WATER QUALITY

Kearney Invitational
January 26, 2013

EXAM

For student to complete:

Name: _____ _____
First Name *Last Name*

Name: _____ _____
First Name *Last Name*

School: _____
Full School Name, No Abbreviations

Exam instructions:

- You are only allowed to use a calculator, a one-sided sheet of paper and a hydrometer during the exam. All other reference materials are prohibited. (You can use either pencil or blue or black pen to complete the exam.)
- Mark your name(s) and school name on the lines above and on the Answer Sheet.
- Look through the exam to confirm you have one double-sided Answer Sheet and 80 test questions (11 pages, excluding the Answer Sheet). If you do not have all of the pages or the Answer Sheet, alert the event supervisor immediately.
- Mark all responses on the Answer Sheet, not within the Exam. Any response not marked on the Answer Sheet will not be scored.
- The event supervisor will not answer any questions regarding the content of the exam.

*** WQ 2013 JR ***

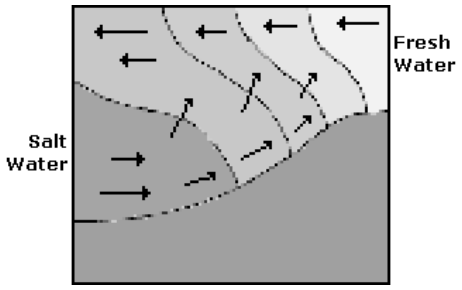
Directions: *Unless otherwise stated, all questions in this exam are in a multiple-choice style. For each question, select the best answer from among the choices given and mark the appropriate corresponding letter on your Answer Sheet. Pay close attention to any provided figures, found alongside their corresponding question(s).*

1. Which of the following is **not** a benefit of a healthy riparian area?
   (A) Trees provide an overhead canopy that keeps stream temperatures cool.
   (B) Vegetated areas help prevent flooding and pollution because of their ability to absorb rain and moisture reduces and filters runoff.
   (C) Log, root wads, low-hanging branches and other streamside vegetation that hang over the water provide cover for fish.
   (D) Highly vegetated riparian areas form silty soils that help maintain a dynamic equilibrium in stream turbidity levels.
   (E) All of the above are true.

2. Which of the following statements is **not** true regarding the river continuum concept?
   (A) In the middle river reaches, the channel meanders and braids.
   (B) In the upper river reaches, the substrate is mainly boulder and cobble.
   (C) In the lower river reaches, the channel is relatively straight.
   (D) In the middle river reaches, the channel is "U"-shaped.
   (E) In the upper river reaches, there are steep gradient step pools.

3. Which of the following is **not** an affect of a wetland?
   (A) Wetlands act as a nursery for young wildlife, providing a safe home for young organisms to live.
   (B) During floods, wetlands absorb excess water and prevent the water from flooding lowland areas.
   (C) Wetlands trap excess sediment and prevent the sediment from entering a nearby water body.
   (D) Wetlands act as direct conduits to groundwater, so pollution can easily affect underground aquifers.
   (E) All of the above are true.

4. Which of the following is **not** true of the intertidal zone in an estuary?
   (A) The intertidal zone is the area between high and low tide, so it is not always wet or always dry.
   (B) Some organisms carve holes into the rocks and hide in these holes during tidal changes.
   (C) Mussels use byssal threads to hold onto rocks and prevent themselves from being pulled off the tide.
   (D) Nekton are always found in the intertidal zone during both high and low tides.
   (E) All of the above are true.



5. Which of the following statements is true with regard to the water circulation diagram above?
   (A) The diagram shows a salt wedge estuary.
   (B) This water circulation pattern can be found in tectonic estuaries.
   (C) This estuary could have been formed when sandbars built up along coastlines.
   (D) This estuary has strong tidal mixing and low river flow.
   (E) These estuaries have been formed by moving glaciers and invading seas.

6. Which of the following statements is **not** true regarding estuary habitats?
   (A) In mudflats, epibenthos are affixed to the surface of the sediment and not free to move.
   (B) Marsh grasses contain toxic compounds, so little vegetation is consumed in a marsh.
   (C) Barrier beaches are continually moving toward the coastline due to pounding waves.
   (D) On a rocky shore, the zone above the intertidal zone is referred to as the spray zone.
   (E) All of the above are true.

7. Which of the following process(es) in the water cycle is/are affected by vegetation?
   I. Transpiration
   II. Interception
   III. Runoff

   (A) I only
   (B) II only
   (C) I and II only
   (D) I and III only
   (E) I, II and III

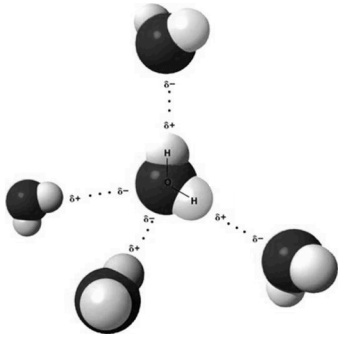
8. Which of the following is **not** true regarding the conversion of forms within the carbon cycle?
   (A) Respiration; oxygen to carbon dioxide in all organisms
   (B) Photosynthesis; carbon dioxide to oxygen in autotrophic organisms
   (C) Combustion; release of methane from organic compounds
   (D) Thermohaline circulation; movement of carbon dioxide within the ocean
   (E) All of the above are true.

9. Which of the following is **not** a way in which atmospheric nitrogen (N_2) can be converted into a form readily available to plants and animals?
   (A) Bacteria within the soil or leguminous plants, such as diazotrophs
   (B) Through the Haber-Bosch process under high temperature and pressure
   (C) Photon release through high-intensity chemical reactions, mainly within the atmosphere
   (D) Evaporative processes within hydrothermal vents or special algae
   (E) All of the above are true.

10. Which of the following is **not** a function of phosphorous within a living organism?
   (A) Energy storage at ATP
   (B) Alkaline compound within the esophagus
   (C) Nucleic acid formation within DNA and RNA
   (D) Bone strengthening as calcium phosphate
   (E) Structure of cell membrane through lipids

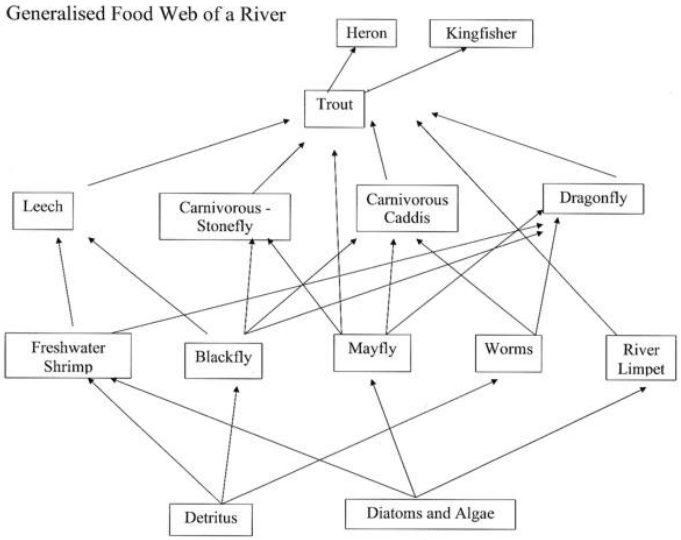
11. Cohesion:
   I. Gives rise to surface tension
   II. Is a result of hydrogen bonding
   III. Helps make water the "universal solvent"

   (A) I only
   (B) II only
   (C) I and II only
   (D) I and III only
   (E) I, II and III



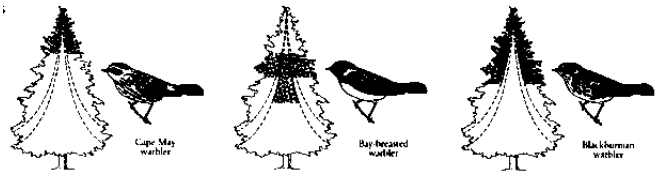
12. The above diagram shows the interaction between a water molecule and surrounding water molecules. What is shown by the dotted lines?
   (A) Hydrogen bonding
   (B) Covalent bonding
   (C) Capillary action
   (D) Adhesion
   (E) None of the above.

13. Which of the following properties of water allows ice to float within a body of liquid water?
   (A) Adhesion
   (B) Surface tension
   (C) Hydrogen bonds
   (D) Polarity
   (E) Capillary action

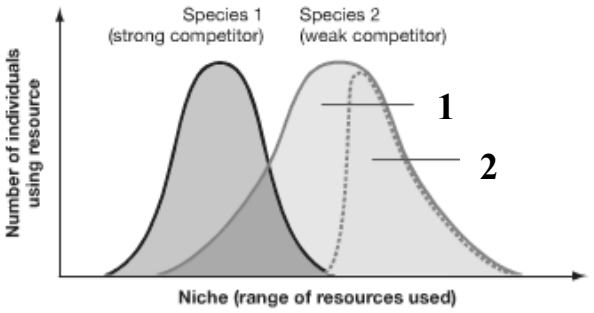


14. In the food web, what order consumer is the dragonfly?
   (A) First
   (B) Second
   (C) Third
   (D) Fourth
   (E) Not enough information to tell.

15. In the food web, when the trout eats the carnivorous stonefly, what order carnivore is the heron?
   (A) First
   (B) Second
   (C) Third
   (D) Fourth
   (E) Not enough information to tell.



16. Select the term that is best exemplified in the diagram above.
   (A) Intraspecific competition
   (B) Interspecific competition
   (C) Resource partitioning
   (D) Competitive exclusion
   (E) None of the above.



17. In the diagram above, 1 represents the ___ of Species 2 while 2 represents the ___ of Species 2 because of ___ with Species 1.
    (A) Realized Niche … Fundamental Niche … Symbiosis
    (B) Fundamental Niche … Realized Niche … Competition
    (C) Realized Niche … Fundamental Niche … Competition
    (D) Fundamental Niche … Realized Niche … Symbiosis
    (E) Fundamental Niche … Realized Niche … Resource Partitioning

ΔΔ•Δ•μΩΔΔ •••ΔΔΔ•••μΩ ΔΩ
ΔΔΩμΩ•••ΔΔΔ•••• μΔ••
ΩΩΩΩμμμΔΔΔΔΔΩΔ
ΔΔμ ΔΔΔ••ΔμΔ ΔΔΔΔ• • ΩΩΔΔμ
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18. The diagram above shows the population distribution and density for algae, shrimp, dragonfly and trout, according to the following food chain:
Algae → Shrimp → Dragonfly → Trout

    Which symbol should represent the algae?
    (A) Ω
    (B) Δ
    (C) μ
    (D) •
    (E) Unable to determine from the given information.

19. Devin has a fish tank with guppies. Every day, Devin feeds his fish one-half teaspoon of fish food. The average guppy population in his aquarium over four months is 38 guppies. Devin goes on a four-month vacation and asks Nathan to take care of his tank. Accidently, Nathan starts to give the guppies one teaspoon of fish food each day. After the vacation, the average population is 53 guppies. Which of the following statements is true?
    (A) The size of the aquarium is a limiting factor.
    (B) Fish food is a limiting factor.
    (C) As long as Devin and Nathan keep adding more food, the guppy population will grow.
    (D) The guppy population has reached carrying capacity.
    (E) Guppies are super cool fish.

Area	A	B	C	D
1	17	6	1	2
2	15	8	9	1
3	8	9	15	9
4	9	3	17	4

20. Organisms A, B, C, and D are counted in four different areas and the results appear in the above data table. Which area has the greatest biodiversity?
    (A) Area 1
    (B) Area 2
    (C) Area 3
    (D) Area 4
    (E) Cannot conclude from the data

21. Which of the following lists the potable water treatment steps in the correct order?
    (A) Filtration, Sedimentation, Disinfection, Coagulation
    (B) Sedimentation, Coagulation, Disinfection, Filtration
    (C) Disinfection, Filtration, Coagulation, Sedimentation
    (D) Sedimentation, Filtration, Coagulation, Disinfection
    (E) Coagulation, Sedimentation, Filtration, Disinfection

22. Which of the following is **not** a potential problem with a septic tank?
    (A) Flushing of non-biodegradable materials such as cigarette butts and hygiene products
    (B) Roots from trees and shrubbery growing above the tank and/or drain field
    (C) Death of septic bacteria due to excessive fecal matter
    (D) High rainfall and flooding from rivers or other bodies of water
    (E) All of the above are potential problems.

23. Which of the following statements is **not** true regarding wastewater treatment?
    (A) In primary treatment, large and small particles are physically removed.
    (B) In secondary treatment, bacterial 'flocs' are allowed to form an activated sludge.
    (C) All of the sludge, after secondary treatment, is sent to large tanks where anaerobic sludge digesters digest the sludge.
    (D) In tertiary treatment, the fluid from secondary treatment is chemically treated to remove phosphate and nitrate products.
    (E) All of the above are true.

Directions for Questions 24-34: *Questions 24-34 are not in a multiple-choice style. For each of the following fifteen questions, you will be given a figure representing a specific macroinvertebrate. Identify the macroinvertebrate and then mark the appropriate letter, corresponding to your identification choice, from the options below. Do NOT write the full common name on the Answer Sheet; you will receive no credit. Mark the appropriate letter, using the key below. You do not need to, and should not, mark pollution tolerance class or life stage on the Answer Sheet.*

Example: If a photograph of a mayfly nymph is given, simply mark "A" on the Answer Sheet, according to the letter designation key below.

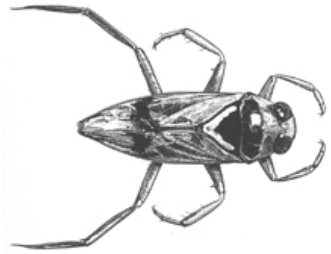
Questions 35-80 will continue in a multiple-choice style, following the instructions given on the top of Page 2.

QUESTIONS 24-34: Macroinvertebrate Letter Designation Key

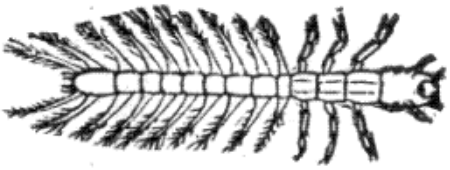
Mark the appropriate English alphabet letter or Greek alphabet letter on your Answer Sheet.

(A) Mayfly	(G) Riffle Beetle	(M) Crane Fly	(S) Deer/Horse Fly	(Y) Giant Water Bug
(B) Stonefly	(H) Water Scorpion	(N) Water Mite	(T) Tubifex	(Z) Back Swimmer
(C) Caddisfly	(I) Aquatic Sowbug	(O) Blackfly	(U) Blood Midge	(θ) Midge
(D) Dobsonfly	(J) Damselfly	(P) Flatworm	(V) Whirligig Beetle	(π) Water Boatman
(E) Gilled Snail	(K) Dragonfly	(Q) Leech	(W) Water Strider	(Ω) Predacious Diving Beetle
(F) Water Penny	(L) Scud	(R) Air Breathing Snail	(X) Mosquito	

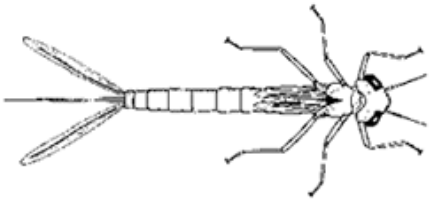
24. Identify the specimen shown below.



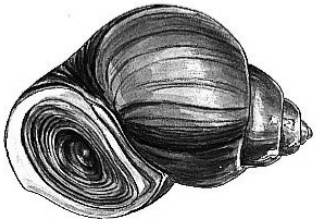
25. Identify the specimen shown below.



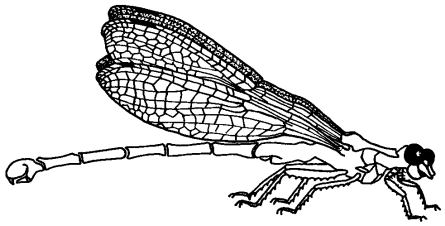
26. Identify the specimen shown below.



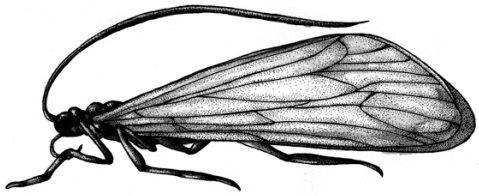
27. Identify the specimen shown below.



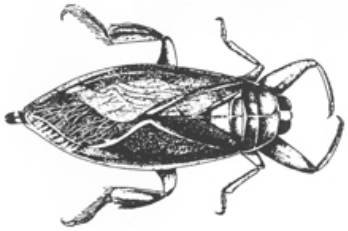
28. Identify the specimen shown below.



29. Identify the specimen shown below.

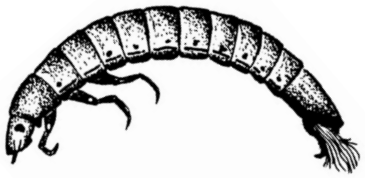


30. Identify the specimen shown below.



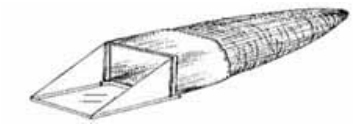
31. Identify the specimen shown below.

32. Identify the specimen shown below.



33. Identify the specimen shown below.

34. Identify the specimen shown below.

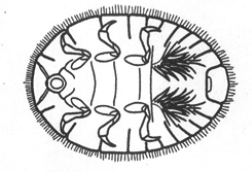


35. Which of the following statements is **not** true regarding the net shown above?
    (A) This net can be used in fast-moving waters.
    (B) In deeper water, some macroinvertebrates may drift over the top of the net.
    (C) This net is typically the most precise for macroinvertebrate sampling.
    (D) This net is commonly referred to as a sieve square net.
    (E) All of the above are true.

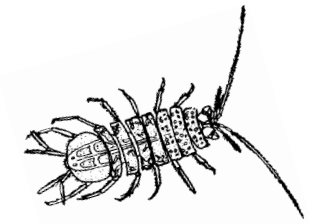
36. A scientist goes out into a stream and comes back with the following observation: "There were only two taxa of macroinvertebrate present, and there were a high number of collectors." Which of the following can be concluded about the stream the scientist visited?
    (A) There is no problem with the stream; it has good water quality.
    (B) There is organic pollution (nutrient enrichment) or sedimentation with lots of algal growth.
    (C) There is severe organic pollution or sedimentation.
    (D) There are toxic pollutants in the water or the water body is naturally unproductive due to limited light or nutrients.
    (E) None of the above.

37. Why is percent composition important?
    (A) Because it indicates the number of stoneflies, mayflies and caddisflies present in a stream.
    (B) Because it indicates the presence of pollution tolerant versus pollution intolerant macroinvertebrates.
    (C) Because it shows the diversity present within the macroinvertebrates at the site.
    (D) Because it shows the density of the macroinvertebrate populations at the site.
    (E) More than one of the above.

38. Which of the following is true about leaf packs?
    (A) The most productive ones consist of older, decaying material.
    (B) They typically support the most diverse macroinvertebrate communities.
    (C) A long-handled net is typically needed to collect them.
    (D) They are a common habitat for scrapers.
    (E) More than one of the above is true.



39. Where in the river continuum would the macroinvertebrate pictured above most likely be found?
    (A) Headwaters
    (B) Midreach
    (C) Lower reach
    (D) Midreach and lower reach
    (E) Throughout the river continuum



40. What type of metamorphosis does the macroinvertebrate pictured above exhibit?
    (A) No metamorphosis
    (B) Simple incomplete metamorphosis
    (C) Incomplete metamorphosis
    (D) Complete metamorphosis
    (E) Bisectional complete metamorphosis

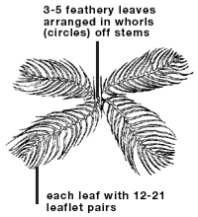
41. In incomplete metamorphosis, an insect during the interval between molts is referred to as a(n):
    I. Molter
    II. Instar
    III. Pupa

    (A) I only
    (B) II only
    (C) I or II only
    (D) II or III only
    (E) I, II or III

42. Which of the following functional feeding groups is **not** matched with its correct food?
(A) Shredder – Coarse Particulate Organic Matter
(B) Scrapers – Photosynthetic Diatoms
(C) Filtering Collectors – Fine Particulate Organic Matter
(D) Predators – Macroinvertebrates
(E) All of the above are correct.

43. Which of the following is **not** true of invasive species?
(A) They are generalists.
(B) They lack natural population checks in their new habitat.
(C) They typically exhibit r-selective reproductive patterns.
(D) They are always introduced from another area (i.e. they are never native species).
(E) All of the above are true.

44. Which of the following is **not** a reason for why people care about the introduction of aquatic nuisance species?
(A) They may disrupt travel patterns on highways or airways.
(B) They may lower native plant and wildlife biodiversity.
(C) They may act as vectors for disease and harm public health.
(D) They may cost a government billions of dollars and, possibly, lead to tax increases.
(E) They may outcompete natives and take over key niches.



45. Walking along a pond shoreline, you find a part of an invasive plant, pictured above. What plant did you find?
(A) Purple loosestrife
(B) Eurasian water milfoil
(C) Water hyacinth
(D) Spiny water plant
(E) None of the above.

46. Why was purple loosestrife introduced?
(A) For roadside erosion management
(B) For scientific research
(C) For garden use
(D) Accidently via cargo on ships
(E) Accidently via seeds getting stuck on clothing

47. Greg Sass, with the Illinois Natural History Survey, said: "This thing'll hurt you. They can jump out of the water at high speeds. They can jump great distances out of the water, and so they're quite dangerous when you're on a river." What invasive species is Sass referring to?
(A) Asian tiger mosquito
(B) Silver carp
(C) Bighead carp
(D) Black carp
(E) Grass carp

48. How was the spiny water flea introduced to the United States?
(A) Ballast water operation
(B) Escape from aquaculture facilities
(C) Released as biological control of an existing invader
(D) Intentional release from laboratory research
(E) None of the above.

49. Which of the following is **not** an effect of water hyacinth?
(A) Decreased water flow
(B) Decreased dissolved oxygen levels
(C) Increase in prime mosquito habitat
(D) Increase in food for waterfowl
(E) All of the above are effects.

50. A forested watershed is currently under development to support an extensive commercial shopping center. Which of the following is **not** a possible effect on the watershed?
(A) Decreased slope stability
(B) Increased runoff
(C) Increased erosion
(D) Increased sediment and debris
(E) All of the above are possible effects.

51. The Big Rock Candy Mountain Mine Co. moves into a nearby watershed and begins an extensive mining operation for candy cane ore. Metals, sulfates and radionuclides begin to leach out of the soil and run off into nearby Wright River. Which of the following will most likely **not** happen in the river?
(A) Bioaccumulation of chemicals within tissues of plants and animals
(B) Over-stimulation of algae growth and then later decay
(C) Lower pH and possibly kill off flora and fauna communities
(D) Decomposition into toxic compounds that can be carcinogenic
(E) All of the above are possible effects.

52. During the mining phase, the Big Rock Candy Mountain Mine Co. builds an urban area to house the miners. From this urban area, runoff is high, contributing PCBs, PAHS and petroleum hydrocarbons to the river. Which of the following will most likely **not** happen in the river?
(A) Create carcinogenic compounds in digestion
(B) Cause extreme fish kills
(C) Reduce visibility for site-feeding fish
(D) Bioaccumulation and bio-magnification within the food web
(E) All of the above are possible effects.

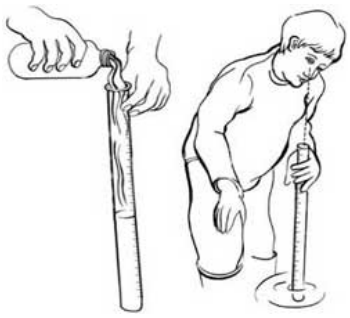
53. The city built by the Big Rock Candy Mountain Mine Co. is also contributing excessive amounts of sediment to the nearby Wright River. Which of the following will most likely **not** happen in the river?
(A) Affect breathing through fish gills
(B) Decrease in available benthic habitats
(C) Decrease in photosynthesis within plants
(D) Bioaccumulation within the food web
(E) All of the above are possible effects.

54. Which of the following is the most accurate way to measure for salinity in a water body?
(A) Titration
(B) Conductivity
(C) Dehydration
(D) Respirometer
(E) Colorimetry

55. Which of the following will **not** decrease the temperature of a water body?
(A) Early morning
(B) Spring from groundwater
(C) Overhanging canopy
(D) Low sediment load
(E) All of the above decrease temperature.

56. Which of the following will **not** increase dissolved oxygen content in a river?
(A) Higher altitude
(B) Higher flow
(C) More riparian vegetation
(D) Dam removal
(E) All of the above increase dissolved oxygen content.

57. A solution has a pH of 5. The pH is then decreased to 2. By what factor did the concentration of hydrogen ions increase?
(A) 2
(B) 3
(C) 100
(D) 1000
(E) 0.001



58. You and your friend are conducting water quality tests in a river. Your friend is shown in the diagram above using a special tool. What tool is your friend using and what is he measuring?
(A) Jackson Tube … Turbidity
(B) Secchi Dish … Total Solids
(C) Jackson Tube … Total Solids
(D) Secchi Dish … Turbidity
(E) Nephelometer … Total Solids

59. Which of the following, if added to a body of water, will **not** increase the turbidity?
(A) Soil
(B) Algae
(C) Detritus
(D) Salt
(E) All of the above increase turbidity.

60. Which of the following is true of a biochemical oxygen demand test?
(A) It is the comparison of a freshly collected sample with a sample stored in a well-lit room for five days.
(B) It is the comparison of a freshly collected sample with a sample stored in a dark room for five days.
(C) It is the comparison of a sample taken from a stream five hundred feet away from another sample taken from the same stream.
(D) It is the comparison of a sample taken five days after a previously taken sample at the same location in the same stream.
(E) None of the above are true.

61. Which of the following locations would most likely have the highest biochemical oxygen demand level?
(A) An oligotrophic lake surrounded by a tall-grass prairie in the Midwest
(B) A headwater stream flowing through the Rocky Mountains
(C) A mid-reach river flowing through a suburban development in Connecticut
(D) A large river flowing through industrial development, filled with effluent from factories and power plants in California
(E) All of the above should have the same biochemical oxygen demand levels.

62. Phosphorous can act as a growth-limiting factor for plants. What kind of phosphorous is most readily available for plant growth and use?
(A) Organic phosphate
(B) Inorganic phosphate
(C) Condensed phosphate
(D) Oxidized phosphate
(E) All of the forms of phosphorous listed above are equally available for plant use.

63. You and your friend are now testing for nitrogen. Which of the following tests should you conduct?
(A) Fix your water sample and then titrate it with a solution with a known nitrate concentration.
(B) Place the solution on a Petri Dish along with known bacteria colonies and count colony growth.
(C) Titrate the solution with a known nitrate concentration to form a precipitate and then analyze the precipitate colorimetrically.
(D) Chemically alter your sample to yield a toxic metal and then analyze it colorimetrically.
(E) Count the nitrate ions floating within the water sample after adding a special chemical to make them visible to the human eye.

64. What is the most common form of nitrogen in the water?

I. NO_3
II. NH_3
III. NO_2

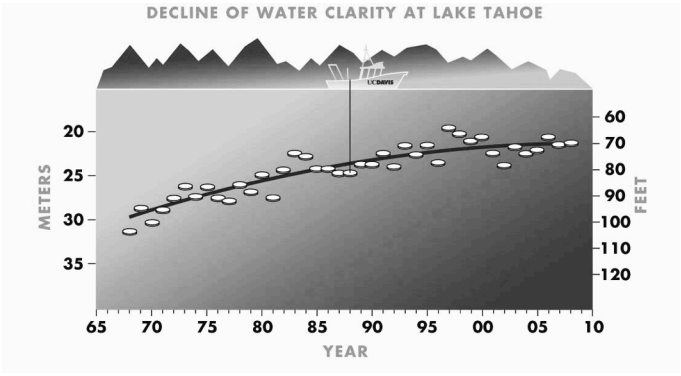
(A) I only
(B) II only
(C) I and II only
(D) II and III only
(E) I, II and III

65. Which of the following methods could be used, either independently or in conjunction with other methods, to properly test for total solids?

I. Conductivity
II. Titration
III. Dehydration

(A) I only
(B) II only
(C) I and III only
(D) II and III only
(E) I, II and III

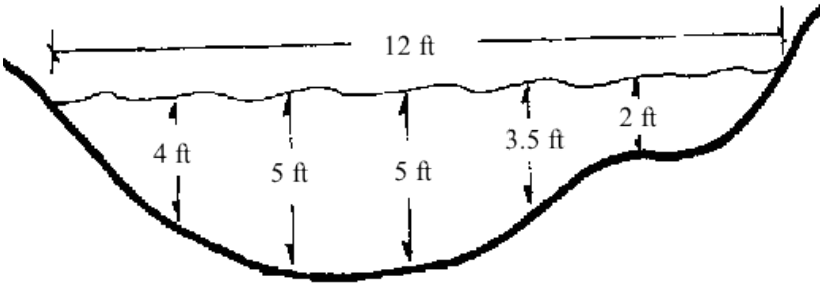
66. Devin boldly declares in his science class: "Fecal coliform is an indicator species!" Nathan snickers in the back of the room and equally as boldly declares: "Silly, Devin! They are not indicator species!" Mr. E., the science teacher, moves to the front of the class and says:
(A) "Devin is right. Fecal coliform is the most important water quality indicator."
(B) "Devin is right. Fecal coliform indicates the presence of harmful bacteria."
(C) "Nathan is right. Fecal coliform themselves are harmful."
(D) "Nathan is right. Though tested for, fecal coliform does not affect the water quality index."
(E) "Well, it really depends on the situation and the particular body of water being studied."



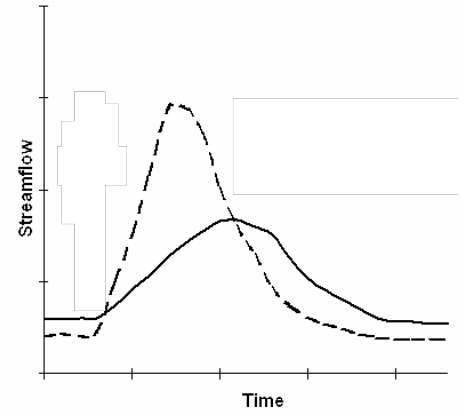
67. Consider the graph above. What is most likely happening to the temperature of Lake Tahoe from 1965 to 2010?
(A) Temperature is increasing.
(B) Temperature is decreasing.
(C) Temperature is increasing until 1989 and then decreasing.
(D) Temperature is not changing.
(E) Not enough information to make any inferences into temperature.

68. Consider the graph above. At what time of day and during what year would a dissolved oxygen reading be the highest?
(A) 2010 at 12:00 pm
(B) 1968 at 6:00 am
(C) 1968 at 6:00 pm
(D) 1989 at 6:00 am
(E) 1989 at 6:00 pm

69. Which of the following benthic zone scenarios provides the best habitat for macroinvertebrates?
(A) High embeddedness, Low consolidation
(B) Low embeddedness, High consolidation
(C) High embeddedness, High consolidation
(D) Low embeddedness, Low consolidation
(E) It does not matter.



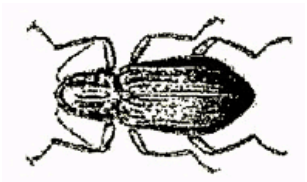
70. On the stream shown above, you conduct a velocity test. Your starting point is 10 feet from your finish line. In the first trial, it takes the ball 4.5 seconds to move from start to finish; second trial, 5.2 seconds; third trial, 4.9 seconds. Calculate the stream flow for the stream shown above.
(A) 2.1 ft^3/sec
(B) 8.0 ft^3/sec
(C) 48.6 ft^3/sec
(D) 73.1 ft^3/sec
(E) 96.2 ft^3/sec



71. The solid line in the hydrograph above represents stream flow three years ago. The dotted line in the hydrograph represents stream flow one month ago. What conversion most likely took place within the watershed where this stream is located?
    (A) Urban to Agricultural
    (B) Suburban to Agricultural
    (C) Forested to Urban
    (D) Urban to Forested
    (E) Not enough information to tell.

Site A	*Site B*
Mayfly nymphs	Air breathing snails
Dobsonfly larva	Black fly larva
Damselfly nymphs	Blood midge
Gilled snails	Deer fly larva

72. Site A is upstream of Site B. You search for macroinvertebrates and you record the data you find in the table above. Which of the following is most likely **not** true for the two sites?
    (A) Site A has more dissolved oxygen level than Site B.
    (B) Site A has higher biochemical oxygen demand than Site B.
    (C) Site B has higher turbidity than Site A.
    (D) Site B has higher fecal coliform count than Site A.
    (E) All of the above are true.

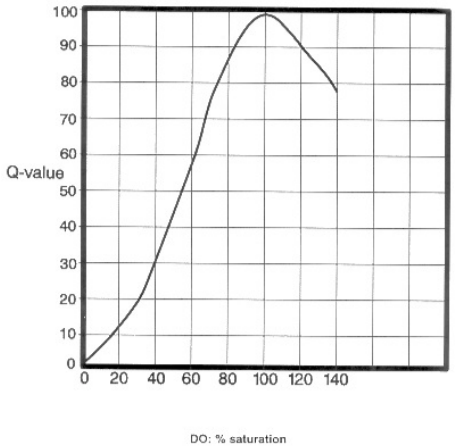


73. Consider the macroinvertebrate pictured above in the context of the table above #72. At what site would this macroinvertebrate most likely be located?
    (A) Site A
    (B) Site B
    (C) Neither Site A or Site B
    (D) Either Site A or Site B
    (E) Not enough information to answer the question.

74. Hardness of a water is:
    (A) Governed by the concentration of calcium and magnesium salts.
    (B) Governed by the concentration of calcium and different carbonates.
    (C) Governed by the concentration of sodium and chloride ions dissociating from salt.
    (D) Governed by the concentration of transition metals or radioactive elements.
    (E) None of the above.

75. Consider the instream habitat with the lowest dissolved oxygen level. When flow is high, what will this habitat most likely be?
    (A) Run
    (B) Glide
    (C) Pool
    (D) Riffle
    (E) None of the above.

WQI Table	**Q-Value**	**Weighing**	**Total**
Dissolved Oxygen		0.17	
Fecal Coliform		0.16	
pH		0.11	
Biological Oxygen Demand		0.11	
Temperature		0.10	
Total Phosphate		0.10	
Nitrates		0.10	
Turbidity		0.08	
Total Solids		0.07	

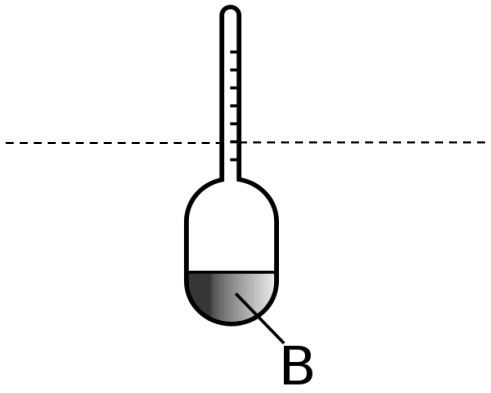


76. Using the Water Quality Index (WQI) Table and the dissolved oxygen Q-value graph, both shown above, if a lake has a dissolved oxygen level of 40%, what is the total Water Quality Index value for dissolved oxygen in the lake?
    (A) 0.006
    (B) 5.1
    (C) 6.8
    (D) 176.5
    (E) 235.3

77. A scientist goes out into a stream and comes back with the following observation: "There is a low biodiversity of macroinvertebrates but a high density of collectors and scrapers." Which of the following can be concluded about the stream the scientist visited?
   (A) There is no problem with the stream; it has good water quality.
   (B) There is organic pollution (nutrient enrichment) or sedimentation with lots of algal growth.
   (C) There is severe organic pollution or sedimentation.
   (D) There are toxic pollutants in the water or the water body is naturally unproductive due to limited light or nutrients.
   (E) None of the above.

78. A hydrometer measures:
   (A) Specific heat
   (B) Specific gravity
   (C) Capillary action
   (D) Cohesion
   (E) Heat of vaporization

79. You and your friend are now testing for fecal coliform. Your result is shown above. What went wrong in the procedure?
   (A) Unclean filter holder or poor seal
   (B) Improper sealing of filter
   (C) Sample size was too large
   (D) Sample was not swirled while filtering
   (E) There is no way to tell.



80. The hydrometer shown above will be placed within a solution so side "B" sinks. The hydrometer is designed to measure salinity concentrations from 0% to 6% with each tick mark representing a one-percent change in salinity from the previous tick mark. Thus, the markings are: 0%, 1%, 2%, 3%, 4%, 5%, and 6%. If the water level moves up to the dotted line when the hydrometer is placed within the solution, what is the salinity of the solution?
   (A) 0%
   (B) 1%
   (C) 2%
   (D) 5%
   (E) 6%

• END OF EXAM •

"Water is the driving force of all nature."
- Leonardo da Vinci