

Activity: Math Madness

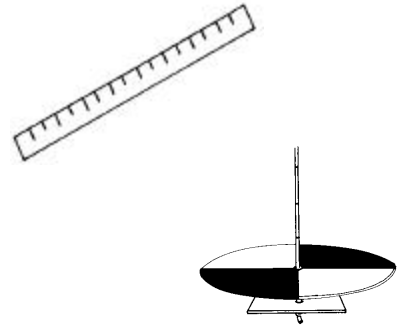
Grade Level: Grade 3

Major Emphasis: Estimation, Measurement and Graphing

Major Curriculum Area: Mathematics and Science

Related Curriculum Areas:

- Refer to Outdoor Education Curriculum Matrix 3-5
- Human Relations
- Social Studies



Program Indicator:

The student will problem solve using math strategies and decision making skills to estimate and measure units of temperature, length, width, depth and perimeter.

Student Outcomes: The student will:

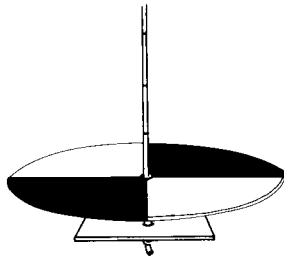
1. estimate and measure the clarity of the water. **(DL2&3)**
2. estimate the depth of the water at two different sites (middle and end of pier). **(DL3)**
3. estimate and measure the length of the pier. **(DL2&3)**
4. estimate and measure the temperature of air and water. **(DL2&3)**
5. choose strategies to solve math problems. **(DL4)**
6. make decisions using collected data. **(DL4)**

Readiness:

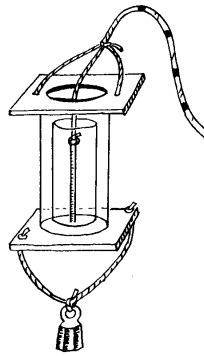
1. Introduce vocabulary:

thermometer	centimeter	trundle wheel
estimate	measure	temperature
graphing	record	degrees
data	secchi disc	tape measure
depth line	meter stick	length
personal flotation device (PFD)	depth	clarity
pier	meter	aquatic
2. Teach the unit on measurement from the Mathematics Grade Three Curriculum Guide.
3. Introduce and explain the following tools of measurement. Refer to Figure 1.

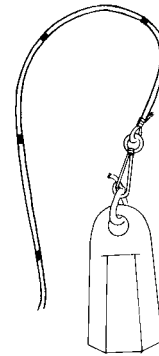
secchi disc	meter stick	tape measure
water thermometer	air thermometer	depth line
trundle wheel		



Secchi Disc



Water Thermometer



Depth Line

Figure 1: Types of Measurement Tools

4. Practice estimating and measuring using thermometers, trundle wheels, meter sticks and tape measures.
5. Select a variety of bar graphs to be interpreted by the students.
6. Review water safety procedures and teach students the proper use of PFD's.

Materials:

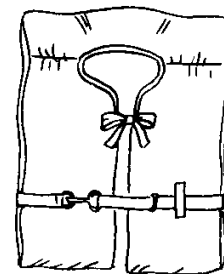
ring buoy
 tote trays
 air thermometer
 PFD's
 clipboards
 masking tape

pencils
 meter sticks
 crayons/markers
 depth line
 tape measures
 trundle wheels

laminated "Math Madness Task" chart
 secchi disc
 water thermometer
 laminated graphing charts
 Supplements A & B

Procedures:

1. Review and discuss waterfront safety rules.
 - a. Make sure personal flotation devices (PFD) are worn at all times. Refer to Figure 2.
 - b. No running or pushing.
 - c. Follow activity leader's directions.
2. Have each student put on a PFD.
3. Read aloud the "Math Madness Task" storyline to instruct the students on the reason they are collecting the data in this activity.
4. Briefly review the measurement tools and their uses.
5. Separate the group into pairs.



**Figure 2:
Personal Flotation Device (PFD)**

- Distribute Supplement A, Supplement B, pencils and clipboards to each pair.

“Math Madness Task” Storyline

Scientists are investigating water quality in the Chesapeake Bay to determine living conditions for the local aquatic life. They are collecting data from this area and they need your help. You have been asked to submit data to assist in their research. You will be testing water clarity, water depth and water temperature.

In our report, you should include the length of the pier so the scientists know the distance from the shore line. Now think about the tools the scientists will use to gather this information.

- On the data sheet, one pair of students will *record* the tool to be used to measure water clarity at two sites (middle and end) along the pier. The secchi disc is a white circular plastic plate that is attached to a line.
- One pair will lower the disc into the water until it just disappears from sight. The group will *estimate* the distance between the water surface and the disc. One pair will raise the disc and measure from the disc to the water line. Everyone will *record* the actual measurements.
- On the data sheet, one pair will *record* the tool to be used and their *estimations* of the depth of the water at site 1 and 2. The depth line is a weighted object attached to a rope.
- One pair will take the actual measurements of water depth by lowering the depth line into the water until it has reached the bottom. The pair will raise the depth line and measure the length of the line from the bottom of the weight to the waterline. Everyone will *record* the actual measurements for each site.
- On the data sheet, each pair will *record* the tools to be used and their *estimations* of the length and width of the pier. Length of the pier is from points where activity leader placed the tape.
- One pair will take the actual measurement of the length of the pier by using the trundle wheel. The student will turn the trundle wheel to the starting position (red arrow down). Count the clicks to determine the number of meters of the length of the pier. *Remember not to count the first click.* Everyone will *record* the actual measurements.
- On the data sheet, each pair will *record* the tools to be used and their *estimations* of the air and water temperatures.
- Read air temperature using a thermometer and *record* on data sheet.
- Take water temperature by lowering water thermometer bottle until the cylinder is full of water. Leave thermometer in water 3 to 5 minutes, raise the thermometer and read and *record* the temperature.
- Using the data from the Supplement A Data Sheet, create a graph, using Supplement B, for water clarity, water depth and temperature. Refer to Figure 3.

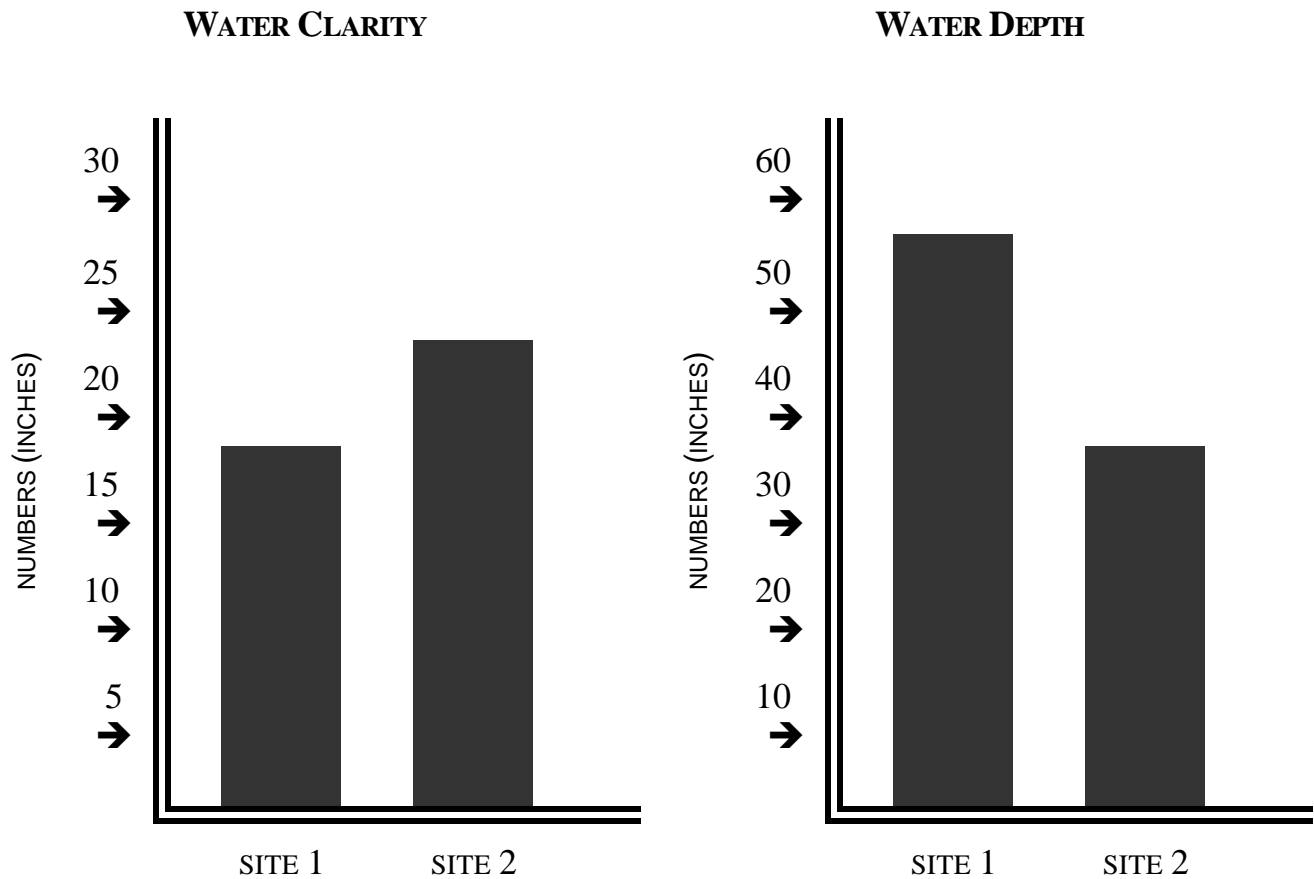


Figure 3: Examples of Graphs

17. Possible answers to questions on Supplement B:
- Clarity = pollution, erosion, visibility, shallowness
 - Depth = shallow water, boats, swimming, diving
 - Temperature = weather, seasons, shade, depth, clarity

Summary: To end this activity, ask the following questions.

1. What tools did you use to collect this data?
2. What are three characteristics that you learned about this body of water?
3. How would you tell someone to measure the clarity of water?

Follow-Up:

1. Develop similar measurement activities that can be used at school from the Mathematics Grade Three Curriculum Guide.(**DL3&4**)
2. Have each group design questions using information from their group's bar graphs. (**DL3**)
3. Trade bar graphs along with questions and assign that group to complete the questions. (**DL2**)

Extension Activities:

1. Discuss why water quality may change in a body of water.
2. Discuss how people can have both a positive and negative effect on water quality.
3. Display given information in a variety of graph forms.
4. Compare the use of estimation and actual measurement in performing a task.

Teacher Resources:

Book:

- *Severn River Monitoring Project Guidebook (Student), Outdoor Education Program.

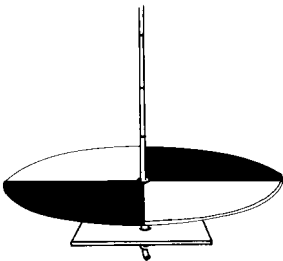
Chart:

- * "Water Measurement Data Chart," Outdoor Education Program.

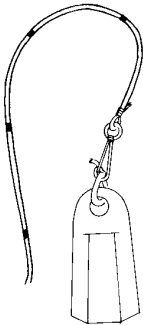
Supplementary Materials:

- *Grade Three Mathematics Curriculum Guide, Anne Arundel County Public Schools.

Water Measurement Data Sheet



Secchi Disc



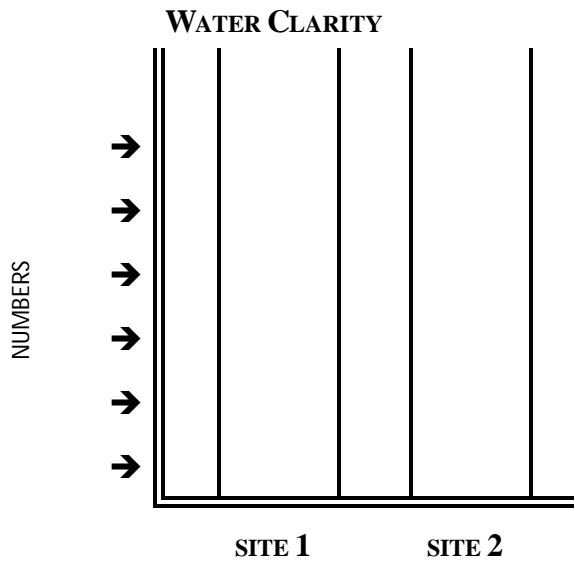
Depth Line



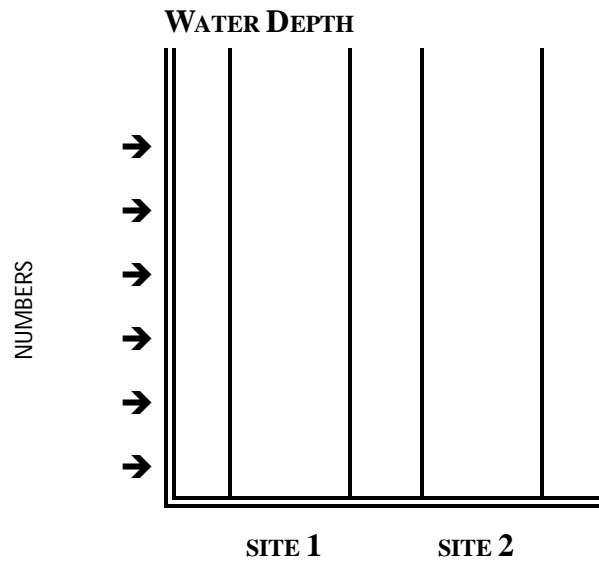
Water Thermometer

TEST	SITE	ESTIMATE	MEASUREMENT TOOLS	ACTUAL MEASUREMENT
Water Clarity	Site 1			
	Site 2			
Water Depth	Site 1			
	Site 2			
Pier Length	Site 1			
	Site 2			
Air Temperature	Site 1			
	Site 2			
Water Temperature	Site 1			
	Site 2			

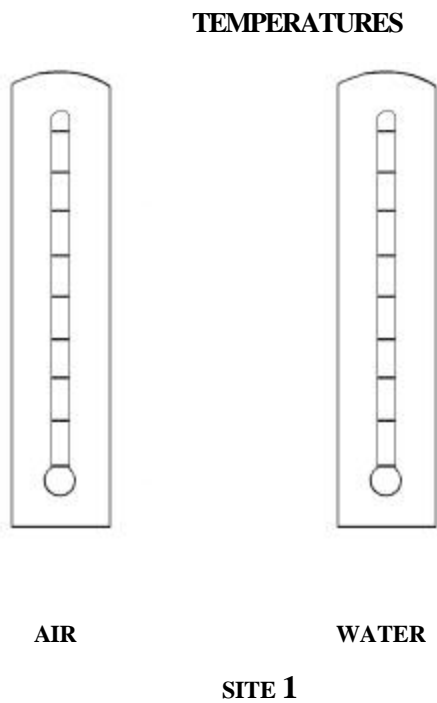
Math Madness Graphs



1. Which site has the better water clarity?
2. Why is water clarity important?



1. How much deeper is it at Site 2 than at Site 1?
2. Why is it important to know the depth?



1. How much warmer or cooler is the air temperature than the water temperature?
2. What factors affect water and air temperature in a natural environment?

