The Mystery of the Mostly Missing Reefs Learning Log - 7

Thinking About Data

DETECTIVE'S NAME: _____ **DATE:** _____

Now, thinking like detectives, use the clues (data) you have gathered to formulate some inferences and conclusions from your investigations.

1. What can you conclude from the quadrat data from Site #2? How does it relate to the Mystery of the Mostly Missing Reefs?

2. What observations did you consider most important at Site #2? Explain your reasoning.

3. What can you conclude about the clarity of water at Mokuola? Does this data support or hinder growth of corals?

4. Based on phosphate, nitrate, and DO clues (Sites 1 and 3), would you consider these waters to be polluted? Use data to support your answer. Does the data match with your hypothesis? Explain.

5. What conditions might contribute to higher phosphate and nitrate levels at different times? Why?

6. What inferences can you make from the salinity and temperature data (Sites 1 and 3)? Was there anything unusual about the numbers you collected?

7. After testing the water from Richardson Ocean Center at the wet lab session, what were the differences in water quality?

8. What inferences can you draw from the water at Richardson Ocean Center about the effects of the breakwall?

9. What other questions do you really want to ask after this analysis of data? In other words, what else do you need to know to help you solve this mystery?

The Mystery of the Mostly Missing Reefs Learning Log - 8

Displaying Data & Solving the Mystery

DETECTIVE'S NAME: _____ **DATE:** _____

CLUES GATHERED FROM MOKUOLA: Summarize key observations and notes from the field investigation.

DATA COLLECTED: On a separate sheet, create a table of your team's data and a graph to summarize your data.

CONCLUSION: Solve the Mystery! State your conclusion and why you think it is the answer to the mystery.

Did you need to revise your conclusions and explanations based on scientific evidence you collected? Explain.

When collecting data, why is it important to have replicable trials (collect information in the same way more than once)? Use the back of this page to write your answer.

HELP USING EXCEL

1. Point the cursor to "start" in the lower left corner of the computer screen – click on "programs", Microsoft Excel (If you don't see it, click on Microsoft Office first). Open the program.
2. The program will open a new "book" automatically – it looks like this:

	A	B	C	D
1				
2				
3				
4				

3. Enter your column headings in the top row. See the example below:
   If heading needs more room, expand the column by clicking at the end of the column, waiting until the cursor looks like an (I) and dragging the line to the left until the column is the width you want.

	A	B	C	D	E	F
1	Gorilla Ogo	Smothering Seaweed	Crown-of-Thorns	Sediments	Fresh Water	Other
2						
3						
4						

4. Enter your data (total percent cover) for each species in the correct columns and save your finished book or "spreadsheet." You can add more data later if you collect it.
5. From this table, you can create a graph. Select or highlight your table.
   Click on "Insert" and select "Chart." Then select the type of graph you want to create.
   Alternatively, click on the mini bar graph icon at the top of the page, the "Chart Wizard," and select the type of graph.
   a. Try different types of charts. The most common types are bar charts, line charts, and pie charts just as one sees them in magazines, newspapers, and on the Internet.
   b. Choose the chart/graph type that best shows the basic relationships in your data and the idea(s) that you may wish to emphasize. For example, line graphs can show growth or shrinkage over time. Bar graphs are good for comparing amounts. Pie charts can show relative size or contribution at a specific time.
   c. Select "Next" and follow the directions to label the "x" and "y" axes on your graph and give the graph a name.

(*Adapted from file provided courtesy of Sandra Webb, Mililani High School, Oʻahu*)

SELF-ASSESSMENT TEAMWORK

NAME: _____ **DATE:** _____

Place a check in the box that matches your performance as a team member. Add up your points and answer the questions below about teamwork.

***Laulima* (Cooperation)**	***Maikaʻi Loa!* (Excellent) 4 pts**	***Maikaʻi!* (Good) 3 pts**	***ʻAno Maikaʻi!* (Not Too Good) 2 pts**	***Auwē!* (Poor) 1 pt**
I did my best work for the team. It was in-depth, organized, neat and inspired!				
I helped others when they needed my *kōkua* (assistance).				
I finished my work on time.				
I listened to others' ideas with *hōʻihi* (respect).				
I gave positive feedback to others on my team.				
I asked for and used feedback from others.				
I'm proud of the work we did as a team.				

Total Score: _____

Explain what your contribution was to the team.

What was difficult for you in working with your team? Why?

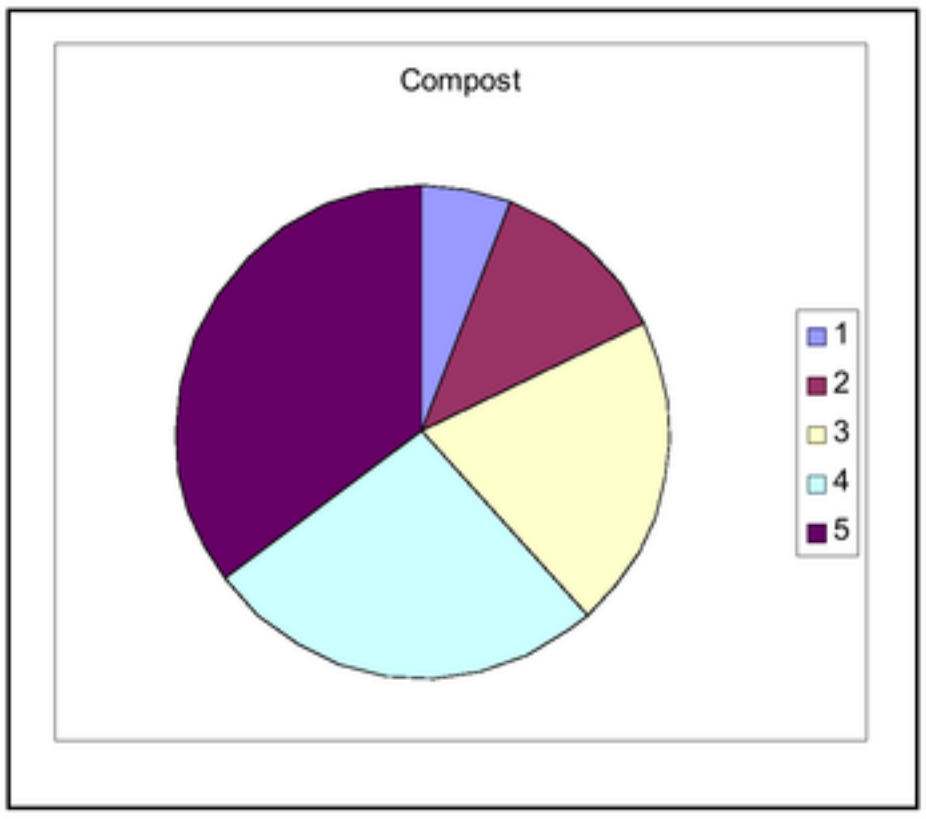
How could you improve and help your team to be more effective?
(Use the other side of the page if you need more room.)

Sample Data Display

Review the data in the chart below and the different types of graphs that can be used to display data. Which type of graph do you think is most effective for comparing plant growth with the different soil amendments? Why?

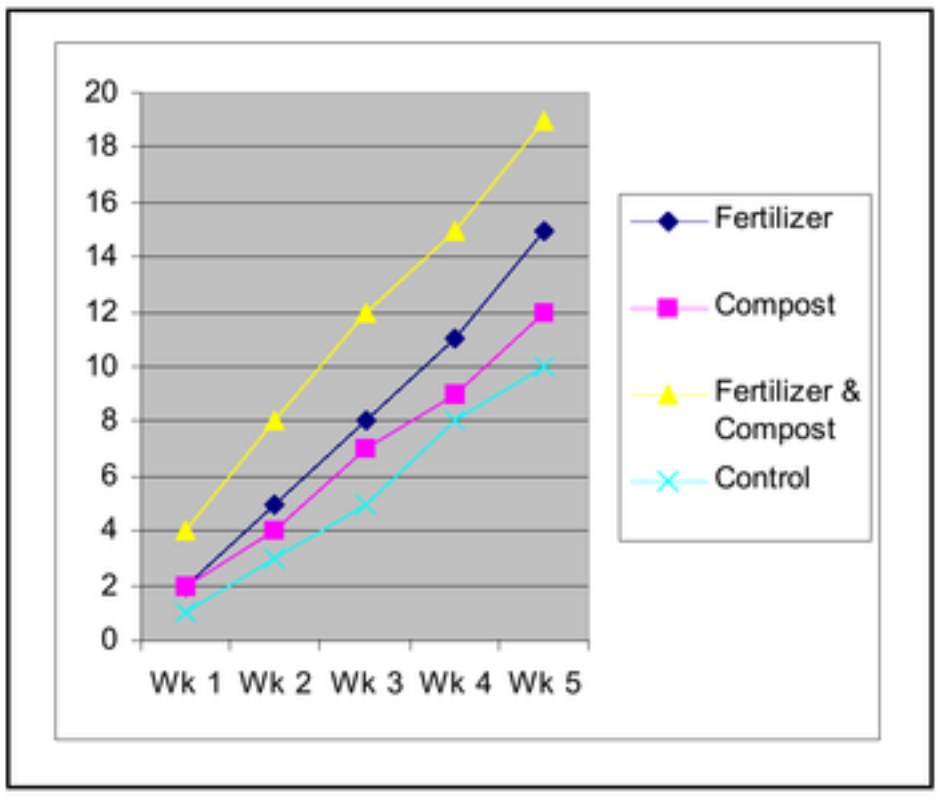
Soil Amendments (added at time of planting)	**Plant Height** (radishes)				
	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5
Fertilizer	2 cm	5 cm	8 cm	11 cm	15 cm
Compost	2 cm	4 cm	7 cm	9 cm	12 cm
Fertilizer & Compost	4 cm	8 cm	12 cm	15 cm	19 cm
None (Control)	1 cm	3 cm	5 cm	8 cm	10 cm

Circle Graphs

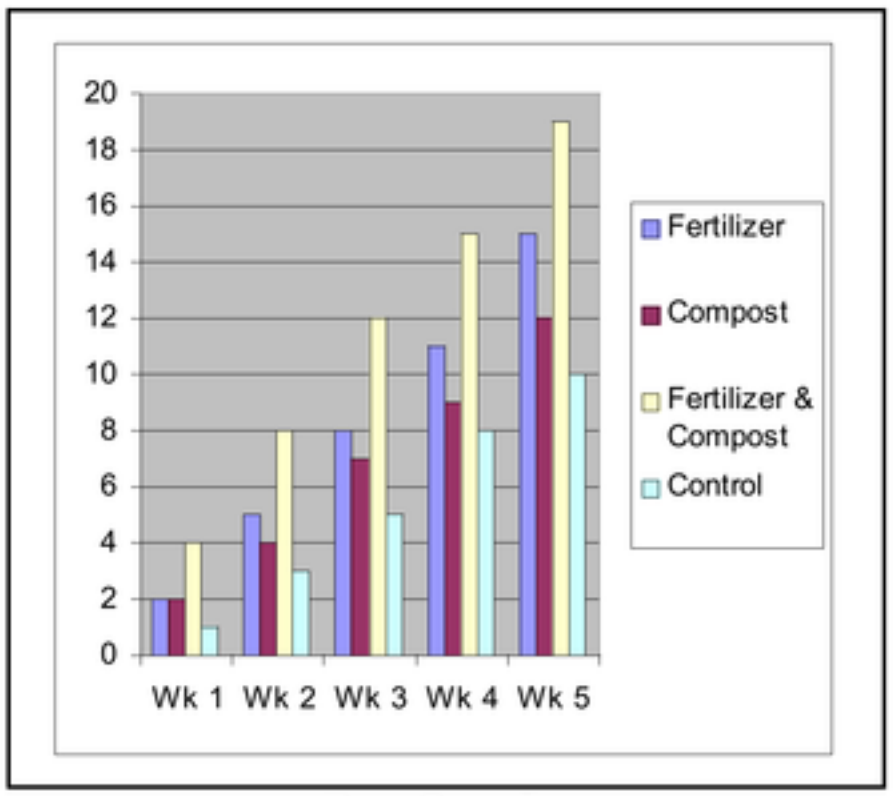


Circle graphs show the relative contribution of each of the progressive data points to the absolute total. In this case, the circle graph shows which weeks the plants are largest, e.g., the older the plant, the larger it appears.

Line Graphs

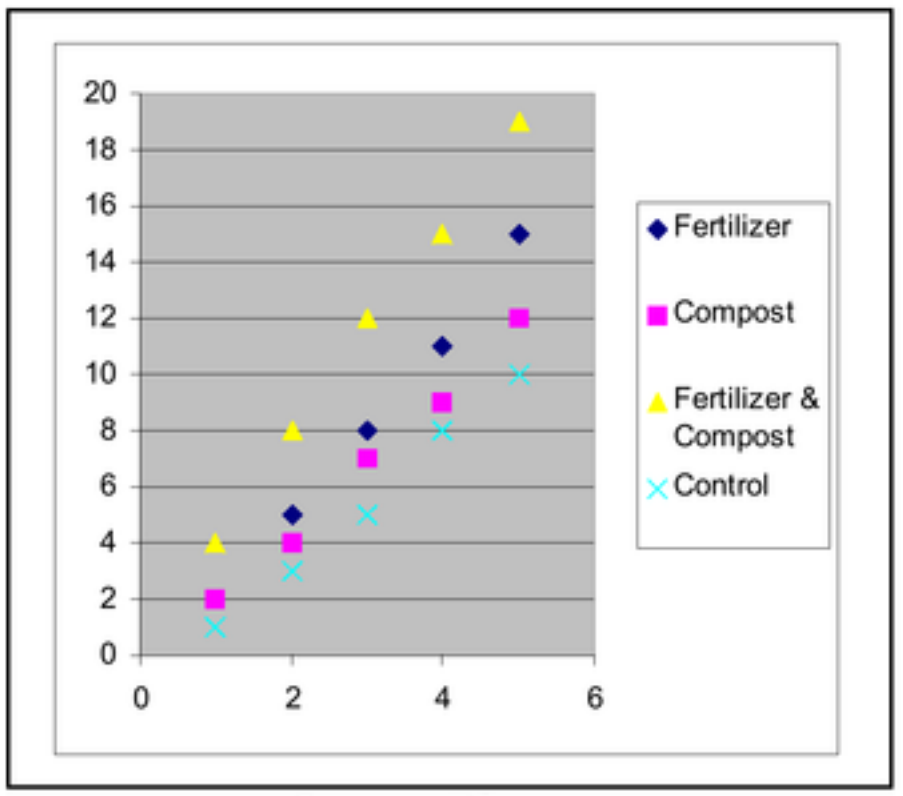


Line graphs show changes, trends, or in this case, growth *versus* time. The slope of the line can also suggest rate of change, e.g., the fertilized and composted plants appear to grow fastest.



Bar Graphs

Bar graphs show absolute size and compare each case against each other at specific places/times. In this case, one can visualize which plant is largest at each of the 5 weeks.



Scatter Plots

Scatter plots are used when one might be looking for some correlation in the data. In this case, the scatter plot suggests a very linear growth over the 5 weeks of data.

Stem-and-Leaf Plots and Back-to-Back Stem and Leaf Plot

Stem and Leaf plot for all plants at week #3

Wk #3	
0	578
1	2

Stem and Leaf plot for all plants at week #5

Wk #5	
0	
1	0259

Stem and leaf plots show a numerical and visual distribution of the data. In this case, we can see that most plants were less that 10 cm at week 3, but all were over 10 cm at week 5. One also gets a visual feel for the distribution of the data. Also, since the data is numerically displayed, it allows for easy identification and/or calculation of the mean, mode, and median.

Back-to-Back Stem and Leaf Plot

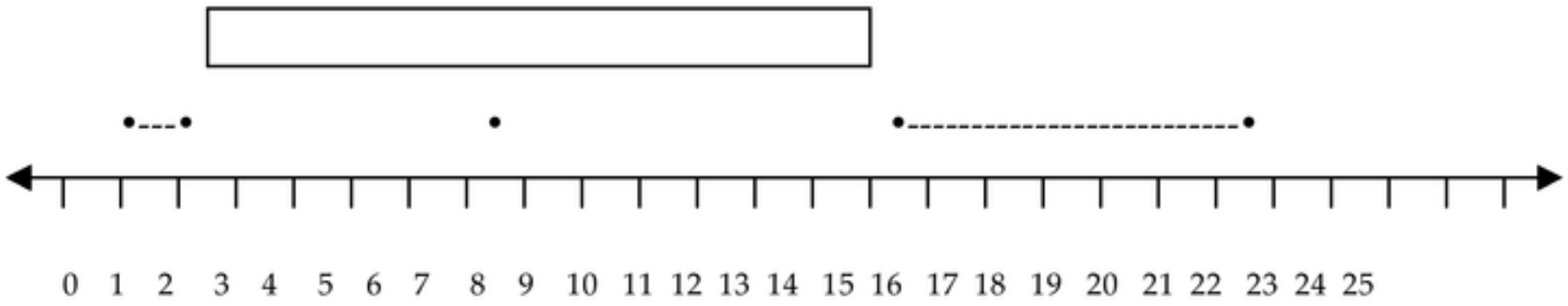
Week 3		Week 5
578	0	
2	1	0259

The Back-to-Back Stem and Leaf plot allows one to compare and contrast two sets of data. In this case, we contrast and compare weeks 3 and 5.

Box and Whisker Plots and Parallel Box and Whisker Plots

Week 1
1 2 2 4

Week 5
10 12 15 19



lower extreme: 1 median: 7 lower quartile: 2
upper extreme: 19 upper quartile:13.5

Box and whisker plots allow one to easily see how the data is distributed. Parallel Box and Whisker plots allow one to compare data sets to each other by comparing directly the relative spread in data. In this case, we see that at week 1, the plants are close in size. At week 5, the data shows that the plants have "spread" out in relative and absolute size.