2024 Iowa Envirothon State Aquatics Exam **KEY**

Each Question is worth three points – 75 points possible

Water samples and testing will be the basis for these questions.

Use the "Chemetrics® Chloride test kit" for Questions 1-2:

Use with Hach® chloride titrators and the sample cup from one of the Chemetrics® test kits to determine the chloride of the aquatics area at this station. Review the directions below and on Quantab® test strip bottle before you conduct the test.

A. Rinse the 25 ml Chemetrics® test kit sample cup three times with stream water.
B. Fill the sample cup up to the 25 ml mark with stream water.
C. Remove a titrator from bottle and replace cap immediately. Insert the lower end of titrator into sample cup. Do not allow the yellow completion string located at the top of the titrator to become submerged in the water sample.
D. Allow water sample to completely saturate the wick of the titrator. There is no time limit for this test – the reaction is complete when yellow string turns dark (this will take about 5-10 minutes).
E. Note where the tip of the white chloride peak falls on the numbered Quantab® scale. This represents the Quantab® unit value. Record the Quantab® unit value for Question #1 below.
F. Refer to the table on the Quantab® test strip bottle to convert the Quantab® units into a chloride concentration and record the chloride concentration value for Question #2 below.
G. If the Quantab® unit is below 1.0, report the chloride concentration as < (less than) the lowest concentration listed on the test strip vial (which for data submission purposes is 25 mg/L).
H. Quantab® test strips may be disposed of with waste container. Sample water can be disposed of in the field.

1. What Quantab® unit value did you get with your Chloride test? _____

2. What chloride concentration value did you get with your Chloride test? _____ mg/L

3. The amount of chloride dissolved in water is expressed in milligrams per liter of water (mg/L). Average chloride concentrations for Iowa streams range from _____ mg/L.

A. 0 to 15
B. 16 to 29*
C. 30 to 43
D. 44 to 67

Use the "Hach® nitrate-N/nitrite-N test strips" for Questions 4-5:

A. Use the Hach® nitrate-N/nitrite-N test strips to determine the nitrate and nitrite level of the aquatics area at this station. Review the directions on the Hach® nitrate-N/nitrite-N test strips vial and the steps outline below, before you conduct the testing. You will need to dip the test strip in the water and remove immediately. **DO NOT SHAKE** excess water from the test strip.
B. Hold the strip level, with pad side up, for **30 seconds.**
C. Compare the NITRITE (lower) test pad to the nitrite-nitrogen color chart on test strip bottle, estimate the nitrite concentration in mg/L, and record your reading for question #4 below (remove sunglasses before reading the strip). ***The pad will continue to change color, so make a determination immediately after 30 seconds***.
D. At **60 seconds** (or 30 seconds after estimating nitrite concentration), compare the NITRATE (upper) test pad to the nitrate-nitrogen color chart on test strip bottle, estimate the nitrate concentration in mg/L, and record your reading on for question #5 below (remove sunglasses before reading the strip). ***The pad will continue to change color, so make a determination immediately after 60 seconds***.
E. Dispose of test strip in waste container

4. What nitrate value did you get with your test? _____

5. What nitrite value did you get with your test? _____

6. The amount of nitrate or nitrite dissolved in water is reported as nitrate-N (nitrate expressed as the element nitrogen) or nitrite-N in milligrams per liter of water (mg/L). Iowa's drinking water standard for nitrate is _____ as nitrate-N. Readings above this level may be a cause of concern and may warrant further investigation.
A. 0 mg/L
B. 2 mg/L
C. 10 mg/L*
D. 50 mg/L

7. On average, Iowa receives _____ of precipitation during a typical year.
A. two feet
B. five feet
C. 32 inches*
D. 320 centimeters

8. In Iowa, one of the biggest water quality concerns is soil erosion. Soil erosion carries particles of soil or dirt also called _____, to streams and rivers during runoff events caused by heavy rains or spring snow melts.
A. colluvium
B. peds
C. residuum
D. sediment*

9. The Iowa _____ is the action plan for the Iowa Nutrient Reduction Strategy (NRS). Its primary goal is to improve water quality through a collaborative, research-based approach that is evaluated and reported by a team of independent researchers from multiple institutions, led by Iowa State University. This comprehensive approach allows farmers and cities alike to adopt conservation practices that fit their unique needs, lands, and budgets.
A. Resource Enhancement and Protection (REAP)
B. Water Quality Initiative (WQI)*
C. IOWATER Program (IWP)
D. Water Rocks Program (WRP)

10. Which of the following is not a category on the "Iowa Benthic Macroinvertebrate Flow Chart" used to identify and classify macroinvertebrates?
A. two pairs of legs*
B. three pairs of legs
C. four pairs of legs
D. five or more pairs of legs
E. All of these are included

11. Many of Iowa's non-game fish species including carps, minnows and shiners belong to what family?
A. Centrarchidae
B. Cyprinidae*
C. Moronidae
D. Salmonidae

12. _____ river is a tributary of the Des Moines River, flowing mainly through the Des Moines Lobe landform, which retains imprints of glacial occupation, such as abundant moraines and shallow wetland basins. Flat land and poor surface drainage dominate this "prairie pothole" landscape.
A. Clear Creek
B. West Nishnabotna
C. Skunk
D. North Raccoon*

13. Engineered practices of rainscaping are also known as _____.
A. green stratification
B. rainiculture
C. green infrastructure*
D. All of these

14. Most lakes and ponds found in Iowa today _____.
A. were created by nature
B. were created by humans damming rivers, streams, and valleys*
C. are mostly temporary bodies of water that dry up during the summer months
D. are not impacted by human activities

MATCHING: For questions 15-20 (3 Points Each)

A. Ames Impact Crater
B. Beavers
C. Coontail
D. Chicxulub Impact Structure
E. Detritivores
F. Eurasian watermilfoil
G. Evaporation
H. Evapotranspiration
I. Hydra
J. Hypoxia
K. Infiltration
L. Manson Impact Structure
M. Maple Creek Meteorite Crater
N. Oxidation
O. Photosythesis
P. Plankton
Q. Plover
R. Precipitation
S. Rock Elm Disturbance
T. Runoff
U. Stoneworts
V. Toxification
W. Transpiration
X. White water lily

Write the correct letter for the term above that matches each description below:

15. _____ is the water that falls to the surface of the earth in the form of rain, snow, hail and/or sleet. **R. Precipitation***

16. _____ is water moving across the land surface to lower elevations including to streams, lakes, or oceans. **T. Runoff***

17. _____ are small organisms that have very limited powers of locomotion which appropriately describes how they move, simply by drifting through the water. **P. Plankton***

18. _____ is an invasive species that poses an ongoing threat to Iowa lakes, rivers, and wetlands**. F. Eurasian watermilfoil***

19. _____ occurred seventy-four million years ago when a 1.5-mile diameter asteroid struck the earth near in what is now Iowa. It was home to dinosaurs and small mammals. The impact of the asteroid instantly ignited anything that would burn within 130 miles. This site was discovered when a well was being dug in the early 1900 and an unusual sequence of rocks was drilled into, followed by the discovery of the only naturally soft groundwater in the state of Iowa. It was later determined that this was due to the meteor removing all of the sedimentary rocks that typically give midwestern water its hard classification by contributing calcium and magnesium ions to the groundwater. **L. Manson Impact Structure***

20. Soil suspended in the water reduces light penetration, thereby slowing or preventing the growth of aquatic plants caused by the reduction in _____. **O. Photosynthesis**

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21. The 2022 "Water Quality Monitoring and the Water Quality Initiative" report indicates:
A. Monitoring of nitrogen and phosphorus in streams and rivers throughout Iowa is an essential element of the Iowa Nutrient Reduction Strategy.
B. The state of Iowa has not adopted a standard approach or strategy for water monitoring for Water Quality Initiative projects to establish baselines and track effectiveness of the projects or progress toward Iowa Nutrient Reduction Strategy goals.
C. Water quality data is not publicly available for many projects and state agencies lack data to assess water quality effects of the individual practices they fund.
D. All of these*

22. Northern crayfish and pond snails are examples of _____ in an aquatic ecosystem.
A. detritivores/decomposers*
B. primary consumers
C. producers
D. secondary consumers
E. tertiary consumers

23. Point Source Pollution is
A. any single identifiable source from which pollutants are discharged, such as a pipe or ditch.*
B. pollution that does not have a specific point of discharge and results from rainfall or snowmelt moving over and through the ground carrying natural and human-made pollutants.
C. the primary source of pollution that causes hypoxia zone in the Gulf of Mexico.
D. All of these are correct.

Use the "Iowa Benthic Macroinvertebrate Key" for Questions 24-25: (3 points each)

24. Using the "Iowa Benthic Macroinvertebrate Key", identify the macroinvertebrate pictured on the next page? (Circle the correct answer)

A. Alderfly
B. Backswimmer
C. Caddisfly
D. Crawdad
E. Damselfly
F. Dobsonfly
G. Dragonfly
H. Giant Water Bug
I. Mayfly*
J. Midge Fly
K. Predaceous Diving Beetle:
L. Scud
M. Sowbug
N. Stonefly
O. Water Scavenger Beetle
P. Water Boat

25. Which group does the macroinvertebrate on the next page belong to?
A. Pollution Intolerant (High Quality Group)*
B. Somewhat Pollution Tolerant (Middle Quality Group)
C. Pollution Tolerant (Low Quality Group)
D. None of the above

Use the picture below for answering questions #24-25

Source: Maine Department of Environmental Protection