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OREGON ENVIROTHON 2024 **TEAM #_____**

AQUATICS **Test Total: _____/ 50 points**

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

Part I. Water Quality & Aquatic Macroinvertebrates

1. Analyze your water sample using the provided test kits and record your values here: (6 points, 1.5 points for each value)
   a) Temperature: _____
   b) pH: _____
   c) Dissolved Oxygen: _____
   d) Phosphate: _____

Note that answers for Q1-Q4 will be determined on the day of Envirothon.

2. Circle the water quality classification for the above 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 common name and the life stage. (2 points)

   _____

4. In the following sentence, circle the correct words from the underlined choices. (1 point)

   The macroinvertebrate in the sample dish could / could not have come from the same source as the above sample because this macroinvertebrate can / cannot tolerate water pollution.

5. A water sample collected from a stream running through an agricultural area indicates that the nitrate and temperature results are too high for aquatic life. What is one action you would recommend to area landowners to:

   a) Decrease the water temperature? (1 point)
   Possible answers: plant trees/vegetation; add shade; reduce water drawn from stream.
   _____

   b) Decrease the nitrate level? (1 point)
   Possible answers: stop using fertilizer; change timing or decrease amount of fertilizer; add a stream buffer to filter nitrate before water washes into stream

___/ 12 points

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6. Fill in the blanks using the correct words from the ones provided below. (2 points)

   Caddisflies undergo _____complete_____ metamorphosis. Metamorphosis occurs during the _____pupal_____ stage.

   larval complete incomplete adult pupal aquatic airborne

7. Which aquatic organisms are very sensitive to pollution? (1 point)

   a) Stoneflies, aquatic worms, black flies
   b) Dragonflies, crayfish, boatmen
   c) Left-handed snails, clams, riffle beetles
   d) Alderflies, water penny beetles, right-handed snails
   e) Caddisflies, craneflies, midges

___/ 3 points

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Part II. Current Issue: Renewable Energy - Hydropower

8. Fill in the blanks using the correct words from the ones provided below. (4 points)

The amount of electricity that can be generated at a hydro plant is determined by two factors: _____head_____ (the distance from the highest level of the dammed water to the point where it goes through the power-producing turbine) and _____flow_____ (how much water moves through the system). If a river has _____high_____ flow rates, a/an _____reservoir_____ may not be needed.

high flow gravity pulse reservoir head penstock low shaft

9. Which of the following IS NOT a negative environmental impact of hydropower. (1 point)

a) Dams and reservoirs reduce river flows and cause sediment to build up.
b) Dams and reservoirs raise water temperatures, which can harm fish and other wildlife.
c) Decaying plant material from flooding releases carbon dioxide and methane into the atmosphere.
d) Hydropower relies on the water cycle.
e) Dams prevent migrating fish from swimming upstream.

10. Which of the following IS NOT a negative human impact of hydropower. (1 point)

a) Hydropower can be used together with other sources of renewable energy.
b) Dams and reservoirs may displace people, requiring them to relocate their homes and lives.
c) People living downstream from large dams are more likely to suffer from reduced food security and flooding.
d) Dams are expensive to build.
e) Dams can be dangerous to swimmers, kayakers, and others.

___/ 6 points

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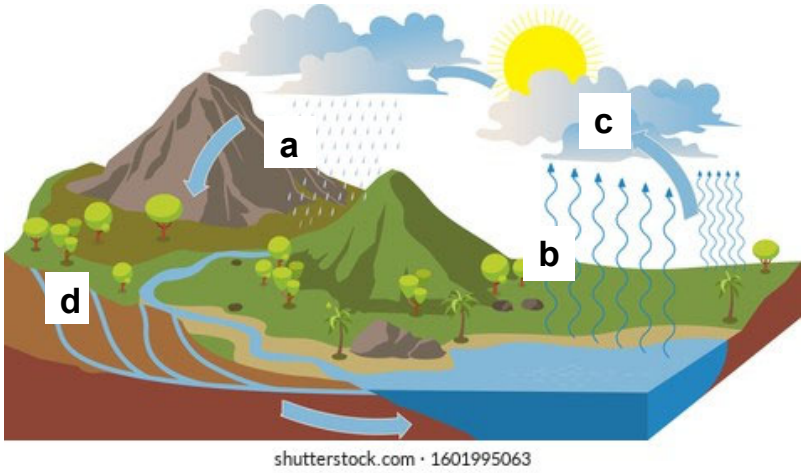
Part III. The Water Cycle

11. Use the word bank below to label the water cycle processes shown in the diagram. (4 points)



a) ___precipitation_____

b) ___evaporation_____

c) ___condensation_____

d) ___infiltration_____

Word Bank

Aboveground flow	Infiltration
Accumulation	Plant uptake
Condensation	Precipitation
Evaporation	Sublimation

12. Use the word bank above to identify two things that could happen to water immediately following precipitation? (2 points)

a) Possible answers: accumulation, sublimation, aboveground flow, plant uptake, infiltration

b) _____

13. Most of Earth's water is in the form of: (1 point)

a) salt water
b) rivers
c) ice
d) fresh water

___/ 7 points

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Part IV. River Systems and Maps

14. Choose the best definition for watershed. (1 point)

a. A building where water is stored.
b. An area of land that shares a common drainage.
c. Surface runoff.
d. A functioning, natural unit with biotic and abiotic components and boundaries determined by energy input.
e. A water movement event from the land to the atmosphere.

15. In which of the following watersheds might you expect to find elevated levels of coliform bacteria? (1 point) ____Watershed B_____

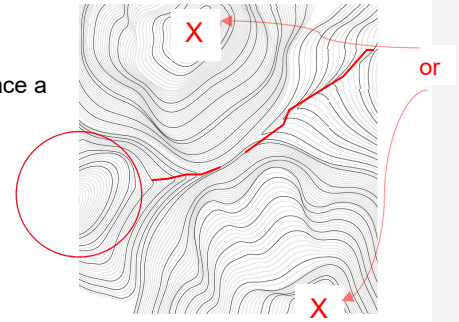
Watershed A – Densely populated. Tall skyscrapers dominate the landscape. There are few wildlife and domestic animals. There are many factories that produce plastics and metal alloys.

Watershed B – Sparsely populated. Farms and ranches dominate the landscape. Livestock and domesticated animals are commonplace.

16. Put the letter of the correct description next to each river term. (5 points)

__d___riffle	a. an important resting and feeding site for fish
__e___redd	b. can suffocate fish
__c___riparian area	c. provides habitat, shade, water filtration, & bank stability
__b___sediment	d. serves as spawning and feeding grounds for salmon
__a___pool	e. a gravel nest made by salmon
	f. a bioindicator of water quality

17. On the image at right (3 points):
a. Place an X on one mountain peak.
b. Circle the area that might be a lake.
c. Draw a line to represent the most likely place a stream is flowing.



___/ 10 points

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Part V. Human Impacts & Food Chains

18. A farmer raises sheep in the Willamette Valley on a property that has a stream flowing through it. What are two ways this sheep operation might negatively impact water quality? (2 points)

a) Possible answers: damage to riparian vegetation; runoff of manure waste (nutrients, bacteria) into the waterway or groundwater; destabilization of topsoil; increase of sediment in the water; or other reasonable answer

b)

19. What are two management practices the sheep farmer above could take to avoid or reduce negative impacts to water quality? (2 points)

a) Possible answers: add fence to keep sheep out of the stream/riparian area; cover the manure pile; place the manure pile away from the stream; compost the manure; rotate pastures/grazing areas; or other reasonable answer

b)

20. What are two conservation practices homeowners in urban environments can adopt to protect water resources? (2 points)

Possible answers:

a)
- Use rain barrels to collect and slow runoff, allowing the water to be used at later times in smaller amounts, where it can help infiltrate and recharge the ground supply.
- Spread mulch around planting beds to hold in moisture, prevent erosion and provide nutrients.

b)
- Maintain vehicles properly to prevent automotive fluids from leaking and potentially polluting the watershed.
- Plant rain gardens, bioswales, or other vegetative buffers along drainage ways to filter stormwater runoff.
- Install green roofs to filter rainwater and help cool down surfaces that could create thermal pollution.
- Use native plants to reduce need for fertilizer and water.
- Encourage birds and other natural, insect predators to reduce the application of pesticides.
- …or other reasonable answer.

___/ 6 points

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21. Diagram a complete aquatic food chain using any 4 of these organisms. (4 points)

cattail – algae – great blue heron – salmon fry – sculpin – net spinning caddisfly – stonefly
snail – osprey – vegetative detritus – swift – mosquito

Possible answers for #20 and #21:

Producer	**Primary consumer**	**Secondary consumer**	**Tertiary consumer**
algae	net spinning caddisfly	salmon fry or sculpin	great blue heron or osprey
cattail	caddisfly	stonefly	salmon fry or sculpin
vegetative detritus	snail	sculpin	great blue heron or osprey
cattail, algae, vegetative detritus	mosquito	swift	osprey

Accept other combinations of these feeding relationships. Give one point for each organism in a correct food chain, up to four points, and ½ point for each correctly labeled trophic label.

22. Label the food chain diagram above with the proper trophic levels. (2 points)

producer – primary consumer – secondary consumer – tertiary consumer

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Commented [LC1]: Please provide guidance for correct answers.

___/ 6 points