Round: 10B
Category: Biology- Difficult
Time: 4 minutes

You have a large estuarine aquarium (water salinity is 20) with many estuarine and marine fishes in your air-conditioned living room in Charleston, SC. All of the fish are healthy and the electrical air pump and water filter are working when you go on a 2-week vacation in the summer. However, the friend you asked to take care of the aquarium forgets about the task and when you come back your neighbors tell you that the electricity in your house went off 2 days after you left. Inside, the electricity is still off and the water level in the aquarium has dropped to $^{2}/_{3}$ of its original level. While you were away, the outside temperature in Charleston was about 38 ºC.

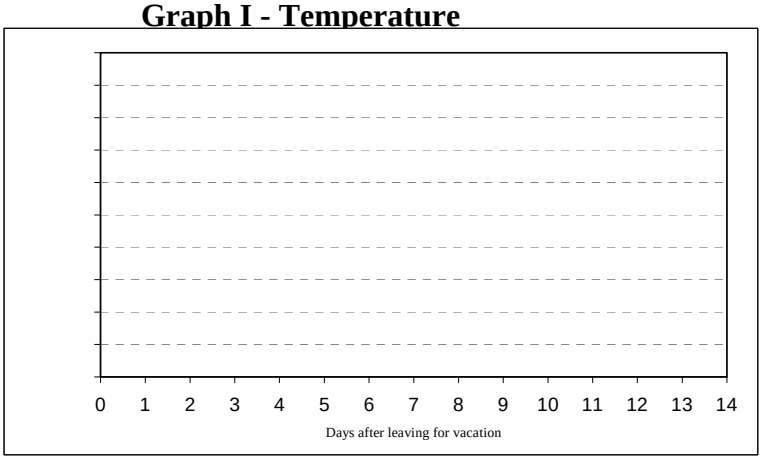
1. Graph the change in the temperature of the aquarium water in graph I. Add values (in ºC) to the y-axis. Explain briefly what changes occurred and why. (5 pts)

2. Graph the change in salinity of the aquarium water in graph II. Add values to the y-axis. Explain briefly what changes occurred and why. (5 pts)

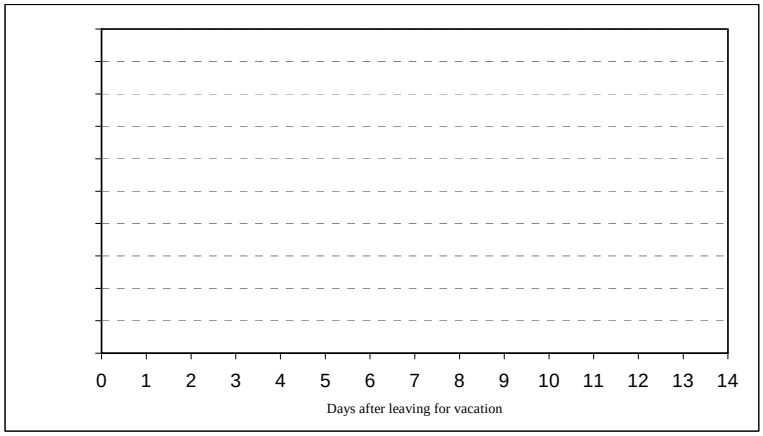
3. Graph the change in oxygen concentration of the aquarium water in graph III. Add values (in % saturation) to the y-axis. Explain briefly what changes occurred and why. (6 pts)

4. Graph the change in ammonia concentration of the aquarium water in graph IV. You DO NOT have to add values to the y-axis. Explain briefly what changes occurred and why. (4 pts)

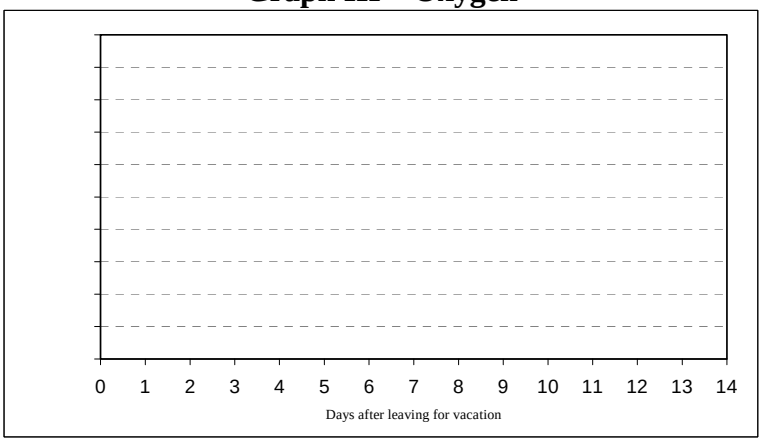
Graph I - Temperature



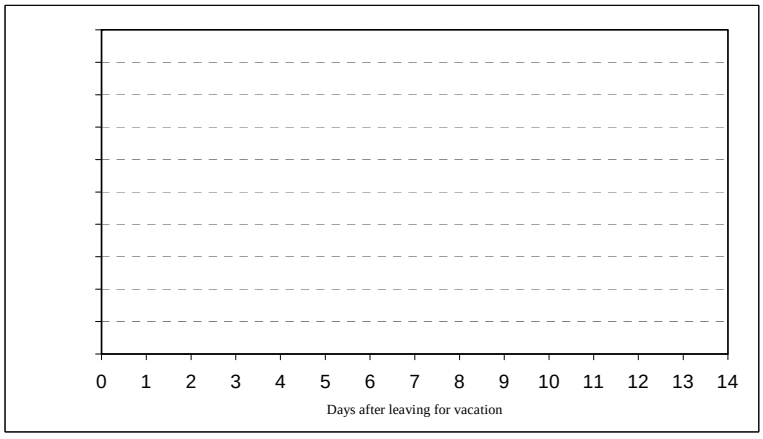
Graph II – Salinity



Graph III – Oxygen



Graph IV - Ammonia



ANSWER **ANSWER** **ANSWER**

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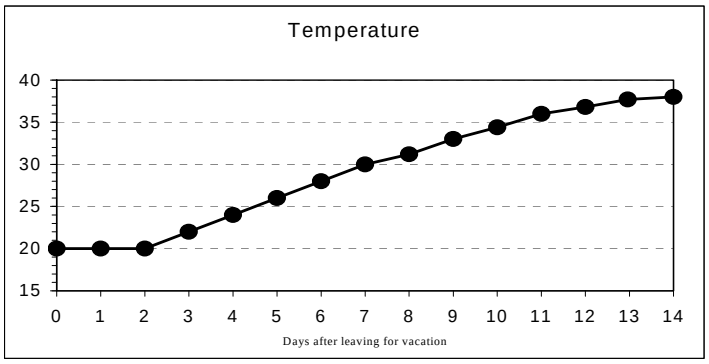
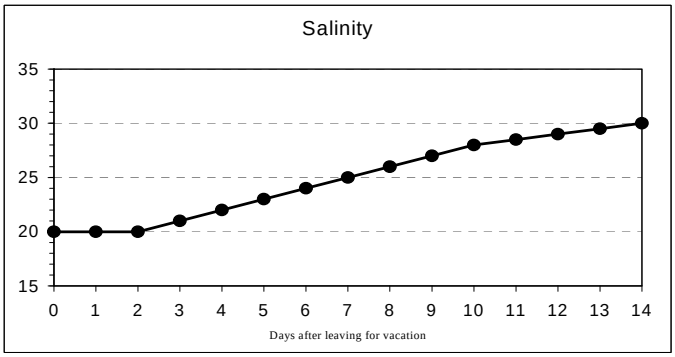
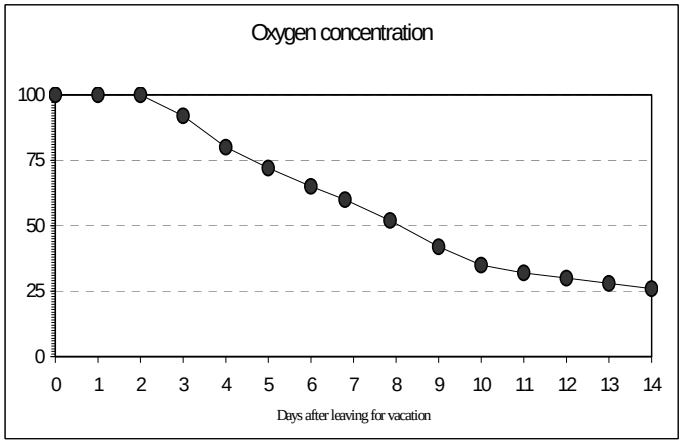


Temperature will <u>remain at room temperature (around 20 ºC) for 2 days</u> (1 pt). When the electricity goes off after 2 days, <u>the air-conditioning stops working</u> (2 pts) and the temperature will <u>slowly rise to the outside temperature, 38ºC</u> (1 pt).
<u>Graph correct</u> = 1 pt



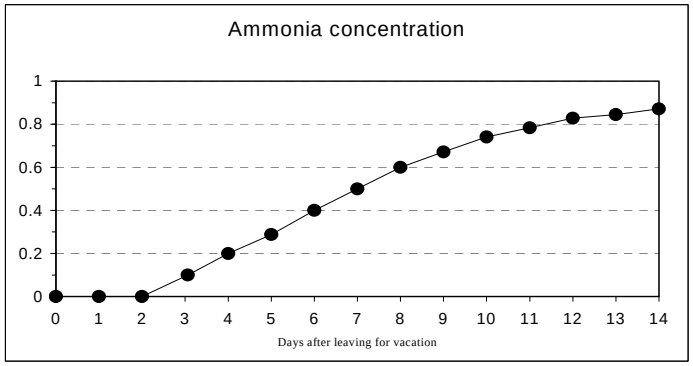
The <u>salinity stays the same for 2 days</u> (1 pt). When the electricity goes off, the temperature increases, <u>causing the water to evaporate</u> (2 pts) which <u>increases the salinity</u> (1 pt).
<u>Graph correct</u> = 1 pt



The <u>oxygen concentration stays near 100% for 2 days</u> (1 pt) as the air pump and filter are working. After <u>2 days the oxygen decreases</u> (1 pt) because:

- *It is consumed by the fish (1 pt)*
- *Inc. in T causes a decrease in dissolved O_2 (1 pt)*
- *Increase in salinity causes a decrease in dissolved O_2 (1 pt)*

<u>Graph correct</u> = 1 pt



The <u>ammonia level stays at 0 for 2 days</u> (1 pt) since the water filter is working. When the electricity goes out, the <u>water filter stops working</u> (1 pt). After 2 days, the <u>ammonia increases because of fish waste products,</u> (1 pt) and continues to increase if fish start to die.
<u>Correct graph</u> = 1 pt