



Water Quality C

Macomb Science Olympiad Extravaganza
9 January 2019
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The Basics

- ▶ Supervisor introduction
- ▶ Event will focus on the evaluation of aquatic environments
 - Freshwater lakes, ponds or rivers; estuaries
- ▶ Three segments
 - Freshwater Ecology
 - Macro-Flora and Fauna Identification
 - Water Monitoring and Analysis

Question Format

- ▶ Inquiry-based competition to emphasize process skills and mental challenges using suggested content.
 - 15 stations; 3 minutes for each station.
 - Multiple-choice, matching, and fill-in answers.
 - Answer sheets will be provided.
 - Essay questions will be used as tie-breakers
- ▶ Data assessments and interpretations
 - Graphs, food webs, ecological pyramids, life patterns, sampling & population densities, etc.
- ▶ Process skills:
 - Defining variables, forming hypotheses, making calculations and predictions, etc.

What to bring...

- ▶ Each TEAM may bring only one (1) 8.5 x 11” 2-sided page of notes that contains information in any form from any source.
- ▶ One STUDENT-BUILT salinometer / hydrometer for testing.
- ▶ Up to two (2) non-programmable, non-graphing calculators.
- ▶ **Z87 chemical splash goggles for EACH participant. ANSI/ISEA Z87.1-2015, Cat. C**
- ▶ Pencils and erasers.

Freshwater Quality Information

- ▶ Aquatic ecology
 - ▶ Water cycle
 - ▶ Nutrient cycling
 - ▶ Aquatic chemistry and its implications
 - ▶ Potable water / wastewater treatment
 - ▶ Aquatic food chains and webs
 - ▶ Community interactions
 - ▶ Population dynamics
 - ▶ Watershed resource management issues
 - ▶ Sedimentation pollution
 - ▶ Nuisance / invasive species
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Macro-Flora and Fauna

- ▶ Identification of immature and adult macroinvertebrates and aquatic nuisance organisms (common names only), and their importance as indicators of water quality.
 - Classes 1–5 Indicator Species
 - Aquatic nuisance plants (purple loosestrife, Eurasian water milfoil, water hyacinth)
 - Aquatic nuisance animals (zebra mussels, spiny water flea, asian tiger mosquito, and Asian carp)
- ▶ Division C must also know the general ecology, life cycles, and feeding habits of all listed organisms (immature & adults).

Study Aids for Indicator Species

- ▶ PowerPoint slides
- ▶ Flash cards
- ▶ Collection of actual specimens
- ▶ Create a study binder (segments for each part of the Water Quality competition
 - Copy of the rules
 - Copy of indicator species and groups
 - Developed by students using multiple sources
 - Tabbing and color-coding to organize into related groupings
- ▶ Use of timer to improve efficiency.

Chemical Analysis

- ▶ Understand what the parameter is, how it is tested, and explain why it is important to water quality.
 - Salinity (only actual testing with salinometer)
 - pH
 - Phosphates
 - Dissolved oxygen (DO)
 - Temperature
 - Nitrates
 - Fecal coliforms
 - Total solids (total residue)
 - Biochemical Oxygen Demand (BOD)
 - Relationships of these parameters to one another.

Chemical Analysis (cont'd)

- ▶ Use of case studies to showcase knowledge of potential human-caused problems and the types of chemical testing that would be performed to confirm suspected sources and types.

Salinometer

- ▶ PRIOR TO THE EVENT, Teams must build and calibrate a salinometer/hydrometer capable of measuring saltwater (NaCl) concentrations between 1–10% (mass/volume), to the nearest tenth. This MUST be brought to the event!
- ▶ During the event, this will be used by the team to test 1–3 solutions to determine salinity of each. Points for salinity testing will be approximately 5% of the total score.

Resources!

- ▶ Science Olympiad webpage for Water Quality:
 - http://soinc.org/water_quality_c
 - Water Quality and BioEarth CDs
 - Rules, training handouts for students, etc.
 - Links to websites for EPA, NOAA, etc.
 - Instructions for constructing a simple Salinometer.
- ▶ Scioly wiki for Water Quality Science Olympiad Student Center:
 - <http://scioly.org/wiki/index.php>
 - Forums and examples of past Water Quality tests.
- ▶ Invasive species:
 - <http://www.invasivespeciesinfo.gov/aquatics/main.shtml>
 - http://www.michigan.gov/deq/0,4561,7-135-3313_3677_8314-16578--,00.html

QUESTIONS??

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