infrared**, **Gamma**, **Radio**, **X-ray**, **Visible**.

_____ _____ _____ _____ _____ _____ _____

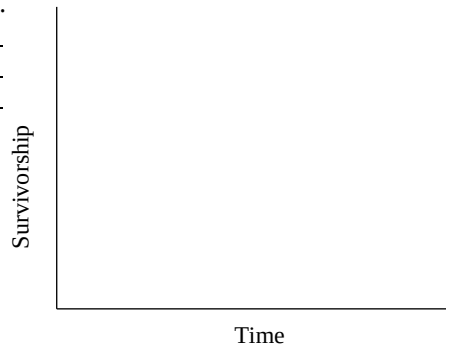
18. List the following types of visible light in order from shortest to longest wavelength: **Green**, **Orange**, **Red**, **Yellow**, **Blue**, **Violet**.

_____ _____ _____ _____ _____ _____

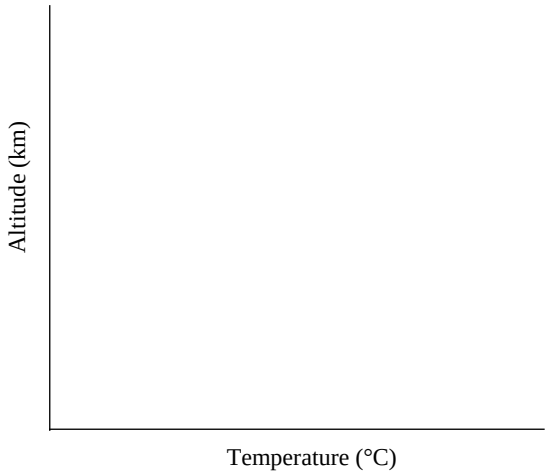
19. Identify three examples organic compounds and three examples of inorganic compounds.

Organic:	(1) _____		Inorganic:	(1) _____
	(2) _____			(2) _____
	(3) _____			(3) _____

20. Using the axes on the right, draw and label three survivorship curves exemplifying early-loss, late loss, and constant-loss species.



21. List three consequences of global warming.
    (1) _____
    (2) _____
    (3) _____
22. List three things you could do to decrease your contribution to global warming.
    (1) _____
    (2) _____
    (3) _____
23. List four greenhouse gases.
    (1) _____ (3) _____
    (2) _____ (4) _____
24. Use the axes to the right for the following:
    a. Draw a line representing the Earth's atmosphere.
    b. Label each layer of the Earth's atmosphere and identify where the greenhouse effect occurs and the ozone layer is situated.
25. Humans began agriculture approximately _____ years ago.
26. A man-made product is also known as _____.
27. The molecular formula of ozone is _____.
28. In the box below, write out a series of chemical equations that illustrate the destruction of the ozone in the ozone layer.



29. The acronym HCFC refers to _____ _____ _____ _____, which is:

    _____

    _____

30. Identify three examples of biotic components of an ecosystem and three examples of abiotic components of an ecosystem.

Biotic:		Abiotic:	
(1)	_____	(1)	_____
(2)	_____	(2)	_____
(3)	_____	(3)	_____

31. Complete the following table for these biogeochemical cycles:

Trait	Carbon	Nitrogen	Phosphorus	Water
Importance to life				
Largest reservoir				
Methods of transport				
Cycle duration (long/short)				

32. Write the balanced chemical equation for photosynthesis in the box on the right.
33. The approximate age of the Earth is _____ years.
34. Write the balanced chemical equation for cellular respiration in the box on the right.

Photosynthesis:

Cellular Respiration:

35. Match the following:

a.	generalist species	____	Zebra mussel
b.	specialist species	____	Galapagos tortoise
c.	invasive species	____	American Alligator
d.	keystone species	____	Tiger salamander
e.	indicator species	____	Norway rat
f.	endemic Species	____	Giant Panda

36. Define the term biodiversity.

    _____

    _____

37. Define the term biome.

    _____

    _____

38. What determines the type of biome an area will have?

    _____

    _____

39. Sketch and/or label the following on the map of the world below:
    a. the equator
    b. the tropic of Cancer and the tropic of Capricorn
    c. the Ogallala Aquifer
    d. the Mid-Atlantic Ridge
    e. the location of suppressed upwelling characteristic of the occurrence of El Niño
    f. the location of China, India, Ethiopia, Brazil, Bangladesh, and Fremont

40. Complete the following table:

Type of Biome	Typical Location	Typical Climate	Characteristic adaptations for survival
Tropical Rain Forest			Plants – Animals –
Temperate Deciduous Forest			Plants – Animals –
Taiga (Boreal) Forest			Plants – Animals –
Tropical Grasslands (Savanna)			Plants – Animals –
Temperate Grassland (Prairie)			Plants – Animals –
Tundra (Cold Grassland)			Plants – Animals –
Desert			Plants – Animals –

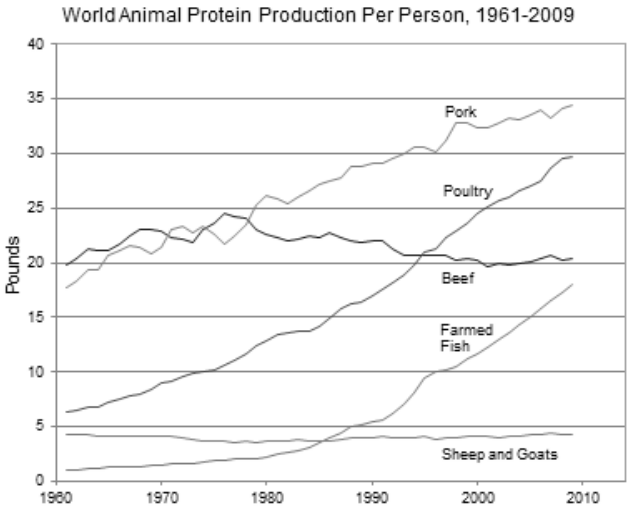
41. Describe the circumstances that will result in cultural eutrophication.

42. Explain the increasing concentration of carbon dioxide in the atmosphere leads to ocean acidification.

43. Name the following:

NO	_____	NO_2	_____
NO_2^-	_____	NO_3^-	_____
NO_2	_____	N_2O	_____
N_2	_____	NH_3	_____
NH_4^+	_____	HNO_3	_____
NO_x	_____		

44. In the box to the right, sketch a house and the surroundings of a house that is designed to make the greatest use of passive solar energy in the northern hemisphere. Include, inside the box, the location of both the winter and summer sun, and labels to indicate the compass direction that the house faces.



45. Use the information in the diagram on the left, to answer the following:
    a. The percent change in the per capita global production of protein from poultry between 1980 and 2000 was approximately _____.
    b. The percent change in the per capita global production of protein from farmed fish between 1980 and 2000 was approximately _____.
    c. The percent change in the per capita global production of protein from beef between 1961 and 2009 was approximately _____.
46. The founder of the Sierra Club was _____ _____.
47. Rachel Carson wrote the book _____ _____to raise people's awareness of the harmful effects of the pesticide _____.
48. The acronym ENSO refers to _____ _____ _____ _____, a phenomenon that occurs in the _____ Ocean.
49. Place the following nine events in chronological order, beginning with the most recent: the oil spill of the **Exxon Valdez**; the meltdown of the reactor at **Chernobyl**; the explosion of the **Deepwater Horizon**; the discovery of contamination at **Love Canal**; The first **Earth Day**; the leak of methyl isocyanate in **Bhopal**; the drafting of the **Kyoto Protocol**; the ratification of the **Montreal Protocol**, passage of the **US Endangered Species Act**.

(1) _____	(4) _____	(7) _____
(2) _____	(5) _____	(8) _____
(3) _____	(6) _____	(9) _____

50. Strengthen this weak statement: "Fossil fuel use releases carbon dioxide, which causes the greenhouse effect."

_____
_____
_____
_____

51. The acronym BOD refers to _____ _____ _____, which is:

_____
_____

52. The acronym GMO refers to _____ _____ _____, which is:

_____
_____

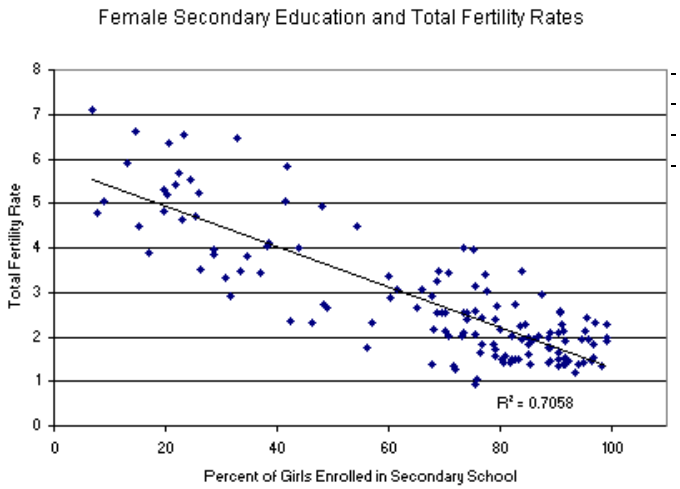
53. Perform the following calculation. Show all of your work. If the grasses on a 100-hectare area of grassland grow at an average rate of 1 cm/day, the average volume of grass that is added to the grassland each day is _____ m^3. If the density of the grasses that grow in the grassland averages 400 kg/m^3, the net primary productivity is approximately _____ g/m^2/day or _____ g/m^2/year.

Show work:

54. Strengthen this weak statement: "Protecting endangered species like the Giant Panda costs too much and should be stopped."

55. Perform the following calculation. Show all of your work. A 40 m^2 solar array is installed on a house where the average insolation is 6 kWh/m^2/day if the average total electricity output of the array is 1.2 kWh/hr; the efficiency of the array is _____.
Show work:

56. Consider the graph on the right and explain what can be inferred from the data it presents.



57. The first National Park was _____ National Park.

58. Match the ten most populous urban areas in the world with its respective continent:

a. Asia
b. N. America
c. S. America
d. Africa
e. Australia
f. Europe
g. Antarctica

____ Seoul
____ Mexico City
____ New York City
____ Mumbai
____ Jakarta
____ Sao Paulo
____ Delhi
____ Osaka/Kobe
____ Shanghai
____ Tokyo

59. Define the following…
Watershed:

Clean Air Act:

Clean Water Act:

Clean Drinking Water Act:

El Niño:

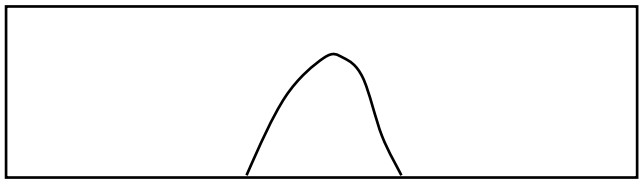
Baghouse filter

Electrostatic precipitator:

Dioxin:

60. List three sources of methane that are amplified by human activities.
(1)
(2)
(3)

61. The box to the right contains a crude depiction of a mountain, use it to sketch and label the essential atributes of a rain shadow. Include labels for the direction of the prevailing winds and nearest ocean.



62. NO_2 is converted to N_2 and O_2 in a _____ _____, which also converts _____ to _____.

63. Explain the causes of an urban heat island.

64. Perform the following calculations: (Show all of your work.)
    a. A rectangular area of forest that measures 10 thousand meters by 300 thousand meters has an area of _____ square kilometers and _____ hectares.
    Show work:

    b. A 60-Watt light bulb that is used for an average of 4 hours each day uses _____ kilowatt-hours of electricity per year.
    Show work:

65. List two characteristics of an r-selected species.
    (1) _____ (2) _____
66. List two characteristics of a K-selected species.
    (1) _____ (2) _____
67. A Pacific Yew is a/an _____ and it is endangered because of the following:
    _____
    _____
68. A Piping Plover is a/an _____ and it is endangered because of the following:
    _____
    _____
69. An Orangutan is a/an _____ and it is endangered because of the following:
    _____
    _____
70. A Dodo was a/an _____ and it is extinct because of the following:
    _____
    _____
71. Complete the following table:

Ecosystem Component	An economically valuable ecosystem services it provides
honey bee	
water cycle	
forest	
bat	
bacteria	
coral reef	
wetland	

72. A company is importing rare tropical hardwood to manufacture furniture, list three laws, regulations, treaties, or acts that the company may have violated.
    (1) _____
    (2) _____
    (3) _____
73. Whaling is justified in the name of _____ research, by the countries of _____ and _____.
74. Two islands, different distances from the mainland have different rates of extinction, this is explained by the theory of island _____.
75. _____ is a technique typically used to harvest scallops, crabs, and shrimp from the sea floor.
76. A fishing practice that is commonly used to catch large solitary species of fish and was featured in *The Perfect Storm* is _____.
77. _____% of the Earth is covered with water. Of all the water on Earth _____% of it is saltwater, _____% is frozen, and _____% is available and relatively accessible.
78. Arrange the following particles in order of smallest to largest: clay, sand, silt
    (1) _____ (2) _____ (3) _____
79. To live a healthy, active life most adults need to consume approximately _____ calories of food each day.
80. Arrange the following foods in order of highest to lowest in terms of global production: corn (maize); rice; wheat.

(1) _____ (2) _____ (3) _____

81. List four innovations that led to the Green revolution.
    (1) _____ (3) _____
    (2) _____ (4) _____
82. Match the following:

a.	anemia	____	iron deficiency
b.	goiter	____	vitamin A deficiency
c.	scurvy	____	vitamin D deficiency
d.	rickets	____	iodine deficiency
e.	blindness	____	vitamin C deficiency

83. Use the axes below to draw and label an illustration of the pesticide treadmill.

84. Explain how the biomagnification of DDT led to the (near) demise of the Bald Eagle population in the US.

    _____
    _____
    _____

85. List three things you could do to conserve water.
    (1) _____
    (2) _____
    (3) _____
86. Perform the following calculations: (Show all of your work.)
    a. A family of 5 replaces a 6-gallon/minute showerhead with a new 2-gallon/minute low-flow showerhead. If every member of the family takes one 10-minute shower per day, the family will save _____ gallons of water in one year.

    Show work:

    b. A family has a rectangular swimming pool that measures 15 feet by 20 feet. If water evaporates from the pool at a rate of 50 gallons per square foot per year and a pool cover will reduce evaporation by 90 percent, the family can save _____ gallons of water per year by using a pool cover.

    Show work:

87. Define the following:

    pH: _____
    _____

    Turbidity: _____
    _____

    Water hardness: _____
    _____

    Biological oxygen demand: _____
    _____

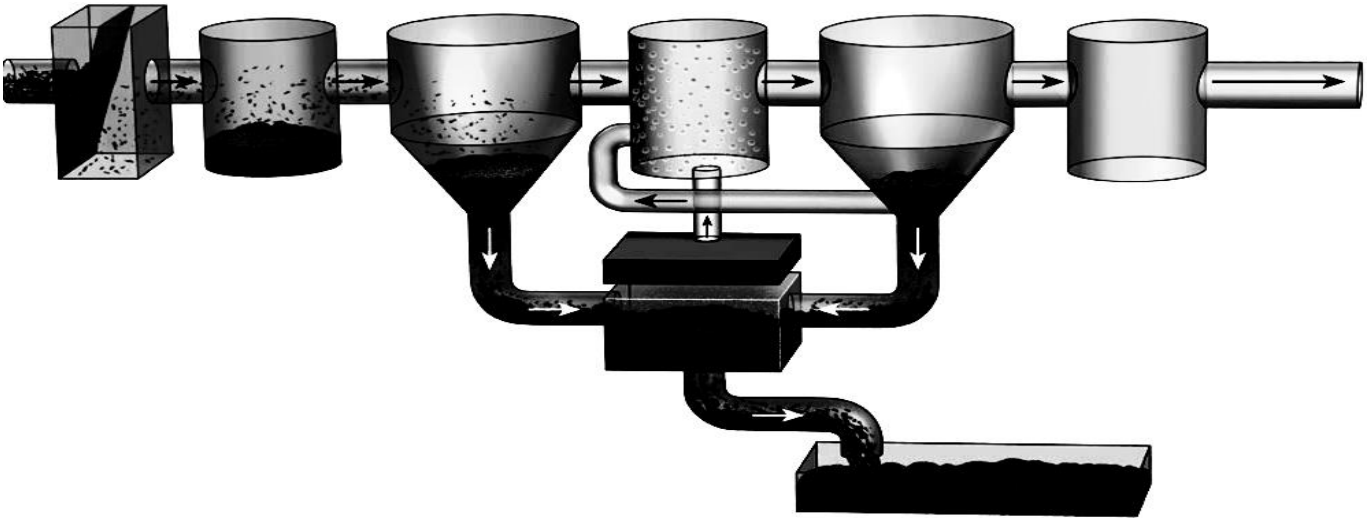
    Organic waste: _____
    _____

    Cholera: _____
    _____

    Schistosomiasis: _____
    _____

    Giardia: _____
    _____

88. Completely label the following diagram of a sewage treatment plant and list the items removed at each step.



89. In the box to the right, list the ranks of coal in order from highest to lowest energy content. (indicate the direction in the box.)

90. List three air pollutants that are emitted during the burning of coal.
(1) _____ (2) _____ (3) _____

91. List seven products that are derived primarily from crude oil:
_____ _____ _____ _____ _____ _____ _____

92. The acronym OPEC refers to _____ _____ _____ _____, which is important because:
_____
_____

93. Fracking is a common name for _____ _____ and it is a concern because…
_____
_____

94. Explain what the Deepwater Horizon was, where it went, and why it is significant.
_____
_____

95. The acronym ANWR refers to _____ _____ _____ _____, which is important because:
_____
_____

96. Perform the following calculations: (Show all of your work in a logical progression to the final answer.)
a. A family has a total of 1500 Watts of light bulbs throughout their house, if they replace them all with LED light bulbs, which use 90% less energy, the family will now use _____ Watts of electricity.
Show work:

b. A space heater operates at 1500 Watts, if it is used for 10 hours each day for one week and the cost of electricity is 20 cents per kilowatt-hour, it will cost _____ to operate the heater for the week.
Show work:

97. The acronym CAFE refers to _____ _____ _____ _____, which is important because:
_____
_____

98. List two species that may be threatened by the construction of a solar power tower in the California Desert.

(1) _____ (2) _____

99. _____ is the active element in most photovoltaic cells.

100. List four things you could do to conserve energy.

(1) _____

(2) _____

(3) _____

(4) _____

101. State where Chernobyl is located and explain what happened there.

_____

_____

_____

102. Complete the following chart.

Mining Technique	Description	Environmental consequences
Open-Pit mining		
Subsurface mining		
Strip mining		
Mountaintop removal		
Drilling		

103. Strengthen this weak statement: "Mining causes pollution that may disrupt the environment."

_____

_____

_____

_____

104. Match each of the following elements with its ore:

a. aluminum ____ galena
b. iron ____ quartz
c. uranium ____ bauxite
d. lead ____ hematite
e. silicon ____ pitchblende

105. Explain what happened at Three Mile Island, and why it is significant.

_____

_____

106. Explain how thermal pollution is produced by power plants.

_____

_____

_____

107. Explain what happened at Fukushima Daiichi and why it is significant.

_____

_____

108. Perform the following calculation. Show all of your work. A radioactive cloud may contain Iodine-131, which has a half-life of 8 days. If the waste must decay to a concentration of less than 0.1% to be considered safe, it will take approximately _____ days to reach safe levels.

Show work:

109. Perform the following calculation. (Show all of your work in a logical progression to the final answer.) A family has a 75 m^2 solar array on their house, which has an efficiency of 10%. If the average insolation on their array is 6 kWh/m^2/day and their average cost of electricity is 20 cents per kilowatt-hour, the family has the capacity to produce _____ worth of electricity daily, and _____ annually, from the sun.

Show work:

110. For each of the following substances, draw an arrow that points to an unambiguous location along the line, below, representing pH: **orange juice**; **normal rain**; **ammonia**; **lime (calcium carbonate)**; **sulfuric acid**; **acid rain**; **human blood**.

1 2 3 4 5 6 7 8 9 10 11 12 13 14

pH

111. Explain what evapotranspiration is and why it is significant.

112. What is different about growing plants hydroponically?

113. In the box below, write a series of chemical reactions that leads to the formation of tropospheric ozone in photochemical smog.

114. The acronym POP refers to _____ _____ _____ which is:

115. Explain what a watershed is and why it is significant.

116. List two environmental benefits of wetlands.
1) _____
2) _____

117. In the box to the right, draw a diagram that illustrates how electricity is produced by a dam

118. List four characteristics that will result in waste being classified as "hazardous"
1) _____ 3) _____
2) _____ 4) _____

119. Explain what an *El Niño* event is and why it is significant.

120. What is a wet scrubber and how does it work?

121. What is an electrostatic precipitator and how does it work?

122. In the box below, write a series of chemical reactions that leads to the formation of acid rain.

123. Kwashiorkor is _____

124. Marasmus is _____

125. If the cost of gas is $3.50 per gallon and the average gas mileage of a car is 25 mpg, the cost of driving the car per mile is _____ $/mi, or _____ ¢/mi.
Show work:

126. The acronym NIMBY refers to _____ _____ _____ _____ _____, which is:

127. Identify significant sources of the following air pollutants:

Formaldehyde: _____
Radon: _____
Mercury: _____
Carbon monoxide: _____
Nitrous oxide: _____

128. List three specific health effects of lead on humans.

_____

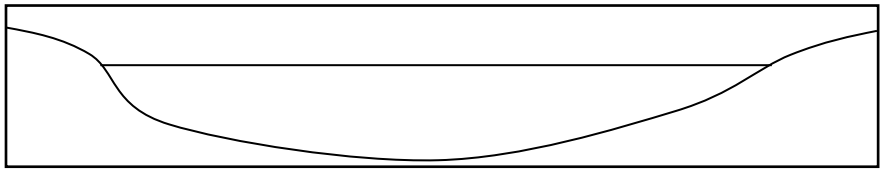
_____

129. What was the Green Revolution and why is it important?

_____

_____

130. Label the four major zones of life in the appropriate areas on the diagram representing a temperate lake in the box to the right.



131. For each of the following biomes, identify a specific country in which each biome occurs in relative abundance:

Taiga	_____	Desert	_____
Tropical rainforest	_____	Temperate grassland	_____
Tropical grassland	_____	Coral reef	_____
Temperate deciduous forest	_____	Tundra	_____

132. List three disinfectants that are commonly used to make drinking water safe during in the water treatment process.

1) _____ 2) _____ 3) _____

133. In the box below, write the chemical equation for the formation of carbonic acid from the reaction of water with carbon dioxide.

Identify two places in the environment where the above reaction occurs naturally.

1) _____
2) _____