Name:

Essential Question: How does temperature impact Gross Primary Productivity?

Part I: Background
Sketch and/or explain the basics of the carbon cycle**:**

Define the following and explain their role in the carbon cycle:
Carbon Stock –

Carbon Flux –

GPP –

Atmospheric Carbon –

Part II: Structured Inquiry
Write down the **essential question** you will be answering today:

The **Protocols** for this study are already input into ForC. You do not need to do anything. The protocols were developed by researchers using a standardized approach to monitor GPP, and collect mean annual temperature.

Data Collection was also done by researchers in the field for individual studies. The ForC database (https://forc-db.github.io/) collected data from multiple studies other questions can be asked. Your specific question deals with GPP and temperature. Define the following terms and determine which temperature and GPP should be placed.

Independent variable:

Dependent variable:

Write your **hypothesis** about how you think temperature might impact Gross Primary Productivity:

Data Processing: Follow the instructions on the PPT or follow along with your instructor to get the data into a scatter plot in Excel. Use the following link to access the data: (https://github.com/forc-db/ForC/blob/master/educational%20resources/ForC_GPP_and_temperature.csv)
Write down some initial observations once you have the chart complete. What seems to be happening?

Data Analysis: Answer the following
What is a linear regression line?

Write down your liner regression equation:

What is an R squared value and how do you interpret it?

Write down your R squared value:

Import your data from Excel. Make sure that you have your x and y axis labeled, the graph is titled, and includes a short description

Think/Pair/Share: You have now spent some time processing real data provided by the ForC database through ForestGEO (of the Smithsonian Institution). But what does it actually mean? Write down what you THINK it means (don't worry if you're wrong, you just need to have something in the blank here).

I **THINK** the data is showing that:

Because:

Now talk to a partner/group member about what the data shows. What is the effect of mean temperature on gross primary production?

8) **Conclusion**: Write a concluding paragraph on the impacts of mean temperature on gross primary production. Be sure to structure include an introduction sentence (on the forest carbon cycle), clearly state your hypothesis, background on ForC, the methods we used as a class, and a reference to your graph and R squared value. Avoid words like "prove" and make sure to explain what the data "suggests."

Extension: Using what you have learned what you can say about the GPP of forests at the equator vs forests growing far north or south of the equator?

Using your graph what is the GPP approximate in the following cities?

Miami, FL, USA: Average Annual Temperature 77°F:

Iqaluit, Canada: Average Annual Temperature 15.3°F:

Washington, DC, USA: Average Annual Temperature 64.8°F :

In the coming years as carbon dioxide continues to accumulate in our atmosphere it is likely the temperature is going to rise. Based on your graph this rise in temperature could be associated with increased plant productivity. Does this mean global warming will **always** be good for plant growth? Why or why not? Explain (you may want to watch https://svs.gsfc.nasa.gov/vis/a010000/a010600/a010630/index.html for some background information)