AP® Environmental Science
1999 Sample Student Responses

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a) i. The first and most important test is Disolved Oxygen (DO) This test measures the amout of dissolved oxygen there is in the water. This is important because different organisms have different oxygen needs. Trout need about 9 parts per million were cat fish need 2. This is an important test to see if the orginism can live in the water present.

ii. The second test is pH this test measures the acidity of the water. This is import because organisms such as worm and larve have narrow pH tolerance ranges. If the pH was too low or too high the organisms would die causeing less diversity

iii. The third test ~~should~~ should be a Nitrate test. This Test, tests how much nitrate is dissolved in the water. This is an indication of how "clean" the water is. The

: more Nitrate the more polluted and more eutrophic the pond is. Nitrate is ~~imp~~ important to test for because it can caus low ~~diver~~ diversity in a pond.

b) Hypothesis: pond A insect larve can only survive in water with a dissolved oxygen (DO) level of 6p.p.m. or higher.

Variable: The only varible that will be manipulated would be the level of DO.

Procedure: i. set up 30 petri dishes for the ~~culture~~ growing of the larve found in pond A. 3 petri dishes for every level of DO up to 10, example 3 petridishes of 1ppm DO, 3 petri dishes of 2ppm DO and so on.

ii. cultravate the larve in the same room, same amout of time, same tempature, same amount of light, same food. Keep all varibles the same, to ensure valid data.

iii. measure how many larve lived in each dish. graph and interpret data.

Results: results could be the larve only grows in water with DO above 6ppm as in the hypothesis. Meaning that pond A has a DO of at least 6ppm, pond B has less than 6 ppm. also my hypothesis could be wrong and the larve grew just as well in all of them. Meaning that there is a different varible that causes the difference.

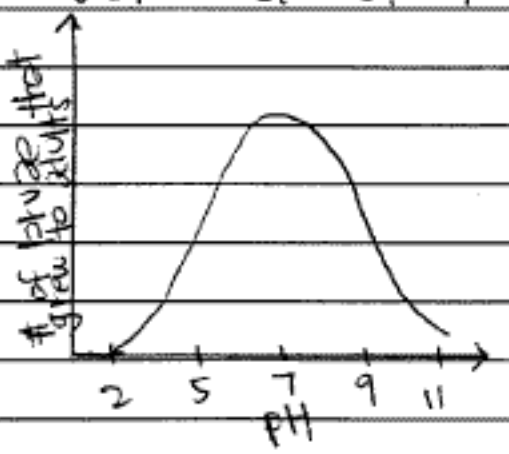
c) Indacator Spicces are spicces that are
uccd to indicate the halth of their ~~envine~~ enviornment.
an example would be the Mayfly. This insect can only
survive is clean water ~~vscally~~ uscally above 7 ppm
DO. If the mayfly was not present I would
mean that the enviornment is not as clean as
it could be, Natorally or human influnced.

2) Test 1: A test to determine the pH of the pond. By doing a pH test, you determine the acidity/basicity of the ~~pH~~ pond by measuring the H^+ in the water. Environment that are too acidic or too basic are usually unfavorable conditions. Usually if the pH is between certain ranges, a certain species can survive. By doing the test, you will determine the range of tolerance in respect to pH.

Test 2: A temperature test measure how hot/cold the environment, in this case a pond, is. Testing is done with the use of thermometers and this will show the range of tolerance for the worms & larvae in respect to temperature. Depending on the specie's preference, the info may show that these species thrive in warm temperature, or cold temperatures.

Test 3: A test measuring the dissolved O_2 levels in the pond would reveal whether the O_2 levels are high enough to sustain life. Because these organisms are animals, they will need O_2 to produce (E) via cellular respiration. Low O_2 levels will have less aquatic organisms than a pond with higher O_2 levels.

b) Hypothesis: If pond B is near a source of acid, then the pH balance of pond B has been disrupted, eliminating the larvae of a certain species of insect from the pond.
Independant variable: ~~larvae population~~ pH of water
Dependent variable: population of larvae
Experiment: Take 5 samples of the larvae from ~~the pond~~ pond A, and a sample from pond B. With the pond B sample, using titration, ~~determine~~ determine the molarity of H^+ in the sample. Then using $pH = -\log[H^+]$, detetmine the pH. With the five samples of larvae, you must grow them at different pHs (pH 3, 5, 9, 11 & 7). The pH 7 would be the control. After growing the larvae for the same amount of time, do a quantitative ~~analysis~~ analysis of the data by counting how many grew to be adults.
Results: Most likely, the amount of larvae that grew to be adults were closest to the pH 7. If this is the case and the pH of pond B showed to be near pH 2 or 11, then it can be shown that the disruption in the pH caused the species of larvae in pond B to die out.



(a.) One could collect water samples from each pond and pour the samples through filter paper. By weighing the filter papers before and after the water is poured through, one can calculate the amount of silt in each water sample. The higher amounts of silt indicate higher amounts of pollution in the water. An increase of silt would hurt biotic organisms. A second experiment could test the oxygen levels in the water. If there is a difference in the amount of mud and debris in the ponds, it may effect the oxygen levels. Lower oxygen in the water would not allow for much biotic growth, this would especially effect fish. A third experiment could test the levels of sulfur and nitrogen in the ponds. Run-off from

yards and roads would increase Sulfur and Nitrogen levels in the water, causing pollution and fish kills. The variety of insects in the pond may be caused by the insects' sensitivity to pollution. If an insect is especially tolerant of pollution, they could survive in the more polluted pond.

(b.) Hypothesis: the larvae of the insects found in pond A are too sensitive to pollution to live in pond B.

Variable: in a controlled experiment, insect larvae will be placed in two same water areas. One area will be exposed to more nitrogen and one will remain constant. Observations will be taken on the survival rate of the insect larvae in the nitrogen-exposed water and the non nitrogen-exposed water. If it is found that more insects survive in the non-nitrogen area, it shows that the larvae is sensitive to nitrogen in the water. This experiment could also use sulfur or silt levels as a controlled variable. Compare the levels used in the controlled experiment to those in pond B. This may show that nitrogen, sulfur, or silt does indeed effect insects in the pond.

Indicator species are species of fish, insects, or plants with varying sensitivity to pollution. For example, a fish that is able to survive in a stream with low nitrogen levels, may not be able to survive in moderate or high levels. And a fish that could survive in moderate levels of nitrogen may not be able to survive in high levels. Indicator species are used to determine the level of certain pollutants in water. If there is a high diversity of biota in the water, the area is not highly polluted.