Name _____   Date _____

Simulation 1
Data from Two Days at Three Lakes Park

Background

The "abiotic" parts or factors discussed in Part 1: Abiotic Factors that influence a freshwater environment can be measured. These measurements can be taken using very simple tests or more complex technology. After the measurements are taken and recorded, water quality experts -- called limnologists -- analyze the data by comparing it with other data, either from the same freshwater environment or a similar environment.

Following is data gathered from two days at Three Lakes Park in Henrico County, pictured above. The same water quality expert analyzed the five abiotic factors below from the same place, using the same equipment. The differences are the time of year and weather.

Materials

Procedure

Day 1: Fall
Graph the data for this fall day for each abiotic factor.
Analyze the graphs for the day and draw conclusions.

Day 2: Spring
Graph the data for this spring day for each abiotic factor.
Analyze the graphs for the day and draw conclusions.

Graph

Abiotic Factors
A. Dissolved Oxygen (DO mg/l)
B. Temperature (°C)
C. pH (no units)
D. Total Dissolved Solids (TDS mg/l)
E. Turbidity (Secchi Disk, cm)

Answer the questions following the data tables.

Data - Day 1: Fall

Time of Day	A. DO (mg/l)	B. Temp. (°C)	C. pH	D. TDS-Nitrates (mg/l)	E. Turbidity (Secchi disk) (cm)
9:30	11	11.1	6.7	143	40
10:00	11	12	7	135	38
10:30	10	12	7	132	41
11:00	9	13.2	7	140	44
11:30	9	13.7	7.3	150	39
12:00	6	14.4	7.0	154	40
12:30	7	14	6.8	157	43
1:00	7	14.4	7	133	38
1:30	5	15	7.5	141	39
2:00	5	15.5	7	155	44
2:30	3	16	6.7	159	43

Data - Day 2: Spring

Time of Day	A. DO (mg/l)	B. Temp. (°C)	C. pH	D. TDS-Nitrates (mg/l)	E. Turbidity (Secchi disk) (cm)
9:30	14	11	6.7	143	40
10:00	13	11	7	135	38
10:30	12	12	7	132	41
11:00	12	13.2	7	140	44
11:30	11	13.7	7.3	150	44
12:00	10	16	6.6	154	40
12:30	6	13	6	300	20
1:00	6	12	5.3	510	18
1:30	6	12	5.4	520	16
2:00	7	11	5.2	493	8
2:30	8	11	5.3	509	7

Graph Results

Day 1: Fall

1. After the abiotic measurements for Day 1 are graphed, analyze the graphs:

a. Finish this sentence: *The dissolved oxygen (A) generally (increases, decreases) _____ from 9:30 am until 2:30 pm.*

b. Finish this sentence: *The temperature (B) generally (increases, decreases) _____ from 9:30 am until 2:30 pm.*

c. Compare graphs A (DO) and B (temperature). Finish this sentence: *As the temperature of the water increases during the day (B), the amount of dissolved oxygen (decreases, increases) _____*

d. Look at graphs C, D, and E. Finish these sentences: *For this one day at Three Lakes Park, the pH of the water generally (increased, decreased, stayed the same) _____, the total dissolved solids generally (increased, decreased, stayed the same) _____, and the turbidity generally (increased, decreased, stayed the same) _____*

e. You are assigned to do a science fair project comparing the temperature with the amount of dissolved oxygen in your aquarium at home. You need to formulate a hypothesis. The hypothesis has to follow the following formula: If the (independent variable) is (decreased, increased), then the (dependent variable) will (increase, decrease).

Day 2: Spring

2. Which parts of taking these measurements are the same (remained constant) as Day 1? (see introduction)

3. Which parts of taking these measurements are different? Could these be controlled? How?

4. After the abiotic measurements for Day 2 are graphed, analyze the graphs by answering these questions:

a. Compare the graphs from Day 1 and Day 2. How are they similar? How are they different?

b. If Day 1 is a "normal," sunny fall day, how would you compare Day 2 using similar words? How does your data confirm your statement?

c. Was there an "incident?" What do you think happened?

d. When did it happen?

e. What was the effect?

5. Summarize Day 2 by completing the following sentence: *On Day 2: Spring the dissolved oxygen (generally, abruptly)* _____ *(decreased, increased)* _____ *. the temperature (decreased, increased)* _____ *at (time of day)* _____ *then (decreased, increased)* _____ *; the pH (increased, decreased)* _____ *at (time of day)* _____ *; the total dissolved solids (generally, abruptly)* _____ *(decreased, increased) at (time of day)* _____ *; and the turbidity (Secchi disk readings) (generally, abruptly)* _____ *(decreased, increased) at (time of day)* _____ *. The dramatic changes between Day 1 and Day 2 could have been from* _____ *.*

Conclusion

Abiotic factors as indicators of water quality are subject to changes. These changes can be hourly, daily, weekly, monthly, or yearly. Sudden changes in weather patterns, succession (natural changes to the environment over time), and human influences can have a dramatic effect on the quality of water in a freshwater environment. Sampling water one time only gives a "snapshot" of the water quality in that environment at that particular moment. Water quality should be sampled and analyzed at regular intervals in order to understand that water environment.

Simulation 1
Graphs for Data from two days at Three Lakes Park

Name _____ Date _____

DAY 1. FALL

A. Dissolved Oxygen (DO) mg/l

B. Temperature (°C)

C. pH

D. Total Dissolved Solids--mg/l

E. Turbidity cm

DAY 2. SPRING

A. Dissolved Oxygen (DO) mg/l

B. Temperature (°C)

C. pH

	7.5	7.25	7.0	6.75	6.5	6.25	6.0	5.75	5.5	5.25	5.0
9:30 am											
10:00 am											
10:30 am											
11:00 am											
11:30 am											
12 noon											
12:30 pm											
1:00 pm											
1:30 pm											
2:00 pm											
2:30 pm											

E. Turbidity cm

	45	40	35	30	25	20	15	10	5
9:30 am									
10:00 am									
10:30 am									
11:00 am									
11:30 am									
12 noon									
12:30 pm									
1:00 pm									
1:30 pm									
2:00 pm									
2:30 pm									

D. Total Dissolved Solids - mg/l

	500	450	400	350	300	250	200	150	100
9:30 am									
10:00 am									
10:30 am									
11:00 am									
11:30 am									
12 noon									
12:30 pm									
1:00 pm									
1:30 pm									
2:00 pm									
2:30 pm									