DATA WORKSHEET: GRAPHING AND ANALYZING DISSOLVED OXYGEN LEVELS

1. Describe the ways in which lake water becomes oxygenated.

   Water becomes oxygenated through one of three ways. The main way is through diffusion (or exchange) of oxygen from the air into the surface water. Second is through photosynthetic aquatic plants and algae releasing oxygen into the water. Third is through input from oxygenated streams and rivers.

2. Based on your graph, describe the relationship between dissolved oxygen levels and depth.

   Typically dissolved oxygen will decrease with increasing depth. However, students may be surprised that the entire lake does not stratify and only parts do and graph may not look as they predicted.

3. How deep is your station?

   Depth=___m

Station	Max depth
968	10m
1003	21m
1190	21m
E42	22m
1047	27m
E10	33m

4. What are the minimum and maximum dissolved oxygen levels at your station? (To find this, use the data table. Selecting the drop down menu located above the dissolved oxygen column, then select *Min.* and *Max*.)

Station	Min	Max
968	4	7
1003	2	8
1190	1	7
E42	1	8
1047	5	8
E10	4	8

5. Do you notice a change in dissolved oxygen levels at your station? If so, at which depth?

   Station 968: No
   Station 1003: Yes, it starts to decline at 12 m.
   Station 1047: Possibly but not a clear point. Decreases around 9m but then oxygen levels rise again near the bottom
   Station 1190: Yes, around 13m
   Station E42: Yes, around 11m
   Station E10: Possibly but not a clear point

6. Based on your graph, do you think the water at your station is mixed or stratified?

   Station 968: Mixed
   Station 1003: Stratified
   Station 1047: Mixed
   Station 1190: Stratified
   Station E42: Stratified
   Station E10: Mixed

7. Does your station fall within the hypoxic zone (<2 mg/l). If yes, at what depth does the hypoxic zone start and why does that occur? Why might there not be a hypoxic zone?

Station	Hypoxic (<2)	Depth at which hypoxic zone starts (m)	Why
968	No		There is no exact answer but the student should demonstrate knowledge of why a hypoxic zone occurs. An example of a good answer is this station is much shallower than the rest so the wind and other factors allow the entire water column to be mixed, spreading the oxygen and preventing it from stratifying.
1003	Yes	20m	Because the depth of the lake at this point is deep enough for lake water to stratify. It stratifies because the sun warms up the top layer of the water, which then becomes less dense than the cooler bottom layer. Without mixing, the bottom layer becomes oxygen depleted because of a lack of atmospheric diffusion. The bottom layer, or hypolimnion, becomes even more oxygen depleted because plants and organisms are decomposed by oxygen-consuming bacteria.
1190	Yes	18m	Same as station 1003
E42	Yes	18m	Same as station 1003
1047	No		There may not be enough nutrients in this portion of the lake to cause a large algal bloom. When there is no algal bloom then bacterial decomposition is not large enough to drop dissolved oxygen levels to hypoxic or anoxic levels.
E10	No		Same as station 1047.

8. Does your station have anoxic conditions (zero dissolved oxygen)?

   None of the stations have anoxic conditions

9. Does your station contain a dead zone?

   If it is hypoxic *or* anoxic, it is considered a dead zone. (stations e42, 1190 and 1003)

10. What is the height of your station's dead zone, if one exists? To calculate the height of the dead zone, subtract the maximum water depth from the minimum depth of the hypoxic or anoxic zone.

    Station 1003: 21m – 18m = 3m
    Station 1190: 21m – 18m = 3m
    Station E42: 22m – 18m = 4m

11. What percent of the water column, if any, is hypoxic at your station? To find this, divide the height of the hypoxic zone by the total depth.

    Station 1003: 3m / 21m =14%
    Station 1190: 3m / 21m =14%
    Station E42: 4m / 22m =18%

12. How can we use dissolved oxygen levels to help describe the health of aquatic environments?

    High levels of dissolved oxygen indicate habitable water for aquatic organisms. Low levels of dissolved oxygen indicate unhealthy, uninhabitable water. If dissolved oxygen levels are too low, a dead zone could result and can suffocate any animals stuck within. High levels of DO are needed for aquatic wildlife to survive. If levels are too low, living organisms will not be able to survive, algae may increase and plants will not be able to complete photosynthesis because the algae will have shaded them from the sun.