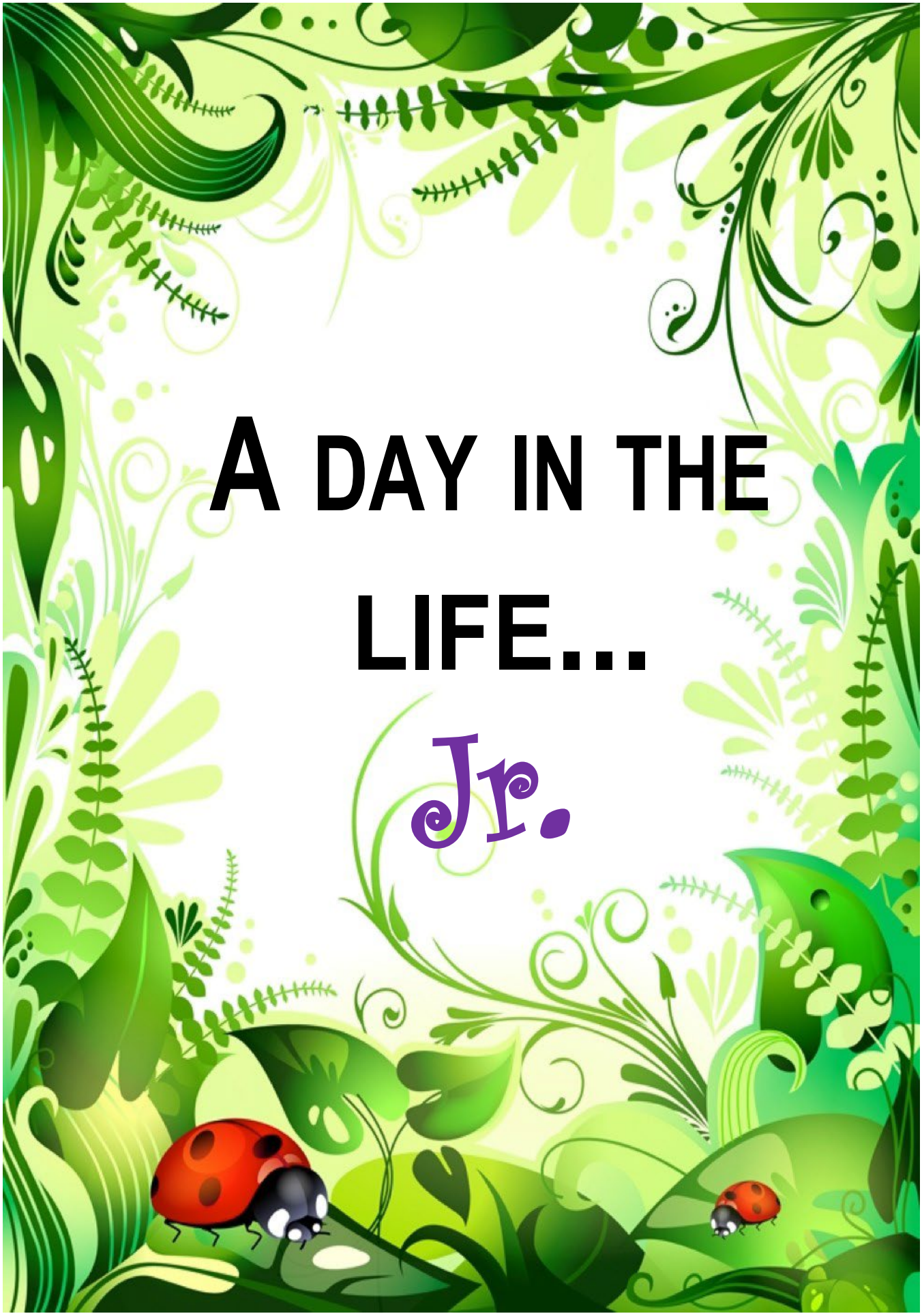
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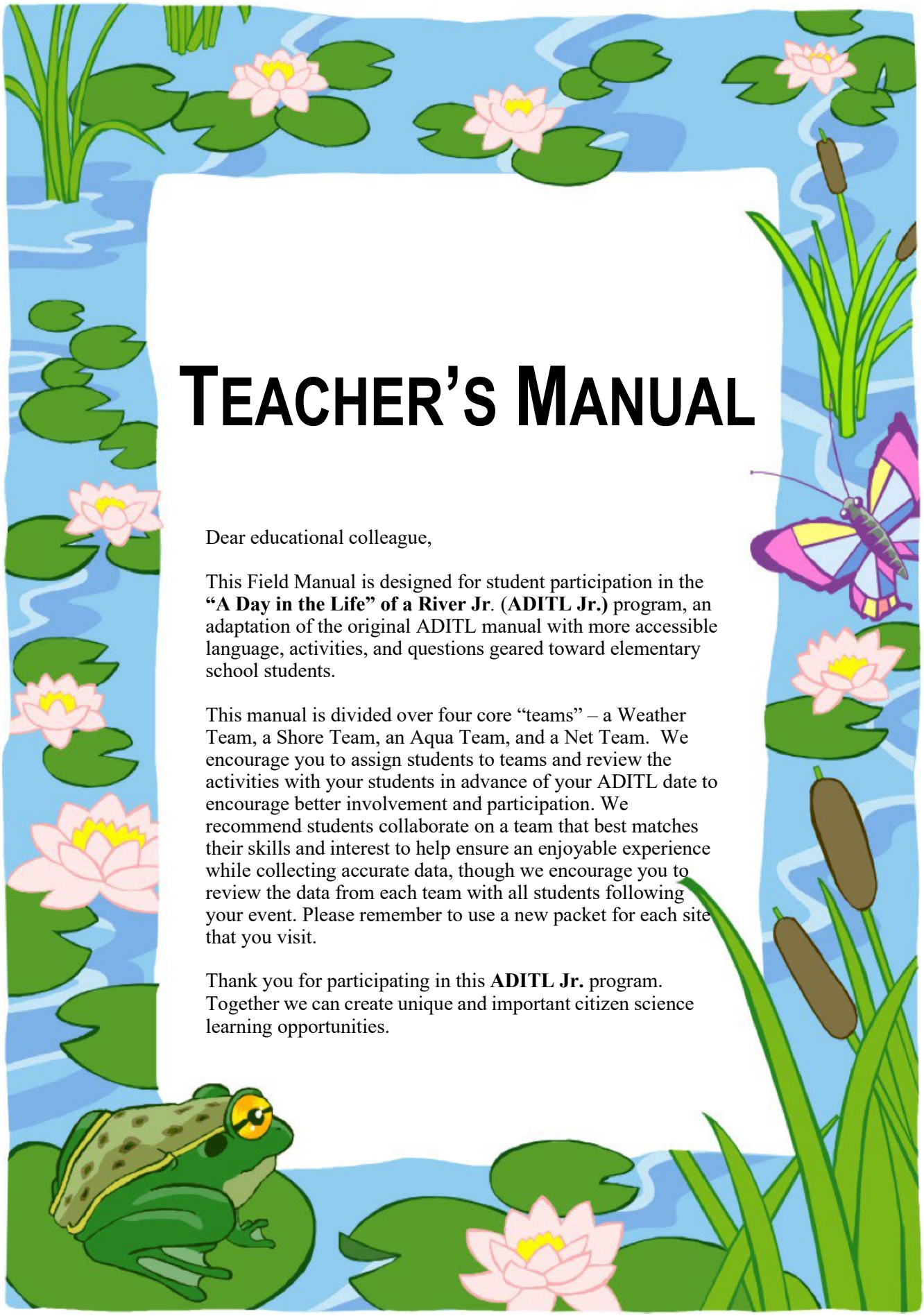


TEACHER'S MANUAL

Dear educational colleague,

This Field Manual is designed for student participation in the **"A Day in the Life" of a River Jr**. (**ADITL Jr.)** program, an adaptation of the original ADITL manual with more accessible language, activities, and questions geared toward elementary school students.

This manual is divided over four core "teams" – a Weather Team, a Shore Team, an Aqua Team, and a Net Team. We encourage you to assign students to teams and review the activities with your students in advance of your ADITL date to encourage better involvement and participation. We recommend students collaborate on a team that best matches their skills and interest to help ensure an enjoyable experience while collecting accurate data, though we encourage you to review the data from each team with all students following your event. Please remember to use a new packet for each site that you visit.

Thank you for participating in this **ADITL Jr.** program. Together we can create unique and important citizen science learning opportunities.

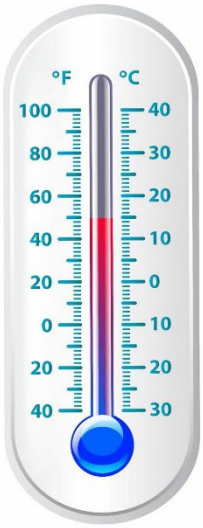
WEATHER TEAM

Scan QR code to enter data for this section

Team A. Weather Team

What is weather?

Weather is the temperature, wind, clouds, humidity and sunshine of a location, both currently and recently. Weather affects environments every day in many ways. Weather can even impact the water quality of a pond, river or lake.



Task 1. Air Temperature

Determining air temperature has every day uses, such as helping us figure out the clothing we should wear to keep us warm or cool. However, air temperature also affects environmental health, agriculture and energy demands, and biodiversity (the number of different species within a habitat), among other things. Extreme temperatures affect human health! Monitoring air temperature over time allows us to identify patterns or trends, such as slow but consistent temperature increases, and determine how this might affect the environment.

In this activity, your team will record the air temperature for 30 minutes.

You will need:

- ☐ Pencil
- ☐ Clipboard
- ☐ Air Temperature Chart
- ☐ Air Thermometer
- ☐ Clock or Stopwatch

IMPORTANT: Is your thermometer in degrees Fahrenheit (° F) or degrees Celsius (° C)? The chart has two spaces for temperature, so make sure you're using the correct column and units. Be as accurate as possible when taking your measurements and read the lines on the thermometer carefully. Select the nearest whole number if your measurement is between lines. Don't guess!

WEATHER TEAM

Procedure

Step 1. Hang your thermometer in the shade to avoid increased temperature due to direct sunlight. *Holding the thermometer in your hand can affect the temperature.*

Step 2. Count to 50. Record the time and the temperature on the thermometer in the first row on the chart.

Step 3. Wait 10 minutes. Record the time and temperature on the thermometer on the second row on the chart.

Step 4. Wait 10 more minutes. Record the time and temperature on the thermometer on the third row on the chart.

Step 5. Wait another 10 more minutes. Record the time and temperature on the thermometer on the fourth row on the chart.

Air Temperature Chart

Time (include AM/PM)	Air Temperature (° Fahrenheit)	Air Temperature (° Celsius)
	° F	° C
	° F	° C
	° F	° C
	° F	° C

Follow-up Questions

1) Did the air temperature change from the beginning to the end of your list?
    a. Why do you think the air temperature might change throughout the day?
2) What types of things can affect air temperature?

WEATHER TEAM

Task 2. Cloud Cover

Cloud cover refers to how much of the sky is covered by clouds with relation to the observer (in this activity, you!) Clouds can influence environmental conditions, such as overall air temperature. During the day, clouds reflect light to space, which helps to cool the planet. At night, clouds can act like a thermal blanket, trapping in heat. Determining cloud coverage can also help to predict weather (i.e. looks like rain!).

In this activity, your team is going to estimate what percentage of the sky is covered in clouds.

You will need:

- ☐ Pencil
- ☐ Clipboard
- ☐ Cloud Cover chart

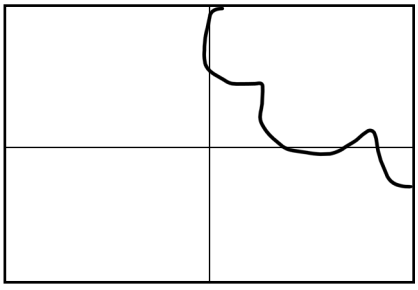
Procedure

Step 1. Imagine the whole sky is a sheet of paper. Divide the sky paper into four quarters.

Step 2. Look at each imaginary sky paper quarter. Is it mostly clouds, or mostly sky?

Step 3. Count how many sky paper quarters are mostly clouds.

Step 4. Record your results in the cloud chart on the next page.

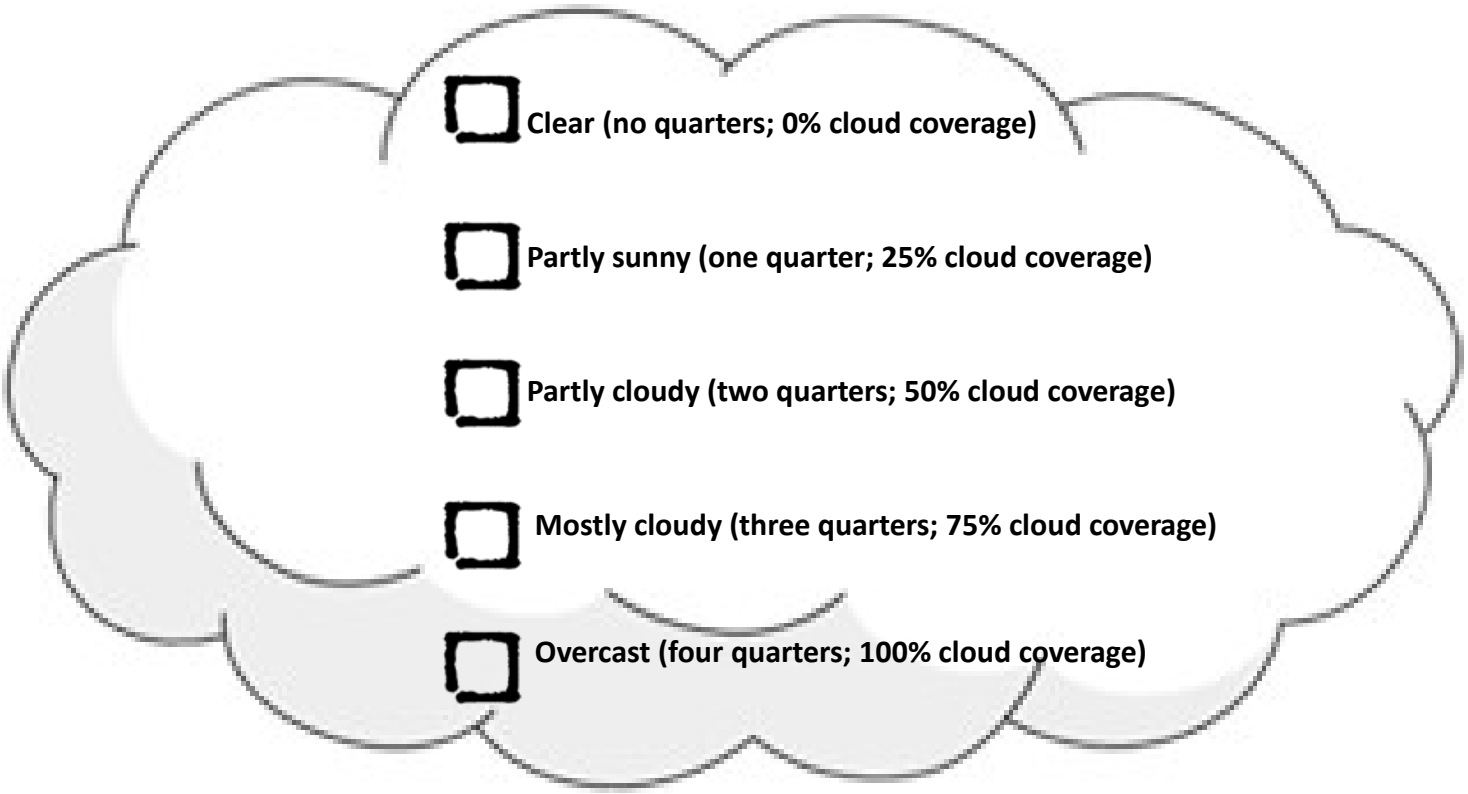


In this example, the sky is only approximately one quarter, or 25%, cloudy.
Check the second box on the Cloud Cover Chart, i.e. "Partly sunny."

WEATHER TEAM

Cloud Cover Chart

Check the box that most accurately reflects the cloud coverage.

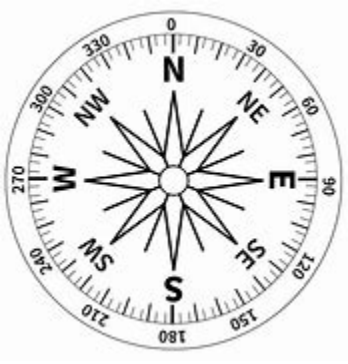


Follow-up Questions

3) How do clouds form?
4) How might clouds affect your air temperature measurements?
5) Based on the clouds you saw (or didn't see), what type of weather do you expect later today?

WEATHER TEAM

Task 3. Wind Direction



Wind is the movement of air across the surface of the earth. This movement can be nearly still, or it could blow fiercely. Measuring wind direction can help predict weather patterns, such as changes in temperature or storms.

In this activity, your team will figure out the direction of the wind.

You will need:

- ☐ Pencil
- ☐ Clipboard
- ☐ Compass
- ☐ Water (optional)

IMPORTANT: The wind direction is named for the direction you are facing when the wind is in your face. If it is a north wind, the wind blows from north to south. A southwest wind blows from southwest to northeast.

Step 1. Figure out which way is north. Hold the compass flat and level. Look at where the red needle is pointing. The needle will always point north. Turn your compass until the red needle lines up with the N for north.

Step 2. The person determining wind direction should face the wind so the breeze is equal on both sides of their face. *Tip: if you moisten your cheeks with a little water, it is easier to feel a light breeze.*

Step 3. The person feeling the wind points in the direction the wind is coming from.

Step 4. The person with the compass declares what direction that is.

Step 5. Record the wind direction on your worksheet. *It should be measured with direction, and with a number of degrees.*

WIND DIRECTION _____ _____°

Follow-up Questions

6) How could wind direction affect the shoreline of your site?
7) Could wind direction affect the vegetation in the water?
    a. What about the plants on the shoreline?

WEATHER TEAM

Task 4. Wind Speed

Wind speed is the measurement of how fast the air is moving. Like wind direction, wind speed can help predict different weather conditions. One of the most common weather tools that is used to measure wind speed is a hand-held device known as an anemometer.

You will need:

- ☐ Clipboard
- ☐ Pencil
- ☐ Stopwatch
- ☐ Anemometer
- ☐ Beaufort wind scale

The weather station measures wind using miles per hour. In this activity, your team will measure the wind using the Beaufort scale.

Step 1. Ask an adult to double check the anemometer is on the right setting. *The anemometer should be set to record the average wind speed in mph.*

Step 2. Face the direction that the wind is blowing – determined this in task 3.

Step 3. Hold the anemometer as high as you can over your head, with the propellor at the top. Make sure no one is in the way of the wind.

Step 4. Another student should time you so that you measure the wind for three minutes.

Step 5. Record the average wind speed on your data sheet.

Wind Speed _____ mph.

Beaufort Force number _____

see next page

WEATHER TEAM

An “old-fashioned” way of judging the wind speed is to look at the effect the wind has on object around you. The *Beaufort Wind Scale* below uses this method. After measuring the wind speed, check this chart and see if your measurements match the Beaufort Scale chart description of the water and the trees around you. If you want to record it, write down the force number (on the previous page).

For example, if there are large ripples on the water but the leaves aren’t moving very much, you’re experiencing a Beaufort Force of about a 2.

Beaufort wind scale

Force (Beaufort)	Wind speed			Description	Observed conditions	
	mph	km/h	knots		Sea	Land
0	<1	<1	<1	Calm	Like a mirror	Smoke rises vertically
1	1-3	1-5	1-3	Light air	Ripples	Wind motion visible in smoke
2	4-7	6-11	4-6	Light breeze	Small wavelets	Wind felt on exposed skin
3	8-12	12-19	7-10	Gentle breeze	Large wavelets	Leaves in constant motion
4	13-18	20-28	11-16	Moderate breeze	Small waves	Small branches begin to move
5	19-24	29-38	17-21	Fresh breeze	Moderate waves	Small trees begin to sway
6	25-31	39-49	22-27	Strong breeze	Large waves	Large branches in motion
7	32-38	50-61	28-33	Moderate gale	Sea heaps up	Whole trees in motion
8	39-46	62-74	34-40	Fresh gale	Moderately high waves	Small branches break
9	47-54	75-88	41-47	Strong gale	High waves	Larger branches break
10	55-63	89-102	48-55	Whole gale	Very high waves	Trees broken or uprooted
11	64-72	103-117	56-63	Storm	Exceptionally high waves	Widespread damage
12	>73	>118	>64	Hurricane	Sea completely white	Violence

Follow up questions:

8) Why do you think people used to use the branch movement and water ripples to estimate wind speed?

9) Why might someone need to know how fast the wind was blowing?

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Team B. Shore Team

Where are we?

A shore is the land along the edge of a body of water and is often a unique habitat for different plants, animals, and microorganisms. Living shorelines can help protect against flooding and erosion, and even assist with purifying water. Your job will be to investigate and record the information about the shore and surrounding locations being studied.

Task 1. Map the Site

The location of your data collection is important to our understanding of the habitat, and specific to the species of plant and animal life that inhabit the survey area. It is important to create a map of the sites where all the teams are collecting data and include accurate site descriptions. You can compare your maps with the documenter's pictures.

In this activity, your team will draw a detailed picture of the location(s) where all the teams are working.

You will need:

- ☐ Pencil
- ☐ Clipboard
- ☐ Unlined paper
- ☐ Measuring tape
- ☐ Compass or compass app on phone

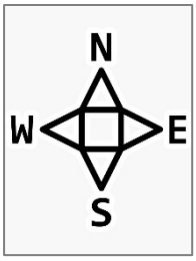
Step 1. Your group should determine the boundaries of the work area – ask the other teams where they are collecting their data.

Step 2. Measure the distance between the left and right boundary of the site. Measure the distance from the edge of the water to the back of the working area. Write those distances down on the edges of the paper. That paper will be your map.

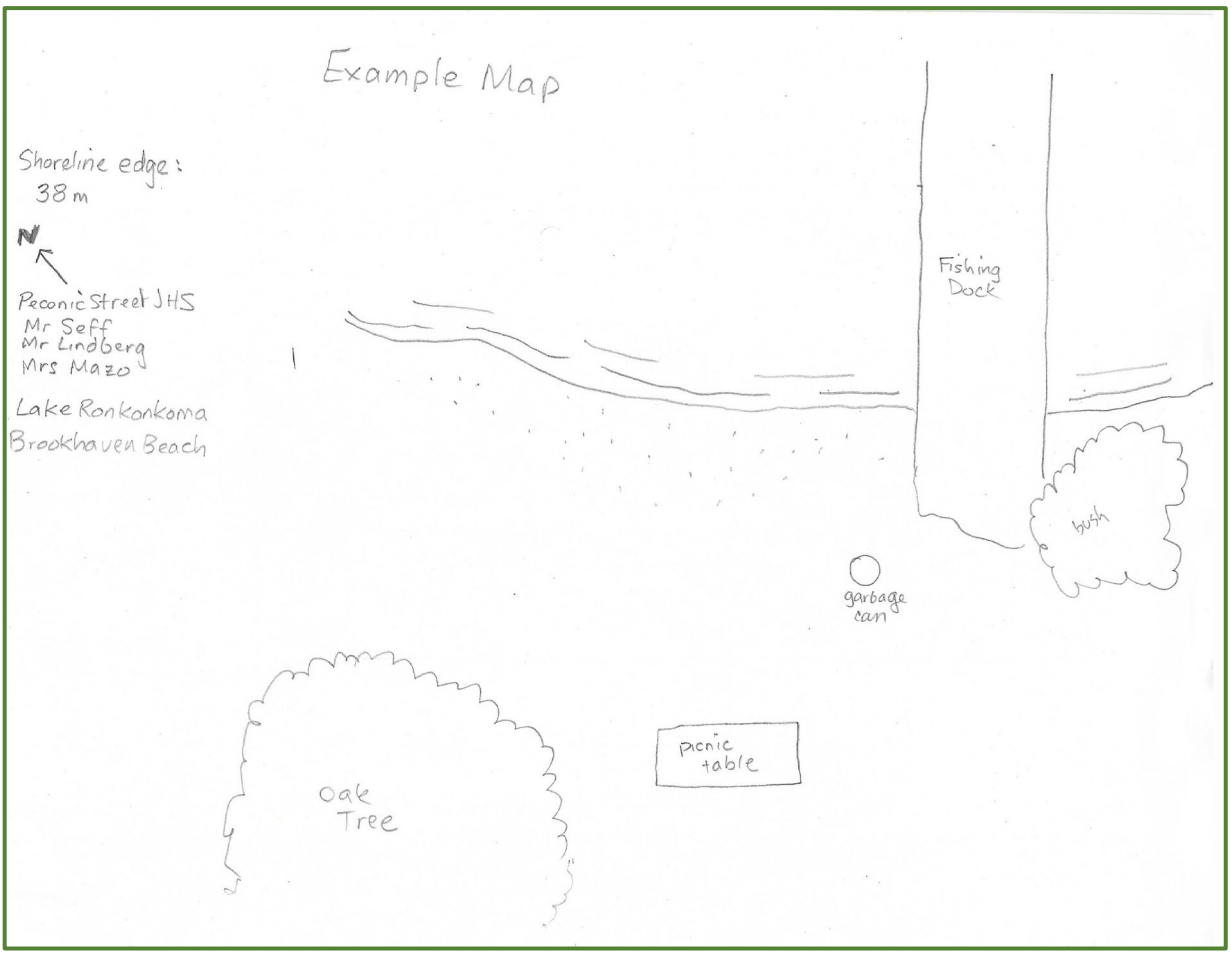
Step 3. Draw the edge of the water on your map. Include any logs, docks, piers or other objects in or out of the water.

Step 4. Draw shapes to represent trees, shrubs, benches, or any other objects that don't move. Label them (*keep your labels small).*

Step 5. Write the correct direction for north on your map (your weather team will be figuring out north as well, so you can work with them).



Step 6. Write the name of the place you are near your North arrow (what park you are in, what the name of the beach is, what the name of the river is, for example). Add the name of your school and your teacher(s).



Follow-up Questions

1) Do you think your site looks like a healthy ecosystem?
    a. Does it look like people take care of the site?
2) Where do you find the most plants and animals along the shore?
3) How might the shore habitat change throughout the year?

Task 2. Describe the Site

In this activity, your team will fill out three site charts describing the shore, the water, and the bottom of the habitat area the teams are sampling at.

You will need:

- ☐ Pencil
- ☐ Clipboard
- ☐ Site Description Charts 1-3
- ☐ Compass/map app on a phone

Step 1. Latitude and longitude are the grid lines of the exact place you are on the globe. Use a compass or map app on a phone to determine your current location or ask an adult to search "What's my Location?" using the internet. Write down the results on the chart. The numbers may be large, so make sure you include all the numbers, decimals and symbols to ensure as accurate a location as possible. Your results might look something like: LATITUDE 40°49'17.46" N LONGITUDE -73°07'06.71" W **or** LATITUDE: 40.730610, LONGITUDE: -73.935242.

Step 2. Look at the shoreline, where the land meets the water. Consider the 10 feet closest to the edge and fill in the second part of the chart.

Step 3. The third part of this task is to describe the area of water, from the bottom to the surface. You will describe the sediment of the bottom, the plants growing on the bottom (if there are any) and the plants growing on the surface (if there are any).

Site Description Chart 1. What is the location of the site?

Latitude _____ Longitude _____

Site Description Chart 2. *Circle all the words describing the land near the water's edge. Definitions can be found in the blue box on the following page.*

Sandy	Rocky	Vegetated (grasses, shrubs)
Muddy / Mucky	Road Ending	Pipe entering river/bay
Gentle slope	Steep slope	Pier
Riprap (large amounts of rocks piled up)	Garbage	Bulkhead (manmade barrier)

Site Description Chart 3.

A. River/ bay bottom is mostly **(circle one):**

Sandy *Muddy* *Rocky* *Weedy* *Unable to determine.*

B. What percentage of the river/ bay bottom is covered in vegetation? **(Check one)**

☐ 0- 25% ☐ 25-50% ☐ 50-75% ☐ 75-100%

C. What percentage of the river/ bay surface is covered in vegetation? **(Check one)**

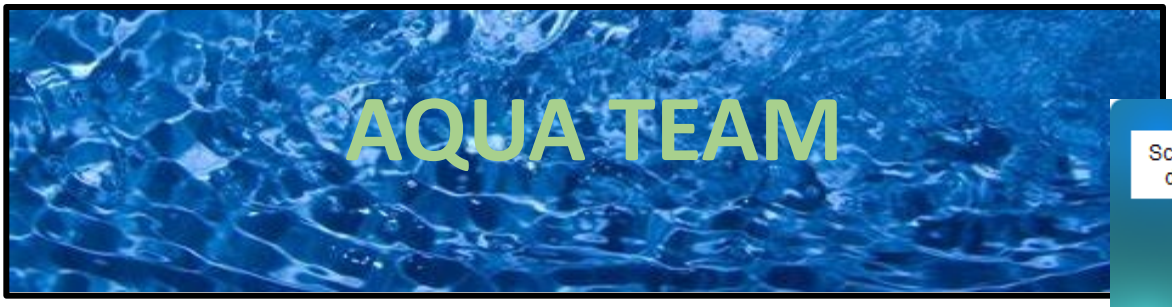
☐ 0- 25% ☐ 25-50% ☐ 50-75% ☐ 75-100%

Definitions

Sandy, rocky and muddy describe the dirt near the water.
Vegetated means there are plants (grasses, wildflowers, bushes) growing next to the water's edge.
Road Ending: Is there pavement at the site? Some places are paved so people can launch boats.
Pipe: Note if there are drainage pipes sticking into the water.
Gentle or Steep Slope: If you must climb down to the water, it's steep. If not, it's probably gentle.
Riprap: This is a term that describes rocks piled up to keep the shore in place.
Pier: Platforms that allow people to walk out over the water.
Bulkhead: A human-made wall that separates the shore from the water.
Garbage: Note this if there's a lot of litter scattered around.

Follow-up Questions

3) What natural features (rocks, sand, grass, etc.) were most abundant in the habitat you documented?
    a. How do you think these features affect the habitat and the organisms that live there?
4) How might plants and animals living in the habitat help each other?



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Team C. Aqua Team

What is the water like?

The team will investigate the chemical and physical properties of the water at your study site. Animals and plants are adapted to survive in their specific water environments. The water quality is determined by water temperature, pH and dissolved oxygen (DO) amount.

Task 1. Water Temperature

Water temperature contributes to the health of aquatic ecosystems in part because it can change the physical and chemical properties of water (ex: how much oxygen can be dissolved in the water). Measuring water temperature can also help predict evaporation rates or weather patterns, such as storm strength.

In this activity, your team will measure the temperature of the water over time.

You will need:

- ☐ Pencil
- ☐ Clipboard
- ☐ Water thermometer
- ☐ Aqua Chart 1
- ☐ Stopwatch/timer

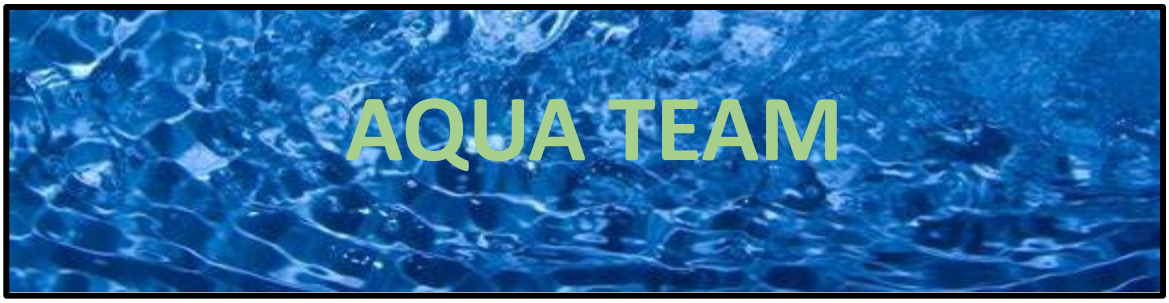
Important! Do not measure the temperature of water in a container. The temperature can change rapidly in just a few minutes.

Step 1. The water thermometer has a plastic case to protect it from banging against rocks. Use the string or plastic cord tied to it, so it can be suspended in the water and not resting on the bottom. Hang the thermometer in the water so that you can easily lift it and read it. You can tie it to a hanging branch or stand a stick in the water. Make sure the spot you select is not being used by another team.

Step 2. Count to 50 and record the temperature of the water in the ***temp at start*** row on the chart on the next page. Write down the current time in the ***Time*** column. Note the units; are you using the Fahrenheit or Celsius scale? Whichever you use, you don't need to fill out the other column.

Step 2. Measure the temperature after 10 minutes. Write down the exact time. Make sure you continue to use the same temperature scale.

Step 3. Repeat again at 20 minutes, and finally at 30 minutes.



Aqua Chart 1: Water Temperature

	Time	Temperature °C	Temperature °F
Temp. at Start			
After 10 mins			
After 20 mins			
After 30 mins			

Follow up questions:

1. Did the temperature rise, fall, or stay the same?
    a. If it changed, did it change at a steady rate? What might this mean?
2. What might affect water temperature?

Task 2. pH

pH is a measurement of the acidity or alkalinity of a water environment or sample. The pH scale ranges from 0 (very acidic) through 7 (neutral) to 14 (very alkaline). Drinking water is usually around a pH of 7. Animals and plants are adapted to live in a narrow pH range.

In this activity, your team will measure the pH of the water.

You will need:

- ☐ Pencil
- ☐ Clipboard
- ☐ Aqua Chart 2
- ☐ LaMotte Kit: pH test tube , pH tablet, color chart
- ☐ Timer

AQUA TEAM

Step 1. The LaMotte kit a white plastic jar with a lid. Find the tablets marked pH and a narrow, squared plastic tube with a lid. There will also be a color chart.

Step 2. Making sure your fingers aren't touching the opening of the tube, fill the tube to the line with water from your site.

Step 3. Add one pH tablet to the tube. Put the cap on the tube.

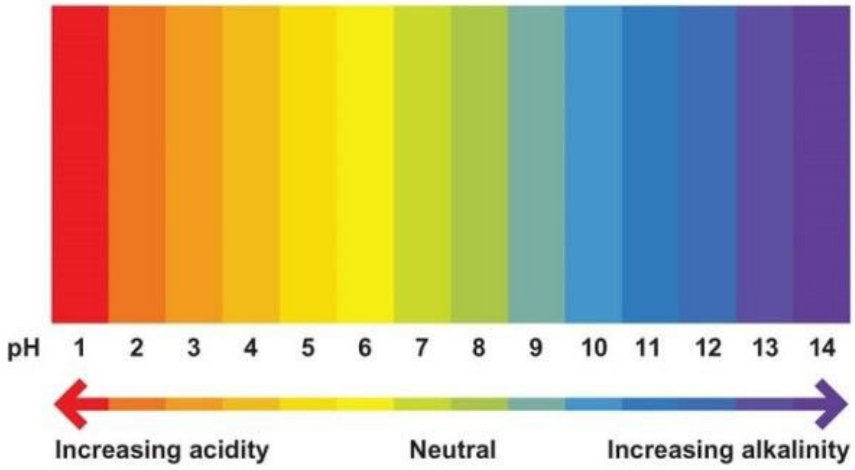
Step 4. Flip the tube over back and forth for 3 minutes until the tablet is dissolved.

Step 5. Compare the color of the liquid in the tube to the color chart. Record the pH color that is the closest match.

Aqua Chart 2: pH Results

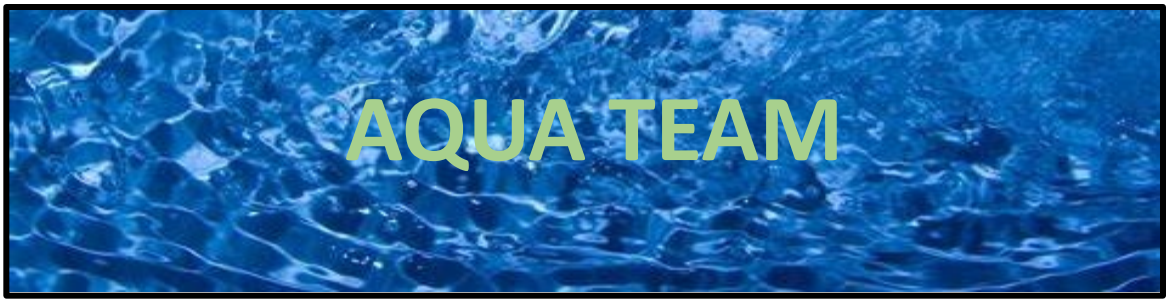
pH is closest to

_____



Follow up question:

3. What can cause changes in aquatic pH, and how might these changes affect the organisms that live in the water?



Task 3. Dissolved Oxygen

Just like you need oxygen in the air to breathe, animals need oxygen dissolved in the water to breathe with their gills. Dissolved oxygen, abbreviated "DO," comes from air dissolving into the water surface and from plants growing beneath the surface. The amount of DO in an aquatic environment is a delicate balance, as both too little and too much DO can harm or kill fish and aquatic invertebrates.

You will need:

- ☐ Pencil
- ☐ Clipboard
- ☐ LaMotte Kit: DO test tube, DO tablet and color chart
- ☐ Timer
- ☐ Aqua Chart 3

In this activity, your team will measure the amount of dissolved oxygen (DO) in the water.

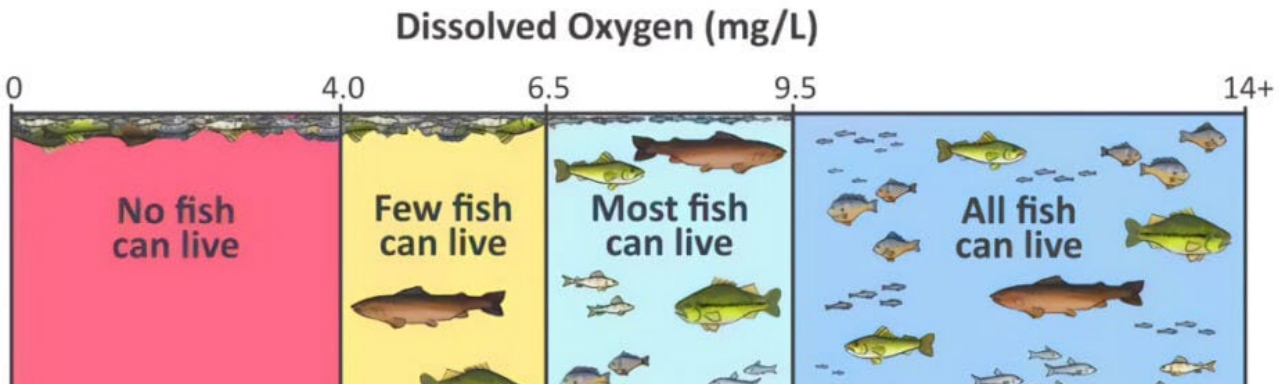


Figure 1 Chart showing the importance of dissolved oxygen for fish. From atlas-scientific.com

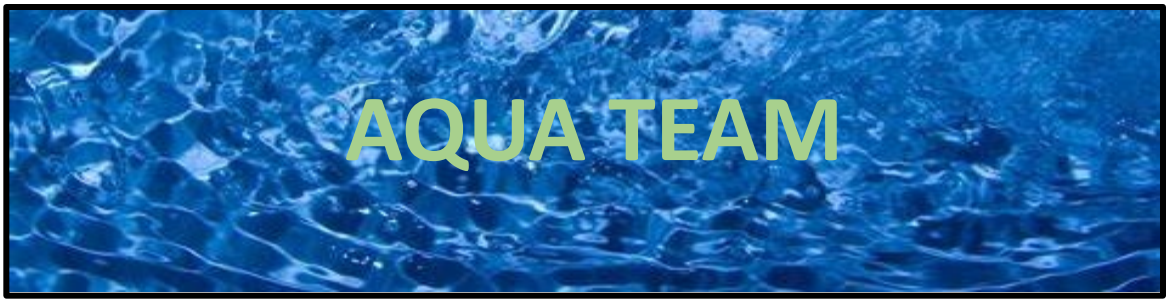
Step 1. The LaMotte Kit is a white plastic jar with a lid. Find the tablets marked DO and a short tube with a black lid. There will also be a color chart.

Step 2. Making sure your fingers aren't touching the opening of the tube, hold the tube under the water. Fill the tube to the top with water from your site.

Important! Make sure there is NO air at the top of your tube before closing it.

Step 3. Add the DO tablet to the tube. Put the cap on the tube.

Step 4. Flip the tube over back and forth for five minutes until the tablet is dissolved.

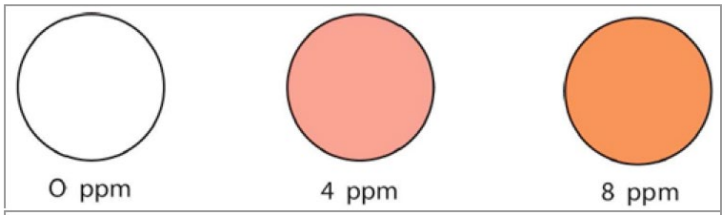


Aqua Chart 3: DO Results

DO is closest to

_____

Step 5. Compare the color of the liquid in the tube to the color chart. Record the DO color that is the closest match, don't guess! The result will let you know if there is no DO that can be measured, some, or more DO in the water survey area.

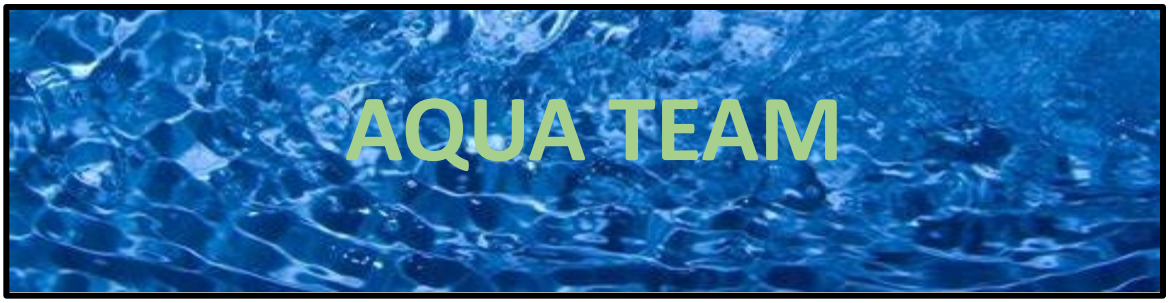


Follow up questions:

4. Is dissolved oxygen higher in warmer water or colder water? Why?

    a. Do your results agree with your water temperature measurements?

5. How might pollution or other human activities affect dissolved oxygen levels in aquatic environments?



Task 4. Current Speed

In this activity, your team will measure the speed the water is moving and what direction it is moving in.

You will need:

- ☐ Pencil
- ☐ Clipboard
- ☐ Measuring Tape
- ☐ Aqua Chart 4
- ☐ Three oranges or other biodegradable floating objects
- ☐ Timer

A current is the internal movement of water, sometimes described as the push or the pull of the river or bay. Scientists will often measure the direction the current is flowing and calculate the current speed. Current speed can influence the transport of nutrients, sediments, and organisms in an aquatic environment.

Important! You are using a stick or an orange instead of a float or a water bottle because sticks and oranges are biodegradable. Oranges are easier to see in the water, which is why they are recommended. Please recover the object you use, if possible.

Step 1. One student will stand with an orange (or other object) at the starting point. Make sure that your test will not interfere with any other testing done by other students.

Step 2. A different student should stand ready with a stopwatch or clock. The stopwatch student will tell the rest when to begin.

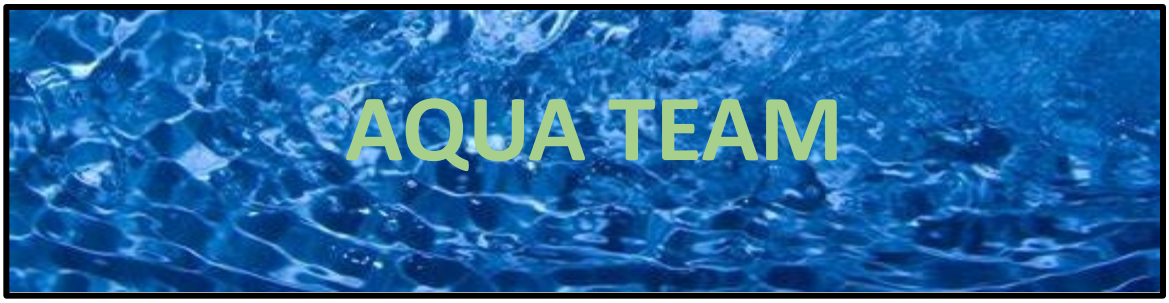
Step 3. When the stopwatch student starts the measurement, the starting student will toss the orange (or other object) out into the water. It is important it travels straight out from the student, and not at an angle. Distance from shore is not as important as tossing the object straight. The starting student **SHOULD STAY IN THEIR SPOT.** Do not move during the activity.

Step 4. The other student should walk along the shoreline, following the floating object.

Step 5. When 60 seconds have elapsed, the stopwatch student calls “TIME,” and the student following the object stops moving (even if the object keeps floating).

Step 6. Measure the distance between the starting students and the ending student. This is the approximate distance the object traveled in 60 seconds.

Step 7. Enter this measurement in the chart on the next page in the row marked Trial 1. Repeat the test two more times.



Aqua Chart 4: Current Speed and Direction

	Starting Time	Stopping Time	Time Elapsed	Distance Object Travelled (cm)	Direction (left or right)
Trial 1					
Trial 2					
Trial 3					

Follow up questions:

6. How might your distance from shore, or how far the object was thrown, affect the results?
7. What might happen to water current speed after a heavy rain?
8. Do you think water current changes at different times of the day? Of the year? Why?

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Team D. Net Team

What is living in the water?

Fish and other organisms are identified in aquatic habitats to observe changes in species or populations, monitor the health of the area, and identify possible problems or threats.

In this activity, your team will count, measure, and identify the living animals that can be found at your site.

Task: Seining

The seine net is a large net strung between two poles. Two adults with life jackets will pull the net through the water. When it lands on the shore, you will **collect** the animals from the net, **placing** them in buckets or trays of water. Once the net is empty, you will **identify** the animals, **count** each kind, and **measure** the largest of each species.

You will need:

- ☐ Pencil
- ☐ Clipboard
- ☐ Trays or buckets half filled with water
- ☐ Data sheet
- ☐ Identification guides
- ☐ Small nets
- ☐ Ruler

Step 1. While the adults are pulling the seine net through the water, make sure your team is ready. Have the trays or buckets half full of water to keep the animals alive while you observe them. Make sure your clipboard has a data sheet ready to record the data.

Step 2. One student should be the recorder. That student should write down the time the net comes to the shore.

Step 3. Without stepping or kneeling on the net (see picture on next page), the other students gather the animals from the net and place them into the containers of water- fish first, then insects, shrimp, crabs and snails. (If there are any large crabs, you might ask an adult to move them for you.)

Step 4. Using small nets, separate the animals so you can count how many of each kind there are.

IMPORTANT: Everyone wants the animals to survive. Don't get so excited that you harm the animals. Do not step on the net, and make sure all animals get into trays or buckets quickly. You should not handle animals or put your hands in the buckets if you have bug spray or sunscreen on your hands or arms.

Step 5. Identify the animal and tell the student recorder the name and how many you count. Be accurate, don't guess. If you're not certain of a species identification, ask an adult

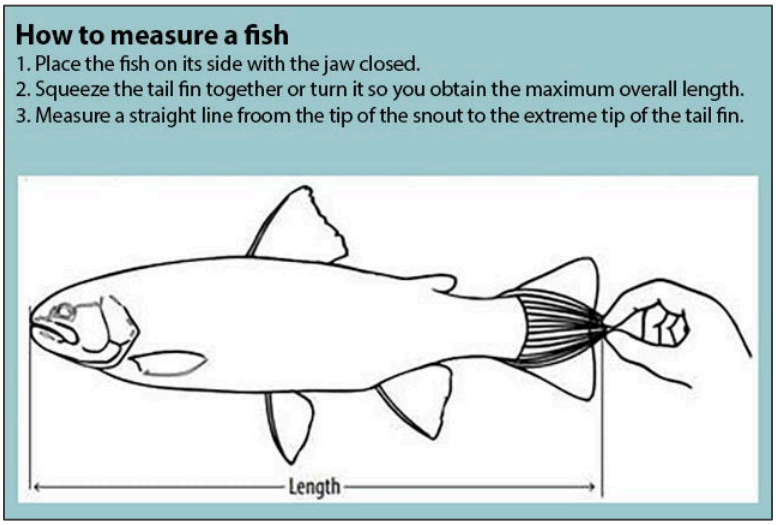
NET TEAM

IMPORTANT: For identification, we need to be certain of the correct species. “Crab” is not accurate enough and is not very useful. Don’t use nicknames like “spearing” or “baitfish.” Use a field guide to identify the organisms you collect.

Step 6. Pick the largest of each species. Using a ruler, measure the animal from front to back. Tell the student recorder the length. Use centimeters and be exact. If you say ‘it’s about…’ be more precise.

Step 7. If there’s enough time, the adults can do another sample. If all the organisms have been identified, counted and measured, release them back into the water where they won’t be caught by the seine net. Repeat the task from the beginning, recording the new time for the second (or more) seining samples. *If you repeat the steps and pull the seine net for another sample, make a new record, DO NOT simply add to the previous one.*

Notice no one is standing on the net. Remember to work carefully, quickly and safely.



Follow up questions:

1. Which species was the most abundant? Why might that be?
2. What surprised you most about the animals you collected?
    a. Were there any you hadn’t seen before?
3. Do you think the students at other locations across Long Island will find the same animals? Why or why not?

TIME THE NET LANDS ON SHORE_____SAMPLE 1

	Species	Total # of individuals	Size of largest individual	Units (mm, cm)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

TIME THE NET LANDS ON SHORE_____SAMPLE 2

	Species	Total # of individuals	Size of largest individual	Units (mm, cm)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

TIME THE NET LANDS ON SHORE_____SAMPLE 3

	Species	Total # of individuals	Size of largest individual	Units (mm, cm)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				