# Assignment Summary

For this assignment, you will record data, create bar graphs, and analyze graphs in a spreadsheet program.

Background Information

The use of spreadsheets is widespread in many industries. It is a very powerful tool that can be used for data analysis. In fact, scientists from all backgrounds use spreadsheets in their day-to-day work and research. Spreadsheets can be used to visualize data, and can help to determine relationships between two sets of data. Excel is a commonly used spreadsheet program with a variety of graphs that convert your values to data points and allow you to see the type of association data sets have. In this project, you will be representing and analyzing the data in this guide using Excel. You may use a different spreadsheet program, but will need to research the steps needed to record and analyze data in that program.

Pine trees in northern Minnesota tend to grow quickly and can reach heights of more than 300 meters. Ecologists are concerned that changes in climate may affect the growth rates of these trees. They collect data on the pine trees’ growth over a period of 10 years. They also keep track of the temperatures and rainfall for each of those years. You are given the growth data for the pine trees from two different years, 2011 and 2017. In 2011, the forest had a typical rainfall of about 20 inches per year. The other year, 2017, was extremely dry with a little less than 10 inches of rainfall. The high and low temperatures were about the same for these two years.

Materials

* Microsoft Excel or similar spreadsheet program

# Assignment Instructions

For this project, you are expected to submit three things.

1. Data set recorded in a spreadsheet program
2. Bar graphs created in a spreadsheet program
3. Answers to analysis questions

**Step 1: Prepare for the project.**

1. Read through the guide before you begin so you know the expectations for this project.
2. If anything is unclear to you, be sure to ask your teacher.

**Step 2: Record data in a spreadsheet.**

1. View Table A at the end of this document. Open a new spreadsheet.
	1. Record the information in the same format seen in the table.
	2. Be sure to include the titles.

**Step 3: Create a bar graph.**

1. Compare the data on the different growth rates for 2011 and 2017. Consider plotting all data as a series of bar graphs. To do this, select all of the data found in your spreadsheet page, including the titles. Then, select the “Insert” tab.
2. Select a graph type. A column graph is a typical example. Choose a clustered 2-D column graph. Add a graph title and label the axes.
3. In the last exercise, you ended up with a graph that looks like Sample Figure A. Students new to data analysis often want to show too much data, and this kind of graph is a typical example. You do not need to show all the data. In fact, showing too much data will obscure the result. What you really want to do is just show the averages of the two groups.

Notice that there were no titles or labels for the example graph. This was done so that you can make your own and not copy it.

1. To only show the averages of two groups, you would first need to calculate the mean. In Excel, use the =AVERAGE(select the data set for 2011). Do this for both data sets.
2. To plot a graph using just the averages, highlight the averages for both years. Select the “Insert” tab. Then, under the column graph, select the clustered 2-D column graph. Add a graph title and label the axes.

**Step 4: Analyze the charts.**

 a) Prepare a short paragraph that addresses the following.

i. Describe the growth rate for both years.

ii. Assuming that the difference in growth rate is significant, what does this mean about pine tree growth?

iii. What other factors might affect the growth rate of pine trees?

iv. Describe another set of data you would look at to analyze the growth rate of pine trees.

**Step 5: Evaluate your project using this checklist.**

a) If you can check each box below, you are ready to submit your project.

* Did you record the data table with a title and labels in a spreadsheet?
* Did you create a bar graph with a title, axis labels, and units?
* Did you answer all of your analysis questions?

**Step 6: Revise and submit your project.**

1. If you were unable to check off all of the requirements on the checklist, go back and make sure that your project is complete. Save your project before submitting it.
2. Submit your spreadsheet, including tables and graphs, and your analysis paragraph through the Virtual Classroom.
3. Congratulations! You have completed your project.

Data

**Data Table A**

|  |  |
| --- | --- |
| **2011 Pine Tree Growth (cm)** | **2017 Pine Tree Growth (cm)** |
| 12.2 | 25.4 |
| 16.2 | 18.4 |
| 22.8 | 31.4 |
| 19.5 | 11.3 |
| 15.6 | 10.2 |
| 17.3 | 9.4 |
| 29 | 3.4 |
| 13.2 | 25.6 |
| 23.4 | 16.2 |
| 15.4 | 18.5 |
| 14.5 | 19.6 |
| 26.5 | 12.2 |
| 19.4 | 17.3 |
| 33.2 | 16.5 |
| 11.3 | 20.2 |
| 10.2 | 21.4 |
| 9.4 | 15.4 |
| 3.4 | 14.5 |
| 27.6 | 13.5 |

Sample Figure A

