Team/School Name_____
Student Name(s)_____

REGIONAL SCIENCE OLYMPIAD
WATER QUALITY
March 3, 2001

University of Colorado at Colorado Springs (UCCS)

PLEASE PUT ALL ANSWERS DIRECTLY ON ANSWER SHEET!

Part I. Multiple Choice: Circle the <u>one</u> correct answer for each question.

1. Why is coliform bacteria used as an indicator of poor water quality?
   a. indicates high O_2 levels
   b. indicates acid rain
   c. indicates fecal contamination
   d. indicates high phosphate levels

2. What do most wastewater treatment plants in the U.S. use as a disinfectant?
   a. ammonium salts
   b. aluminum chlorohydrate
   c. UV light
   d. chlorine

3. Where should O_2 samples be taken in a stream?
   a. surface
   b. middle
   c. bottom
   d. doesn't make a difference, O_2 levels are uniform throughout depths

4. What causes salination of the soil?
   a. use of pesticides
   b. dissolved salts in irrigation water
   c. salt domes
   d. saltwater intrusion

5. What do we call the accumulation of heavy metals and pesticides in the food chain?
   a. biomagnification
   b. biogenesis
   c. necrosis
   d. calcification

6. In which form is water the purist?
   a. steam vapor
   b. solid ice
   c. clear liquid
   d. combination of ice and water

7. The water quality index (WQI) is used to evaluate and compare waters around the world. Which of the nine tests is weighted the highest?
   a. phosphates
   b. pH
   c. O_2
   d. Nitrates

8. The alkalinity of a water sample may be defined as the:
   a. capacity of a water sample to react with and neutralize acid
   b. capacity of a water sample to become toxic
   c. ability of a water sample to carry nutrients to plants and animals
   d. ability of a water sample to evaporate at low temperatures

9. The term water hardness is used to describe the concentrations of:
   a. sodium and potassium
   b. zinc and lead
   c. lead and calcium
   d. calcium and magnesium

10. Most aquatic organisms have a pH range of:
    a. 4.0-6.0
    b. 6.0-9.5
    c. 7.0-9.0
    d. 8.0-10.0

11. As the WQI of a stream increases, the biodiversity:
    a. increases
    b. remains the same
    c. decreases
    d. there is no correlation between the WQI and the biodiversity

12. Aquatic invertebrates can be classified according to how and what they eat. Which is not a "functional feeding group"?
    a. collector
    b. scraper
    c. chewer
    d. shredder
    e. predator

13. As the temperature of a stream increases, the:
    a. dissolved oxygen (DO) increases
    b. DO decreases
    c. DO remains the same
    d. no direct correlation between temperature and DO

14. Water alkalinity is a measure of:
    a. the acid neutralizing capacity of a particular body of water
    b. the H^+ concentration in a water sample
    c. the COD/BOD ion concentration in a water sample
    d. the ability of water to buffer sudden pH changes

15. The capacity for transmitting fluids is known as:
    a. permeability
    b. fluid flow
    c. porosity
    d. transferability
    e. none of the above

16. Groundwater flows into most wells directly by gravity, but into Artesian wells under what kind of pressure?
    a. hydrosystem
    b. hydoelastic
    c. hydroelectric
    d. hydrostatic
    e. none of the above

17. The free chlorine residual in water is:
    a. the amount of chlorides in the water
    b. the amount of chloramines in the water
    c. the amount of chlorine in the supply as it comes from the stream, reservoir, or well
    d. the amount of chlorine applied as measured in milligrams per liter
    e. the amount of uncombined chlorine that remains in the water after chlorine demand has been met

18. The pH of healthy ponds and streams is approximately:
    a. 4.0
    b. 5.0
    c. 6.5
    d. 8.0
    e. 9.5

19. Hard water is:
    a. detrimental to wildlife
    b. a soap and detergent strengthener
    c. beneficial for wildlife
    d. rare in nature

20. Sublimation is the movement of water:
    a. from plant leaves into the air
    b. from snow fields and ice into a vapor
    c. downward through the soil
    d. from a liquid state into a gaseous state

TIE-BREAKER QUESTIONS:

21. What percentage of the world's diseases can be attributed to poor water quality?
    a. 30%
    b. 50%
    c. 80%
    d. 90%

22. A secchi disk is used to measure:
    a. light penetration of a lake or pond
    b. flow of a stream or river
    c. pH of any body of water
    d. the depth of silt on the bottom of a body of water

23. Which of the following are exotic species to U.S. water systems?
    a. parrot feather weed and Corbicula
    b. walking catfish and zebra mussel
    c. grass carp and nutria
    d. Hydrilla and water hyacinth

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Part II. Short Answer.

1. A group of students conducted a physical survey of a local river and noted that the undersides of rocks on the river bottom were black. What does this color indicate?

2. Farm or street run-off are examples of what kind of pollution?

3. Water is the universal solvent. How does this property help explain water pollution?

4. What element leaches out of soil due to acid rain forming compounds lethal to animals with gills?

5. What group of organisms dominate waters at all pH levels?

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Part III. Macroinvertebrate Indentification. Give the common name for each organism shown.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Calculate the cumulative pollution tolerance index for the above organisms. Use the values below to help, if needed. Full credit will not be given unless work is shown.

Class 1 (pollution sensitive)	Class 2 (moderately sensitive)	Class 3 (moderately tolerant)	Class 4 (pollution tolerant)
Index Value = 4	Index Value = 3	Index Value = 2	Index Value = 1

Cumulative pollution tolerance index value: _____

Part IV. Chemical Analysis of Water.

pH _____

Turbidity _____

Phosphate _____