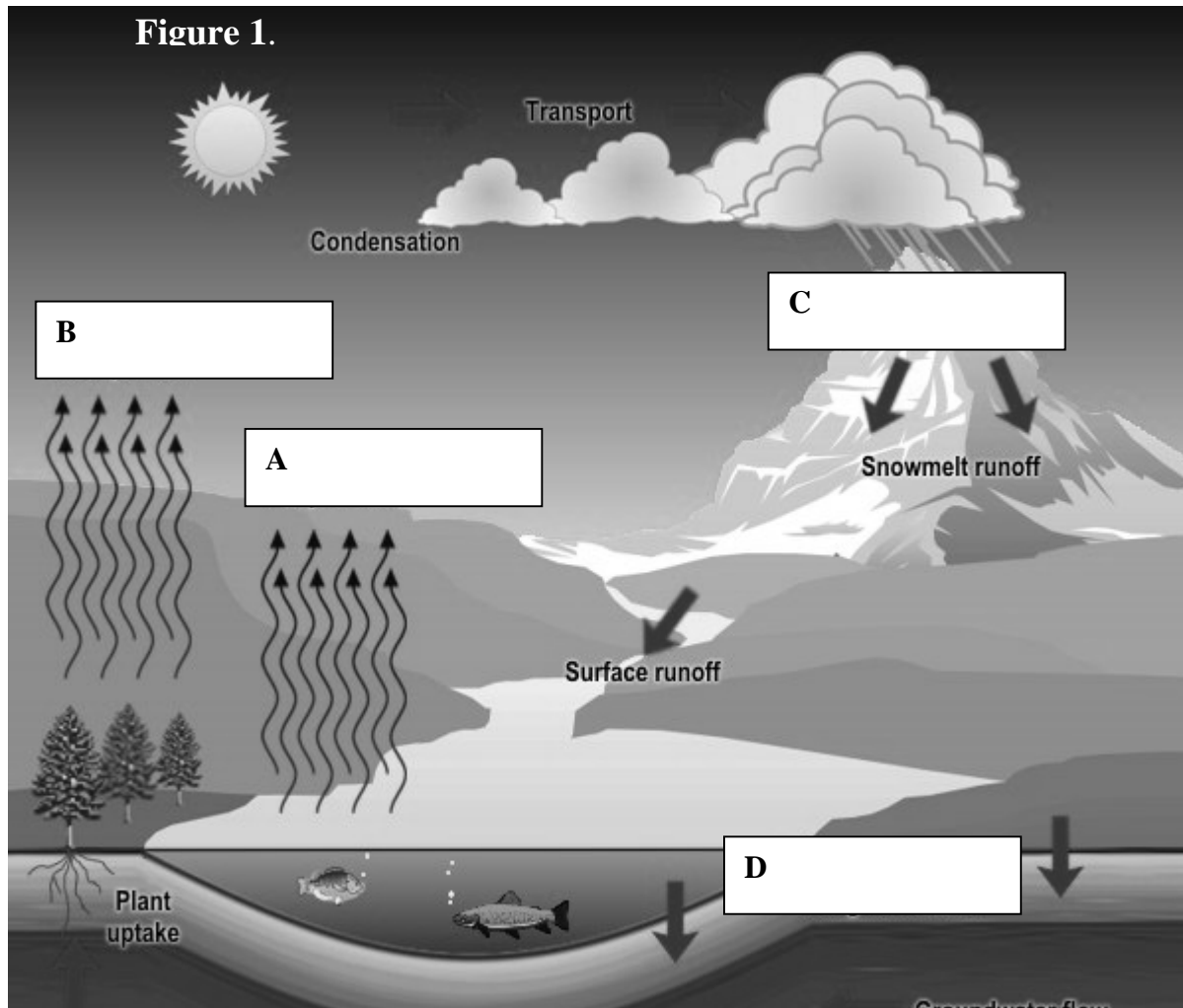


2011 California Envirothon
Aquatics Station Test
100 Points

Please write team number on top of each page of the test. You may un-staple the test and work on questions in any order, however, pages should be returned to correct order when test is turned in. You may choose to split your team up and work on multiple questions at once or work on questions together. Please WRITE LEGIBLY show all work, as you may receive partial credit where possible.



The next five questions apply to Figure 1.

This figure is an illustration of the transfer of water from atmospheric precipitation to surface water and ground water, to storage and runoff, and eventually back to the atmosphere.

1. What is this cycle called _____ (1 pt.)
2. Fill in the four blanks on Figure 1. The blanks define processes. (4 pts.)

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3. Evaporation is the change of state in a substance from a _____ to a gas. (1 pt.)
4. Of the transpired water passing through a plant, only 1% is used in the growth process of the plant. The remaining 99% is passed into the _____. (1 pt.)
5. Runoff occurs when there is excessive precipitation and the ground is _____ . (1 pt.)
6. A portion of precipitation never reaches the ground because of vegetation, forest floors, or other surfaces. What is this process called? _____ (1 pt.)
7. Impervious surfaces such as pavement and rooftops generate how much more runoff than a woodland area of the same size? (2 pts.) (Circle answer below)
 - a. 3-4 times
 - b. 5- 6 times
 - c. 9-12 times
 - d. 100 times
8. What 4 factors contribute to the degree of salinity within an estuary? (5 pts.)

9. Within coastal waters and estuaries, plants provide for what 4 important ecosystem functions? (4 pts.)

10. The degree to which fresh water and saltwater mix in an estuary is measured using

_____. (1 pt.)

11. Define “brackish”? (3 pt.)

12. Isohalines are_____.(3 pts.)

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13. The original Estuary Restoration Act was passed into law in 2000 to: (5 pts.)

14. In addition to classifying estuaries based on their geology, scientists also classify estuaries based on their water circulation. The five major types of estuaries classified according to their water circulation include: (5 pts.)

15. What is a freshwater estuary and where do they occur? (3 pts.)

16. Of the 32 largest cities in the world _____ are located on estuaries. (1 pt.)

17. Aquatic invasive species introduction can often be traced back to human-related activities including boat hulls and the use of fishing bait. Name 2 other human-related activities responsible for invasive species introduction into estuaries? (3 pts.)

18. What is the difference between anadromous and catadromous fish? (4 pts.)

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Water Chemistry Measurements

19. Fill out the following table using the water quality testing equipment available at the station.

| Measurement | San Francisco Bay Estuary near China Camp | Dutchbill Creek |
|--------------------|--|------------------------|
| Water Temperature | Given | (2 pts.) |
| pH | Given | (2 pts.) |
| Alkalinity | Given | (2 pts.) |
| Dissolved Oxygen | Given | (2 pts.) |

20. Based on your measurements and the data provided in the table above, describe the similarities or differences in the physical properties between the two. (5 pts.)

Water Chemistry Short Answers

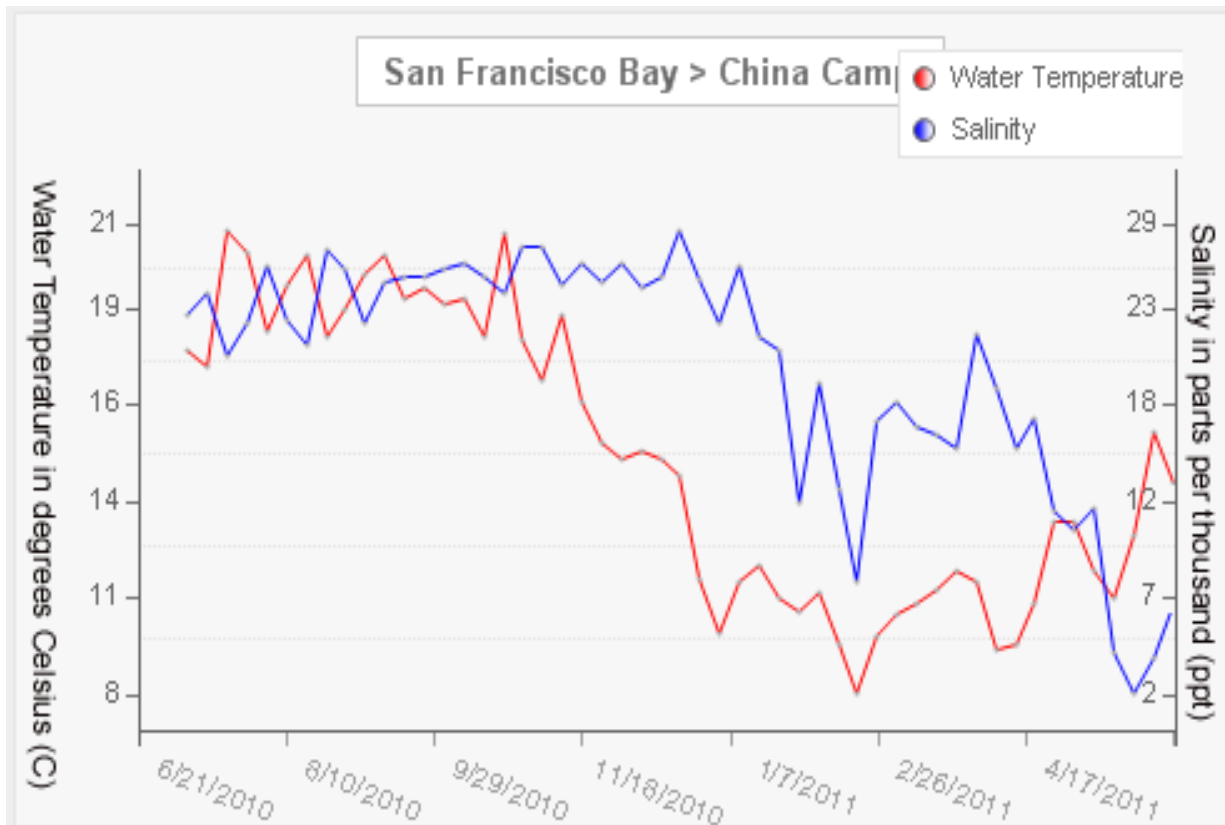
21. Estuaries consist predominantly of fluctuations in what three variables? (3 pts.)

22. Explain how a change in each of the three variables, increase and decrease, can affect the water quality from your previous answer above. (6 pts.)

Team # _____

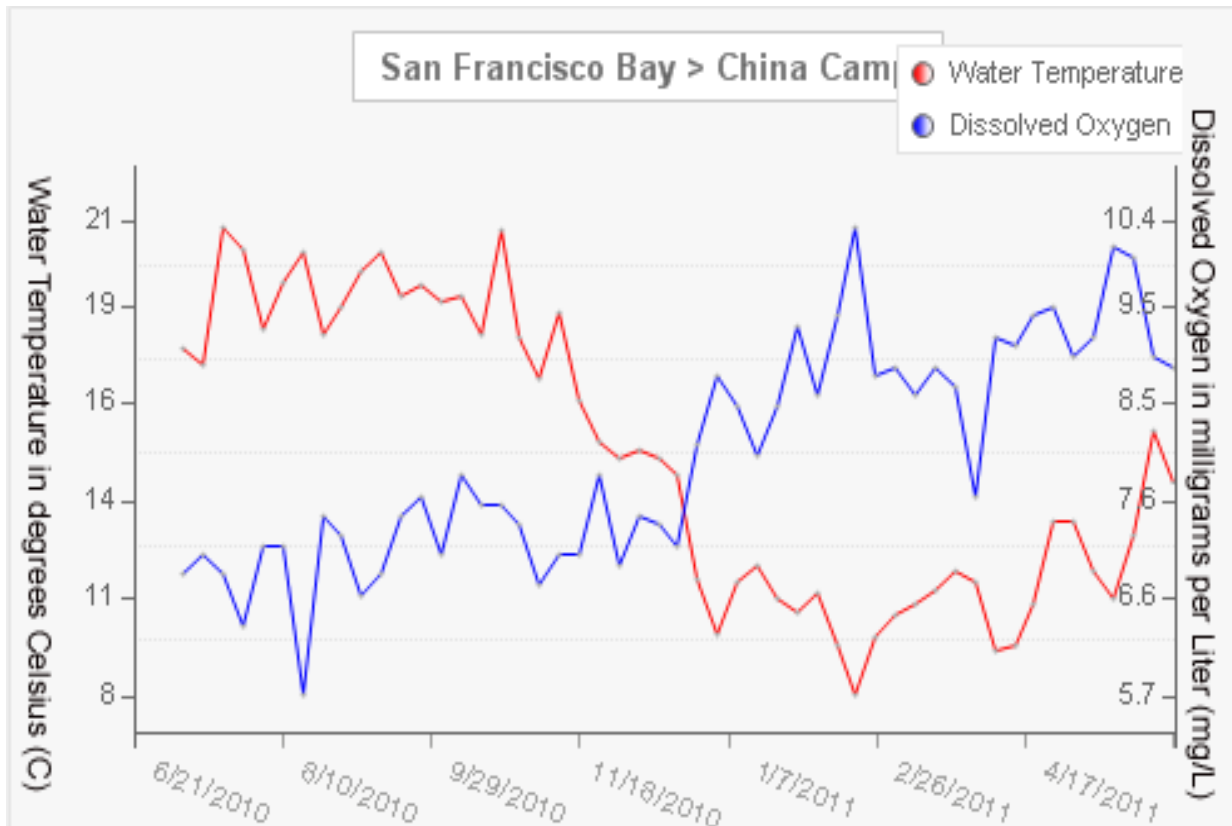
23. When estuaries develop hypoxic zones, what is happening within this zone? (3 Pt.)

24. Over the last several millennia, what is the greatest source or contributing factor affecting estuaries health and stability? (3 pts.)



25. Looking at the graph, what general observations can be made and, if applicable, how does this/these observation(s) you made affect estuary habitat? (3 pts.)

Team # _____



26. Looking at the graph, what general observations can be made and, if applicable, how does this/these observation(s) you made affect estuary habitat? (2 pts.)

Team # _____

Water Essay

27. Estuaries are crucial transition zones between land and water that provide for lessons in biology, geology, chemistry, physics, history, and social issues. In a short essay, explain the importance of each of these elements and how the interaction between these elements would cause not only national but global concern for their continued health and function? (20 pts.)