3: Leaf Length

SUMMARY: Calculate average lengths of eelgrass blades and conjecture why leaves are different lengths in different areas. Devise and set up growth rate experiments in their own tanks.

MATERIALS:
- pencil
- paper
- calculator

BACKGROUND:

Eelgrass leaves can tell us something about the environment where the plant is growing. Because eelgrass needs at least 22% of the light that hits the surface in order to photosynthesize, the leaves will grow longer in deeper waters in order to reach its required level of light.

ACTIVITY:
Give students the data worksheet on the following page, and let them answer the questions. During discussion, see if students can correlate water depth with leaf length.

EXTENSION: What is the growth rate of eelgrass blades? Have students brainstorm ways to measure plant growth over time. Recall that the outer blades on a plant stop growing; the inner new blades are the ones putting on growth.

Ideas for measuring blades:
1- Thread a needle and pull the thread between a new and an old blade. Cut the thread between the two blades. Measure the distance between the threads over time to get a growth rate.
2- Push a plant up against the side of the tank and mark where a young blade is located by drawing a mark with a sharpie on the tank. Draw a new mark each day, and measure the distance between the two marks.
3- Put a ruler into the tank, being sure to measure from a set point at the base of the plant each day.
4-Other ideas?

Is the growth rate different in tanks with more or less light? In tanks with higher or lower dissolved oxygen? Does the number of organisms colonizing a blade affect growth? Students can make up data sheets that enable them to collect the data they are interested in. Have students sum up their observations weekly.

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AVERAGING LEAF LENGTH

A group of students from Tremont School went on a field trip to the Bar in Bar Harbor and saw a beautiful eelgrass bed. In order to document some characteristics of this bed for 2009, students used a 25 centimeter square called a quadrat, which they tossed into the bed to randomly choose areas for study.

Quadrat

<-------25 cm--------->
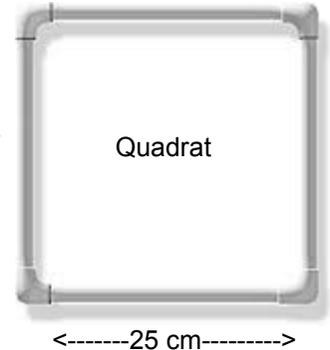
In quadrat # 1 a student measured three eelgrass blades. He recorded these three numbers:

Blade #1: 29 cm
Blade #2: 45 cm
Blade #3: 35 cm

What is the average length of these three blades? _____
 (Hint: add up the numbers and divide by 3!)

Another student measured three eelgrass blades in another location at the Bar. She recorded these three numbers:

Blade #1: 1 foot, 10 inches
Blade #2: 2 ft
Blade #3: 2 ft

OOPS! These numbers should be in cm. Convert the numbers to cm and then average.

What is the average length of these three blades in centimeters? _____

The table below is the data Tremont students gathered. Tremont students did a lot of work!

Find averages for all of their measurements:

Quadrats at the Bar	Length Blade #1 in cm.	Length Blade #2 in cm.	Length Blade #3 in cm.	Average Length
1	10	12	14	
2	12	6	24	
3	30	6	11	
4	25	7	10	
5	36	6	12	
6	15	10	9	
Total of all the averages:				
Average of the Averages (total divided by number of averages):				

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What is the average length of ALL eelgrass blades at the Bar? _____

In which quadrat were the blades the shortest?_____

Why do you think some eelgrass areas have longer blades and some eelgrass areas have shorter blades?

Another group of students repeated the study at Hadley Point in Bar Harbor.

Quadrats at Hadley Point	Length Blade #1	Length Blade #2	Length Blade #3	Average Length
1	20	15	8	
2	12	6	15	
3	15	16	10	
4	26	34	21	
5	15	10	6	
6	7	10	9	
Total of all the averages:				
Average of the Averages (Total divided by 6)				

What is the average length of all eelgrass blades at Hadley Point? _____

What is the difference in average eelgrass length at the Bar compared to Hadley Point?

What do you think can explain the difference between eelgrass at these two sites (What other information do you need to draw a conclusion)?