**Turbidity Lab**

**Problem*:*** How do we measure turbidity?

**Background Information:** Plants, animals, and algae all need a certain amount of sunlight to penetrate the water in order to survive. Some can live in more turbid water where others need almost no turbidity in order to thrive and reproduce. Turbidity can be affected by a number of factors ranging from glacial run off, rainstorms, human activity, and so on. Our job as ambassadors to the outdoor world should be to identify the amount of turbidity that the water in our area can manage and try to keep the water as turbid free as possible!

Please define the following terms to help you with the remainder of the lab.

*Turbidity:*

*Water Quality:*

*pH:*

*Dissolved Oxygen:*

*Climate Change:*

**Hypothesis:** Create a hypothesis about what you think will happen when we create Secchi disks and test them in simulations of different environments. Think in terms of turbidity and water quality.

**Materials:**

1. Pencil or Pen

2. Ruler

3. String

i. One piece at least 26 cm (about 10 inches) long ii. One piece at least 2m long

4. Large white construction paper

5. Black colored pencils or pens or crayons

i. Can substitute black construction paper and glue

6. Clear packing tape

7. Meter stick or metric tape measure

8. Thermometer

**Procedure**

**Creating the Secchi Disk**

1) Gather all materials

2) Take the large white construction paper and fold it in half horizontally then vertically. Try to make your folds as precise as possible to get the perfect lines. Flatten your paper and smooth out the creases. Place a pen mark at the center of your folds where the two lines meet; that will be the center of your circle.

3) Attach the smaller string around the tip of your pencil/pen. Place the string at the center of your circle. Measure, from the tip of your pencil 8inches or 25.4cm.

4) With your pencil, trace a circle that should have an 8inch radius on the white paper.

 5) Because your paper should have crease marks, it should be divided into quadrants. Using your black colored pencil or construction paper,color every other quadrant, alternating black and white.

 6) When you have a fully colored Secchi Disk, use packing tape to laminate your circle on both sides. Get the tape a smooth as possible so there are no bumps or ripples. You want it to lay flat.

7) Attach the long string to the center of your Secchi disk at the pen mark using tape to hold it in place.

8) Using tape, or a staple, attach the bottom of the meter stick or tape measure to the center of your Secchi disk.

**At the water**

9) Take your completed Secchi Disk out to the water stations with your data table.

10) You will be visiting 4 stations that are simulations of different water scenarios. Each station will have a card that will describe the setting for where the water was collected. Record the general observations about each area.

11) Before you use your Secchi disk, take the surface temperature of the water and record that information on your data table.

12) Carefully lower the Secchi disk into the water (remember you want to keep your disk as flat as possible)

13) You are going to lower the disk until it disappears from sight (you can no longer see the disk) or until you have reached the end of your meter stick. Record the distance, from the top of the water (as flat as you can get it) onto your data table. Your measurement should be in cm.

14) Pull your Secchi disk up to where you can see it, lower it in the water again, and record. You will do this 4 more times for a total of 6 data points on your data table.

15) Move to the next lowering point and repeat steps 11-13. You will do this for all locations.

**Data:** Fill in the data chart below for all 3 locations. Be sure to record the general surroundings in your information and location!

|  |  |
| --- | --- |
| Location: | Temperature: |
| General Observations about setting: |
| Measurement 1 (in cm) |  |
| Measurement 2 |  |
| Measurement 3 |  |
| Measurement 4 |  |
| Measurement 5 |  |
| Measurement 6 |  |

|  |  |
| --- | --- |
| Location: | Temperature: |
| General Observations about setting: |
| Measurement 1 (in cm) |  |
| Measurement 2 |  |
| Measurement 3 |  |
| Measurement 4 |  |
| Measurement 5 |  |
| Measurement 6 |  |

|  |  |
| --- | --- |
| Location: | Temperature: |
| General Observations about setting: |
| Measurement 1 (in cm) |  |
| Measurement 2 |  |
| Measurement 3 |  |
| Measurement 4 |  |
| Measurement 5 |  |
| Measurement 6 |  |

|  |  |
| --- | --- |
| Location: | Temperature: |
| General Observations about setting: |
| Measurement 1 (in cm) |  |
| Measurement 2 |  |
| Measurement 3 |  |
| Measurement 4 |  |
| Measurement 5 |  |
| Measurement 6 |  |

**Calculations**: Find the average distance for each of the different locations. Record and show all your math!! Record results here in cm.

|  |  |  |  |
| --- | --- | --- | --- |
| Location 1 | Location 2 | Location 3 | Location 4 |
|  |  |  |  |

**Analysis:**

**Data:** Based on your results, create a graph (on graph paper) showing all your data points. Then answer the questions that follow on a separate sheet of paper.

On your graph, be sure to include:

• Title

• X and Y axis titles

• Key

• 16 data points labeled and connected

• 4 clearly identified average points



**Questions:**

1. Look over your graph; are there any points or recordings that surprise you? Explain why or why not.

2. Describe the relationship between each location, its surroundings, and the results you collected.

3. Did your data support your hypothesis? Why or why not?

4. Things like increased snow melt, tornadoes, and other natural disasters can cause a drastic change in turbidity. What types of things might cause a change in turbidity in the locations you sampled?

5. Why might taking the temperature in only one spot in a river or stream be an inaccurate representation of the body of water as a whole? Explain.

6. How might turbidity affect water temperature?

7. Explain how turbidity affects dissolved oxygen in the water.

8. What kind of life do you think each location must sustain? How might the organisms have adapted to live with the level of turbidity you sampled?

9. If I have a crystal clear, fast moving cold stream in an area that I then convert to agricultural land, what do you think will happen to the stream (explain in terms of temperature, turbidity, and oxygen levels)? How might a change in turbidity affect the ecosystem of that stream.