



SCIENCE OLYMPIAD
— AT THE —
UNIVERSITY OF FLORIDA

Northern Regional: January 19th, 2019

Water Quality C Test

Name(s): _____

Team Name: _____

School Name: _____

Team Number: _____

Rank: _____

Score: _____

Water Quality B Key
Part 1: Freshwater Ecology (50 Points)

Question	Answer	Points
1	10,000	/1
2	Sulfuric acid	/1
3	Acidic	/1
4	$-\log[H_3O^+] = pH$ $-\log[8.9 \times 10^{-9}] \quad (1)$ $pH = 8.05$ $14 - pH = pOH$ $14 - 8.05 = pOH \quad (1)$ $pOH = 5.95 \quad (1)$ <div style="display: inline-block; vertical-align: middle; border: 1px solid black; padding: 2px; margin: 0 10px;">OR</div> $1 \times 10^{-14} = [H_3O^+][OH^-]$ $1 \times 10^{-14} = [8.9 \times 10^{-9}][OH^-] \quad (1)$ $\frac{1 \times 10^{-14}}{8.9 \times 10^{-9}} = [OH^-]$ $[OH^-] = 1.12 \times 10^{-6} \quad (1)$ $pOH = -\log[OH^-]$ $pOH = -\log(1.12 \times 10^{-6})$ $pOH = 5.95 \quad (1)$	/3
5	$pH = pK_a + \log\left(\frac{[B]}{[BH^+]}\right)$ $14 - pK_b = pK_a$ $14 - 12.4 = pK_a$ $1.6 = pK_a \quad (1)$ $pH = 1.6 + \log\left(\frac{3.2 \times 10^{-4}}{5.4 \times 10^{-8}}\right) \quad (1)$ $pH = 1.6 + 4.23 = 5.83 \quad (1)$	/3
6	False	/1
7	True	/1
8	64/[15*14]	/2

	.3	
9	1-.3 .7	/2
10	1/.3 3.3	/2
11	\$12 billion	/1
12	5	/1
13	River otter, beaver, salmon, American alligator	/1
14	C	/1
15	F	/1
16	E	/1
17	G	/1
18	F	/1
19	D	/1
20	A	/1
21	C	/1
22	D	/1
23	A	/1
24	95%	/1
25	Oxidation ditches	/1
26	Extended aeration	/1
27	Sulfur-reducing bacteria (SRD's)	/1
28	Calcium and magnesium	/1
29	Carbonates and bicarbonates	/1
30	Ammonia; nitrites; nitrates	/1

31	Atmospheric nitrogen	/1
32	1,000	/1
33	LiCl, Fe ₂ (HPO ₄), NH ₄ F, MgSO ₄	/1
34	Sediment; bacteria and nutrients	/1
35	anaerobic	/1
36	Wastewater entered the groundwater, ruining the aquifer	/2
37	Bottom; top	/1
38	Sarni River	/1
39	An effort to clean the Ganges River; it has not receive adequate funding	/1
40	Mining dams spilt iron ore	/1
41	50	/1
42	Mississippi River	/1

Part 2: Macroflora and Fauna Identification (50 Points)

Question	Answer	Points
43	No. All organisms but the Asian Carp are pollution sensitive	/1
44	Zebra mussel	/1
45	Ship ballast	/1
46	Clogging pipes	/1
47	The Great Lakes (accept Michigan/Wisconsin)	/1
48	Decrease; increase; increase; decrease	/2
49	Rocky	/1
50	Mosquito	/1
51	Yes	/1
52	Predaceous Diving Beetle	/1
53	No	/1
54	They take an air bubble filled with air underwater	/1
55	Water tigers	/1
56	Water penny	/1
57	Yes	/1
58	Water boatmen	/1
59	Slow	/1
60	Yes	/1
61	Light	/1
62	Water scorpion	/1
63	Red	/1
64	It slows metabolism and oxygen diffuses into its air bubble	/1
65	Increase	/1

66	Eurasian Water Milfoil	/1
67	Decrease	/1
68	Decrease	/1
69	Decrease	/1
70	Fast	/1
71	Wisconsin	/1
72	yes	/1
73	Spiny Water Flea	/1
74	Zooplankton	/1
75	Spines make it inedible	/1
76	Ship ballast	/1
77	Lake Ontario	/1
78	Flatworm (accept planarian)	/1
79	Yes	/1
80	No	/1
81	4°C to 25°C (range of 1°C with answer choice)	/1
82	Its ecological niche varies throughout different regions/their life span is not well defined/they are often difficult to locate in a river	/1
83	Higher genetic diversity= lower fatality rate	/1
84	<ol style="list-style-type: none"> 1. Copper 2. Zinc 3. Iron 4. Lead 5. Manganese 	/1
85	No	/1
86	Yes	/1
87	Stonefly	/1

88	Dissolved oxygen	/1
89	Trout	/1
90	Caddisfly and mayfly	/1
91	It does “push ups” or rapidly moves its tail/body	/1

Part 3: Water Monitoring and Analysis (50 Points)

Question	Answer	Points
92	Typhoid fever, Dysentery, Gastroenteritis, and Hepatitis	/1
93	Boiling water, UV radiation, chlorine treatment	/1
94	True	/1
95	True	/1
96	Accept anything between 195-205	/1
97	Downstream	/1
98	Turbidity	/1
99	277K	/2
100	A non-natural chemical found in an ecosystem	/1
101	7	/1
102	A	/1
103	Nonpoint	/1
104	Constant; changing	/1
105	a. High b. High c. Low d. Low	/2
106	Hydrochloric acid, perchloric acid, hydrobromic acid, hydroiodic acid, nitric acid, sulfuric acid	/3
107	Lithium hydroxide, sodium hydroxide, potassium hydroxide, strontium hydroxide, calcium hydroxide, barium hydroxide	/3
108	Reverse Osmosis Water Purification Units	/1
109	National Pollution Discharge Elimination Systems	/1
110	Jackson Turbidity Units	/1
111	Total Dissolved Solids	/1

112	Formazin Turbidity Units	/1
113	Total Suspended Solids	/1
114	Nephelometric Turbidity Units	/1
115	Clean Water Act	/1
116	a. Saline b. Brackish c. Brine d. Fresh e. Fresh f. Brackish	/3
117	Higher	/1
118	The ability of a solution to buffer pH	/1
119	Thermal enrichment	/1
120	Increase	/1
121	Accept anything between 20-30	/1
122	Accept anything between 60-70	/1
123	Decreases	/1
124	pH	/1
125	6.7%	/10 TB Y/N