

HYDROLOGY INVESTIGATION AREA
GLOBE SAMPLE STUDENT ASSESSMENT TOOL – HIGH SCHOOL (2)

Given data from the GLOBE data archives)

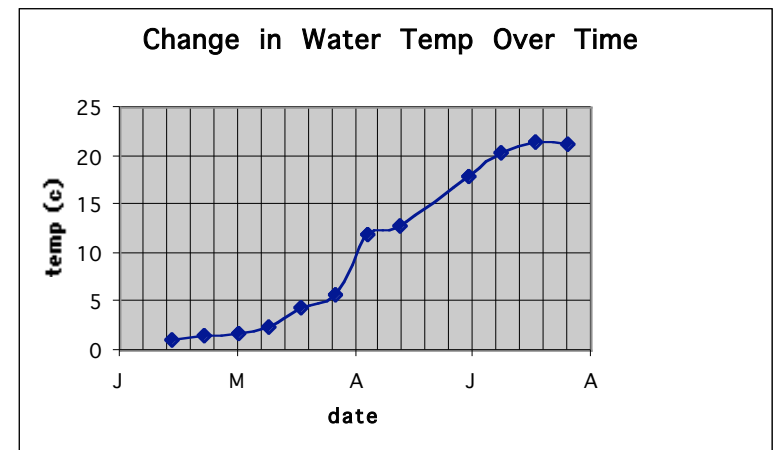
GLOBE Data for C.R. Jakobsoni Gymnasium, Viljandi, Estonia
 Latitude: 58.3467 Longitude: 25.5817

YY/MM/DD	WATER TEMP	DISSOLVED pH	OXYGEN
98/07/26	21.2	8.4	8.2
98/07/12	21.4	8.5	8.2
98/06/28	20.4	8.1	8.6
98/06/14	18.0	8.5	8.4
98/05/16	12.9	9.2	9.3
98/05/02	11.9	8.2	11.2
98/04/18	5.8	8.9	13.5
98/04/04	4.5	8.0	13.0
98/03/21	2.4	8.1	13.0
98/03/08	1.7	8.2	11.4
98/02/22	1.5	7.9	9.0
98/02/08	1.1	7.8	11.6

(Present problem requiring use of GLOBE data archives)

The forest area around Jakobsoni Gymnasium experienced an earlier and more rapid than normal melting of snow. As a result of the snow melt, greater amounts of vegetation and animal debris has washed into local streams and lakes. The local authorities are concerned that the drop in the dissolved oxygen level poses a risk to life in the local waters since dissolved oxygen levels below 3 are stressful to most aquatic organisms. You have been asked to investigate this potential problem.

- (Plan Investigations: Pose relevant questions)** Look at the GLOBE data to the left. Think of two questions you might ask regarding the data. A sample question might be “Is there a dissolved oxygen threat to the organisms in the waters around Jakobsoni Gymnasium?”
- (Interpret GLOBE Data: Infer patterns & trends)** What trend do you see regarding the water temperature?
From the data given, it appears to me that the water temperature tends to go up as the date increases. The Jakobsoni Gymnasium must be in the northern hemisphere



since the temperature increases as summer (June, July, August) approaches.

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3. **(Take GLOBE Measurements: Use quality assurance procedures)** Are there any data that you suspect might be due to a measurement error? How can you tell? What can be done by the school to ensure that this doesn't happen again?
I would guess that the dissolved oxygen recorded on June 28th is a measurement error, since it is drastically different from the surrounding measurements. I would suggest that all of the measurements recorded are checked by at least two students. In this case it might just be that the person who input the data forgot to include the decimal.

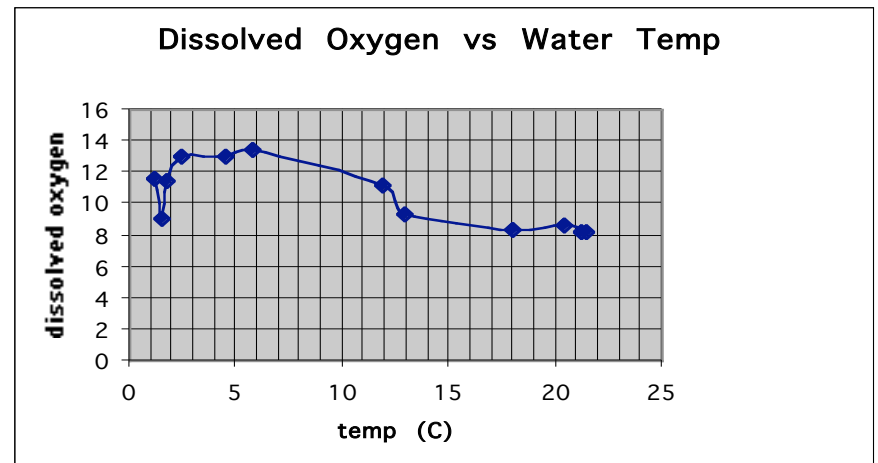
4. **(Interpret GLOBE Data: Infer patterns & trends)** What are the relationships between the different variables given above? For example, if pH increases, what happens to the dissolved oxygen level? Do any of the relationships help to inform your investigation of the early and rapid snow runoff in the forests around Jakobsoni Gymnasium?
Water temperature increases over time; as the water temperature increases, the amount of dissolved oxygen decreases; it almost looks like the dissolved oxygen goes down as the pH increases.

5. **(Interpret GLOBE Data: Create multiple formats to represent data; explain data & relationships)** Using the data given above, create a graph with time on the x-axis and dissolved oxygen on the y-axis. Are there any trends that you notice?
You can see that the temperature increases over time.

6. **(Interpret GLOBE Data: Create multiple formats to represent data; explain data & relationships)** Using the data given above, create another graph with water temperature on the x-axis and dissolved oxygen on the y-axis. What trends do you notice this time?

For this graph I purposely changed what looked like an error in the June 28th dissolved oxygen reading – I added the decimal. Now you can kind of see a decrease in dissolved oxygen as temperature increases.

7. **(Interpret GLOBE Data: Explain data & relationships)** If the dissolved oxygen level dropped by 6 in the month of June, would there be cause for concern? Explain your answer.
I would be concerned because a drop of 6 in the dissolved oxygen would bring the level down below 3 for any of the dates in June. If the dissolved oxygen level dropped below 3 it would probably be very hazardous to the animal and plant life in the waters.



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8. **(Plan Investigations: Set up another problem)** Randomly choose another set of 12 dates in chronological order for a single site in the GLOBE database. Pick one trend you would investigate. Why does this trend look interesting to you? What other surface water variables might you look at to tell you more about the particular trend you chose?

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 your analysis of the potential problem. Be sure to support your conclusions with data you have analyzed and suggest other data that might be helpful for further study of the risk to life in the local waters.