OREGON ENVIROTHON 2022

AQUATIC ECOLOGY TEST

TEAM: # _____

Note to teams: *If you notice that a kit is missing pieces, please notify one of the test administrators.*

Part I. Hands-On Analysis

1. **Collect a water sample and analyze it with the test kits. Record the values you find for the following parameters: (5 points)**

    a. Temperature: _____
    b. pH: _____
    c. Dissolved Oxygen: _____
    d. Phosphate: _____
    e. Nitrate: _____

2. **What is the water quality classification for this sample according to the Oregon Water Quality Standards for Salmon and Steelhead? (1 point)**

    Class AA **Class A** **Class B**

3. **Identify the macroinvertebrate within the sample dish; include both the <u>name</u> and the <u>life stage</u>, common names are allowed. For example, "*mosquito larvae.*" (2 pts)**

    _____

4. **Based on the macroinvertebrate in the sample dish, do you believe that this sample came from the same source as the water sample? Explain why or why not. (2 points total; 1 for yes/no from sample, 1 for explanation)**

__ / 10 pts

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Part II. Wastewater Treatment

5. **Briefly (1 sentence) describe the following wastewater treatment plants (2 point):**

   1) Chemical/Physical plants: Utilize screens, water movement and chemical additives to remove waste and harmful material

   2) Biological plants: Rely on organisms to break down wastes, example would be a septic system

6. **Of the two types of wastewater treatment plants above, which system is ideal for treating wastewater from households (1 point)?**

   Biological treatments

7. **Name two ways that bacteria, such as E. coli, can enter a waterway. (2 points)**

   Untreated sewage; storm drains; Combined Sewer Overflows (CSO's); wastewater treatment facilities; naturally in the environment; wildlife, domestic animals, and birds; farmland and road runoff; human sewage from recreational boats and septic systems; land application of animal waste. Or any combination of correct answers.

8. **How do harmful concentrations of lead generally get into drinking water? (1 point)**

   a) Lead filled paint cans are poured into water sources.
   b) Lead is a natural byproduct from decaying material that cannot be filtered out at treatment facilities.
   c) Lead is leached from old pipes that deliver water to homes/businesses.
   d) Lead is added to the water in an effort to filter out other chemicals.

9. **Stormwater runoff can introduce pollutants to water sources. Name five pollutants that can be found in stormwater runoff. (5 points)**
   Agriculture activities, vehicle movement, acid rain, surface run-off. Fertilizers, herbicides and insecticides (pesticides); oil, grease and toxic chemicals; sediment, silt, soil or dirt; salts; bacteria and nutrients; heavy metals; pathogens; phosphorous; phosphate; nitrogen; nitrate; PCB; DDT, acids; lead, mercury, zinc, cadmium. (If they list "heavy metals" and follow it with "lead, mercury, etc." both do not count).

___ / 11 pts

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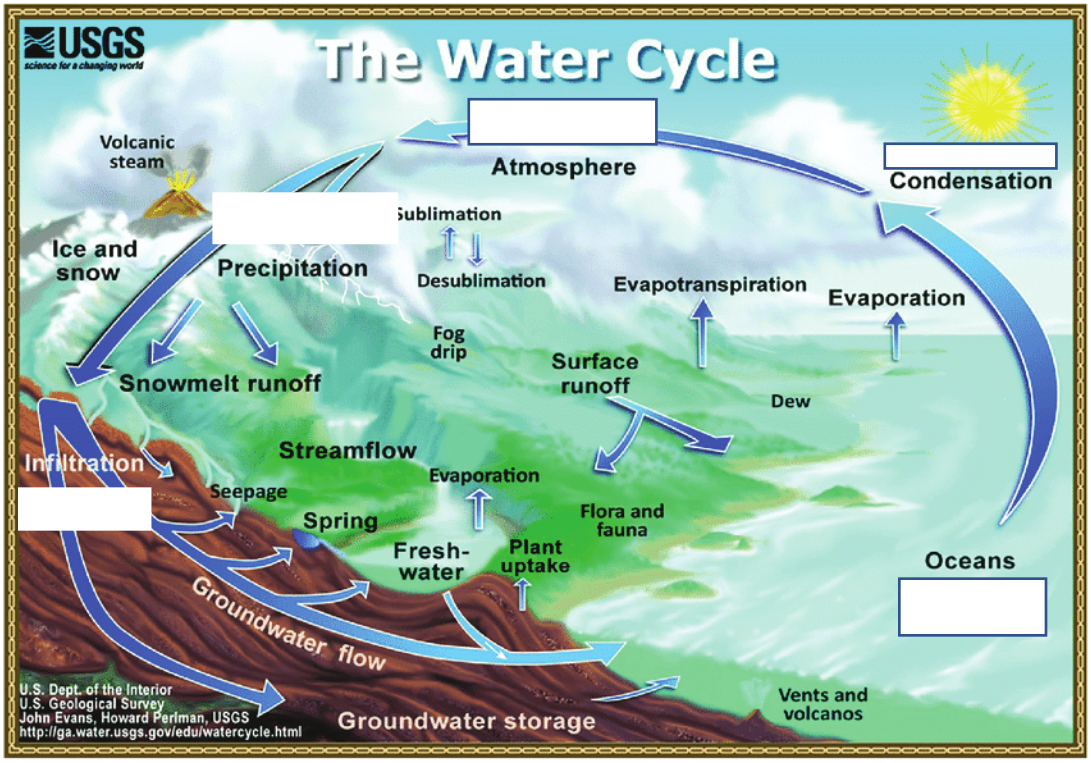
Part III. The Water Cycle



10. Use 3 of the following words to fill in the missing water cycle components (3 pts):
Condensation Oceans Atmosphere Infiltration Precipitation

11. Match the following components of the water cycle with the definition on the right (4 points):

_c_ Evapotranspiration
_e_ Ground-water storage
_b_ Sublimation
_a_ Infiltration

a. Water replenishes aquafer
b. Solid state water into gaseous
c. Directly from plants into atmosphere
d. From a gaseous state to a liquid
e. Pooled subsurface liquid

12. Reduction in runoff would NOT be caused by which of the following? (1pt)

a. Porous surfaces
b. timber harvesting
c. Buffer strips
d. Cover cropping

__ / 8pts

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Part IV. River Systems

13. Which term is the area that occurs along the edges of waterways and waterbodies? (1 pts)

a. savanna
b. riparian zone
c. wetland
d. prairie

14. Match the component of a healthy streamside habitat (left) with its most important function (right). (4 pts)

_d_ Berries
_e_ Canopy
_b_ Roots
_a_ Soil

a. water storage & filtration
b. erosion control
c. livestock access
d. wildlife food
e. Shade

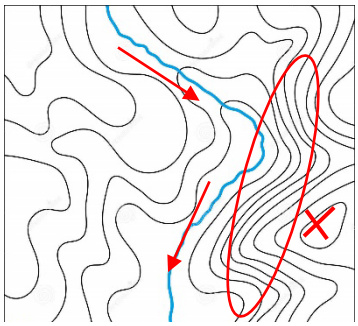
15. Match the terms on the left with the definitions or examples on the right: (4 pts)

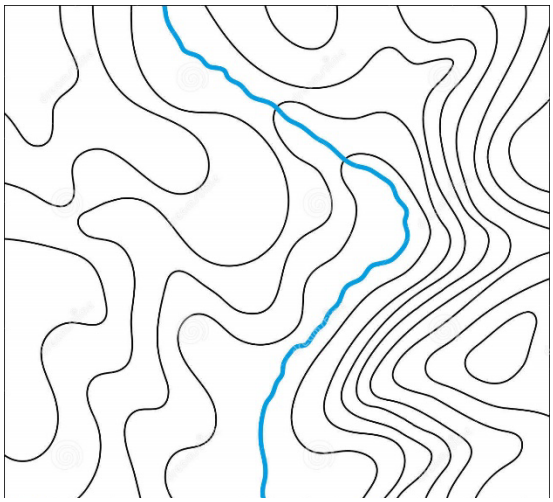
_e_ Pervious
_c_ Impervious
_b_ Interstitial
_d_ Oxbow

a. Shallow, fast, turbulent water
b. The space between
c. Asphalt
d. River bend
e. Gravel drives

16. On the image at right (3 pts):

a. Place an X on top of the hill
b. Circle the area with the steepest slope.
c. Place arrow(s) indicating the direction of flow.





__ / 12pts

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Part V. Nutrients, Food Chains/Webs

17. Explain <u>how</u> algal blooms occur and <u>what effect</u> this has on dissolved oxygen. (1 pts, 1 pt for how algal blooms happen, 1 pt for effect**)**

Algal blooms – excess nutrients, when these blooms decompose, they reduce the dissolved oxygen within that body of water. Eutrophication can be part of the answer for full credit.

18. The following organisms compose a food chain. What trophic level are they in this scenario? (4 pts)?

a. **Bald Eagle** (Tertiary consumer)

b. **phytoplankton** (producer)

c. **bass** (secondary consumer)

d. **zooplankton** (primary consumer)

- Answers: looking for **trophic levels** and not type of organism (predator/herbivore/carnivore) but ½ point per answer can be awarded for those responses.

19. Give an example of a Pacific Northwest freshwater keystone species (1 pt) and explain how it alters its ecosystem (2 pts):

Beaver, salmon, Bald eagle.

Second part will depend on the species chosen, grade accordingly.

An organism that helps define an entire ecosystem. A species on which other species in an ecosystem largely depend, such that if it were removed the ecosystem would change drastically.

___ / 9pts