

HYDROLOGY INVESTIGATION AREA
GLOBE SAMPLE STUDENT ASSESSMENT TOOL – MIDDLE SCHOOL

(Given data from the GLOBE data archives)
 GLOBE Data for Holcomb School and Jefferson School, Fayetteville, Arkansas

Holcomb Elementary

YY/MM/DD	WATER	
	TEMP(°C)	pH
99/01/24	2.5	8.9
99/01/17	3.2	8.8
99/01/10	3.5	8.8
99/01/03	3.8	8.7
98/12/27	4.0	8.8
98/12/20	4.1	8.8
98/12/13	4.3	8.8
98/12/06	4.2	8.7
98/11/29	4.2	8.7
98/11/22	4.3	8.6

Jefferson Elementary

YY/MM/DD	WATER	
	TEMP(°C)	pH
99/01/24	4.0	8.7
99/01/17	4.1	8.6
99/01/10	4.5	8.6
99/01/03	4.8	8.6
98/12/27	5.5	8.5
98/12/20	6.0	8.4
98/12/13	6.2	8.4
98/12/06	6.4	8.3
98/11/29	6.4	8.1
98/11/22	6.5	8.1

(Present problem requiring use of GLOBE data archives)
 Holcomb and Jefferson are two schools located within 5 miles of each other in Fayetteville, Arkansas. Both schools sit next to the same river, with Holcomb located upstream from Jefferson. Even though the schools are relatively close to each other, the plant and fish life appears to be different between the two sections of the river. You and several other students have been asked to report to your science class what some of the differences are and why you think they exist. To the left is data from the two schools between late November and late January to help you in your investigation.

- 1) **(Plan Investigations: Pose relevant questions)** Look at the GLOBE data in the tables. Think of two questions you might ask regarding the data. A sample question might be “What is unusual regarding water temperature between the two schools considering they take measurements from the same river?”

One question I might ask: If water temperature goes up, does pH change? Another question I might ask: Does the pH change because of the time of year? By this I mean as you're going from November to January, does pH automatically go up or down?

- 2) **(Interpret GLOBE Data: Infer patterns & trends)** One of the students in your research group, Tom, suggests that you can sometimes see patterns in the data. Describe one pattern you see in the pH.

I noticed that for Jefferson the pH goes up over time – it starts out at 8.1 in November and goes up to 8.7 in January. There is a similar increase in pH for Holcomb but it goes from 8.6 to 8.9.

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- 3) **(Take GLOBE Measurements: Use quality assurance procedures)** You have watched some of the students at your school collect GLOBE data and you've noticed that they have done a very good job. Just to check, are there any data that look to you to have errors? How can you tell? What would you tell these students to insure that measurement errors do not happen?

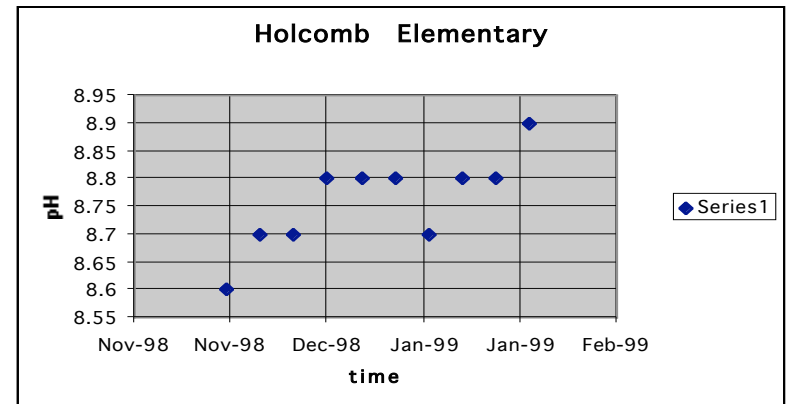
One measurement that seems unusual is for Jefferson - the temperature reading on January 17th is 41°C which is very high for a day in the middle of winter. It looks like this error is because the decimal point was put in the wrong place.

I would tell these students they need to be very careful when taking measurements and recording the measurements. It might be a good idea for all measurements and recordings to be double-checked by another student. They should also be very careful when entering the data into the GLOBE database. Here they should also have the data double-checked before it is sent to the GLOBE database.

- 4) **(Interpret GLOBE Data: Explain data & relationships)** One of the students in your science group, Hilda, remembers in her math class showing how different variables relate to each other and suggests doing the same with the GLOBE data. What is the relationship between water temperature and pH for Jefferson Elementary? For example, if water temperature increases, what happens to the pH level?

From just looking at the data, each time the temperature increases, the pH decrease. It is kinda hard to tell if they both increase/decrease at the same rate though.

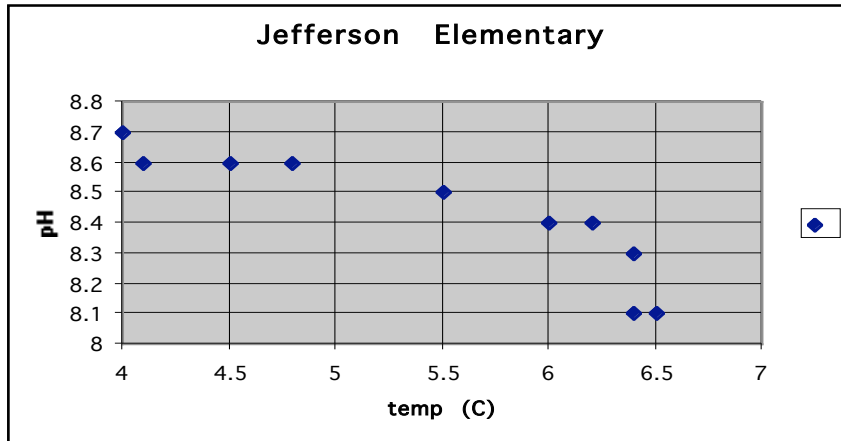
- 5) **(Interpret GLOBE Data: Create multiple formats to represent data; explain data & relationships)** Using the data provided for Holcomb, create a graph that has time on the x-axis and pH on the y-axis. Describe what happens to pH as time increases.



The pH goes up as time goes along. There is one place in January where it kinda drops a little, but for the most part it goes up.

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- 6) **(Interpret GLOBE Data: Create multiple formats to represent data; explain data & relationships)** Using the data provided for Jefferson, create another graph with temperature on the x-axis and pH on the y-axis. What happens to pH as the temperature increases?



From this graph it looks like pH decreases as temperature goes up. It looks like the pH drops slowly at first and then drops quickly.

- 7) **(Interpret GLOBE Data: Explain data & relationships)** One of the students in your science group, Debbie, mentioned that certain pH levels can affect fish and plant life. If the pH level dropped by 3 in the month of December for either of the schools, what would be the concern regarding life in the river?

I remember in one class that there are certain pH levels at which it becomes harmful for fish and plant life. These levels depend on the type of fish or plant you are talking about, but in general the level I remember from class is around a pH of 4.0.

- 8) **(Plan Investigations: Set up another problem)** In the questions so far you have been looking at water temperature and pH. Randomly choose another site in the GLOBE database, pick a different variable that you would investigate, and choose a set of 10 dates in chronological order for the same time period to use as your data. Follow the same steps for this data as you did for Jefferson Elementary and Holcomb Elementary. Why does the new variable you chose seem interesting to you?
- 9) **(Communicate: Compose reports to explain or persuade)** Using the data analysis you have done, write a short report (1-2 pages) that summarizes your findings and explains why you think the plant and fish life vary between the two schools. Be sure to support your conclusions with data you have analyzed and suggest other data that might be helpful for further study of the river.