Name _____

Water Quality

I. Water Quality Indicators

1. **Define the term water quality.**

   Water Quality - chemical, physical, biological, + radiological characteristics of water (relative to human needs or purpose)

2. **Identify what each indicator examines and the acceptable range for drinking water.**

   A. Biological Indicators

   1. Coliform Bacteria : Bacteria found in fecal contaminants
      Acceptable Range : 0 per 100 mL
   2. Ephemeroptera : Mayflies, shadflies, or fishflies (presence of immature nymphs = clean, unpolluted H_2O)
      Acceptable Range : ____
   3. *Escherichia coli* : Bacteria that can potentially cause food poisoning
      Acceptable Range : 0 per 100 mL
   4. Mollusca : Hard-shelled invertebrates (mussels, snails, etc.)
      Acceptable Range : ____
   5. Plecoptera : Stoneflies → (intolerant to water pollution)
      Acceptable Range : ____
   6. Trichoptera : Caddis flies → (bioindicators of clean water)
      Acceptable Range : ____

   B. Chemical Indicators

   1. Biochemical O_2 Demand (BOD) : Dissolved oxygen needed by organisms
      Acceptable Range : Very Good = 1-2 ppm
   2. Chemical O_2 Demand (COD) : Oxygen needed in solution reactions
      Acceptable Range : ____
   3. Dissolved O_2 (DO) : Amount of oxygen found in water
      Acceptable Range : (5.0 mg/L = stressful)(1-2 mg/L = fish kills)
   4. Hardness : Mineral content of water (calcium/magnesium)
      Acceptable Range : (Soft = 0-60 mg/L)(Hard = 121-180 mg/L)
   5. Heavy Metals : Toxic substances naturally formed
      Acceptable Range : Less than 1.3 mg/L
      (mercury, cadmium, arsenic, chromium, thalium, lead)

Name _____

6. Nitrates : Amount of NO_3^- in water (methemoglobinemia "blue-baby syndrome")

   Acceptable Range : Less than 10.0 mg/L

7. Orthophosphates : Natural fertilizer (can ↑ rates of eutrophication)

   Acceptable Range : 0.01-0.03 mg/L = uncontaminated lakes

8. Pesticides : Chemicals to control pests (plants, insects, etc.)

   Acceptable Range : Less than 0.04 mg/L

9. pH : Amount of H^+ ions (pH = 7 = neutral; >7 = base; <7 = acid)

   Acceptable Range : 6.5 - 8.5

10. Surfactants : Lower surface tension between surfaces (detergents)

   Acceptable Range : _____

C. Physical Indicators

1. Color : Clear = few samples / Blue = pure water

   Acceptable Range : Not a good quality indicator (tuna = harmle

2. Dissolved Solids : All organic or inorganic substances in liquid

   Acceptable Range : Less than 500 mg/L

3. Electrical Conductance : Ease at which electric current passes

   Acceptable Range : No set standards

μS/cm = (microsiemens per centimeter)

4. Odor : Indicator of polluted/organic water

   Acceptable Range : _____

5. Suspended Solids : Particles trapped by a filter

   Acceptable Range : _____

6. Taste : Indicator of polluted/organic water

   Acceptable Range : _____

7. Temperature : Indicator of water quality + DO levels

   Acceptable Range : _____

8. Turbidity : Cloudiness or haziness of water

   Acceptable Range : _____

II. Forms Of Freshwater Pollution

1. What percentage of the Earth is covered with water?

71 % Saltwater 97 % Freshwater 3 %

(of the 71%)

Name _____

2. Match each water pollution term with the correct definitions.

1. E.	Acid Precipitation	A. Increased temperature of a lake or stream
2. B.	Biomagnification	B. Build-up of pollutants at successive food chain levels
3. F.	Eutrophication	C. Draining away of water from the surface of land
4. D.	Groundwater Pollution	D. Pollutants released contaminate groundwater sources
5. C.	Runoff	E. Rain, sleet, or snow that contains high amounts of acid
6. A.	Thermal Pollution	F. Excessive richness of nutrients due to runoff

3. List three adverse effects of <u>each</u> type of freshwater pollution.

A. Acid Precipitation

1. Strip nutrients from foliage (dead leaves + needles)
2. Cause aluminum leaching from soils = acidification
3. Harmful to fish + wildlife

B. Biomagnification

1. Pollutants persist and consumed at unhealthy levels
2. ↑ pollutant buildup = less functional organism
3. Organisms at top food levels at greatest risk

C. Eutrophication

1. Algal blooms = blocks water sunlight
2. Bacteria levels increase
3. Oxygen levels depleted → fish kills

D. Groundwater Contamination

1. Contamination of drinking water wells
2. Toxic water in lakes, rivers, swamps, ponds
3. Caused by storage tanks, septic systems, hazardous waste, landfills, chemical + road salts

E. Runoff

1. Erosion of sediments → microinvertebrates!!
2. Eutrophication
3. Threat to downstream ecosystems (agricultural chemicals) →

F. Thermal Pollution

1. Amount of dissolved oxygen in water
2. Metabolism, growth, + reproduction of organisms
3. Biodiversity loss ; migratory disruptions