

# SCIENCE INQUIRY PLANNING GUIDE ~ PLANNING THE INVESTIGATION

Team Members Names: Kim, Stephanie, Roxanne, and Sydney

## Inquiry Tips:

### Research Questions:

- Should be testable (by experimentation)
- HOW or WHAT questions typically work well

### Hypothesis:

- What you think will happen based on prior experience and/or knowledge of this topic
- Be sure to state WHY you think this will happen

### Independent Variable:

- The manipulated or tested variable (the ONE thing you are changing)
- The cause

### Dependent Variable:

- The outcome or measured variable (what you measure/observe; the results or outcome of the experiment - Include the unit of measurement (or category of observation) - The effect

### Constants or Controls:

- All the things you keep the same to be sure you are investigating ONLY the independent variable

### Materials:

- List all materials you will use during experimentation (and quantities needed)

### Diagram of Set up:

- Draw (and label) the experimental set-up (and control set up if needed), being sure to NOTE any needed safety precautions

### Procedures:

- Include step-by-step directions of the procedures to be followed
- The procedures should be detailed so that another person could read them and perform the test EXACTLY the same way

### Data:

- Set up and label both a data table and a graph to be used to record the data during experimentation
- Be sure to have your plan expert reviewed before proceeding with the experiment

### Conclusions:

- Start by supporting or rejecting the hypothesis (Never use "PROVE")
- Provide concise evidence (summarize data) to support/reject

### Discussion:

- Discuss what you now know based on the data results
- Elaborate on the "so what" or meaning behind the results
- Avoid opinions, but include EVIDENCE-based inferences

Our research question is: How does soil temperature (DV) in the prairie compare to the garden (IV)?

Our hypothesis question is: We think that the prairie soil will be cooler than the garden soil because the plants are taller and create more shade.

The independent (tested, manipulated) variable is:  
Location (Prairie vs. Garden)

The dependent (outcome, measured) variable is:  
Soil temperature

In what unit will the dependent variable be measured? Celsius

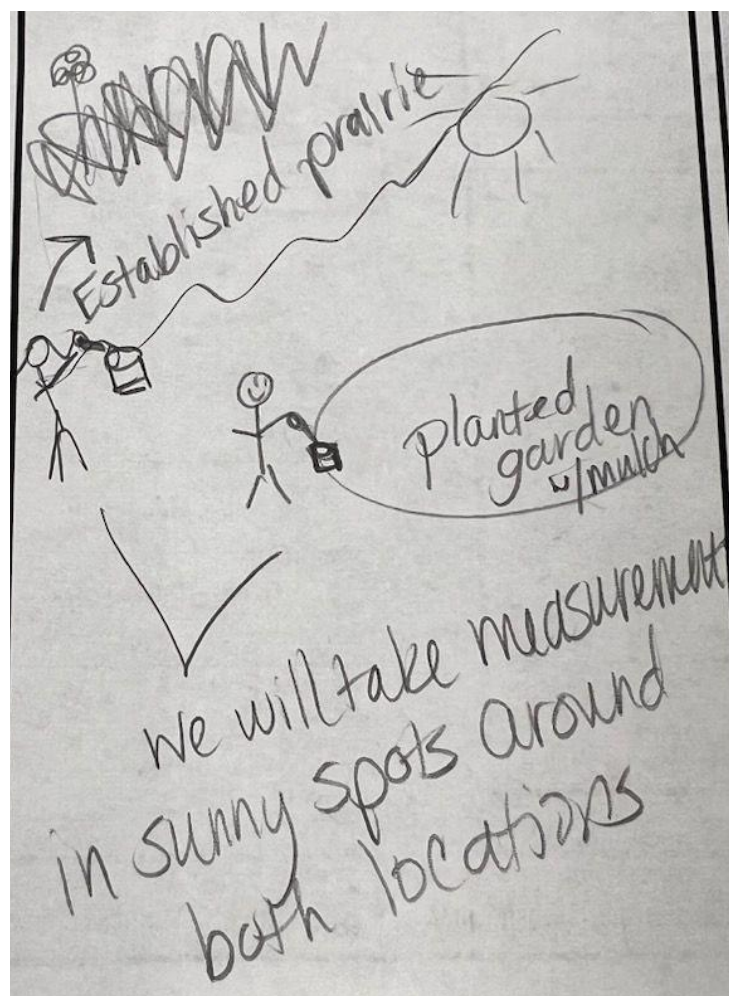
### Materials needed:

- Soil Thermometer (1 per group)
- 5cm Can (1 per group)
- Map (1 per group)
- Research Backpack (1 per group)

### Constants or Controls:

- Nine measurements
- Depth of measurements (5cm and 10cm)
- Sunny spot
- Flat and non-rocky ground

### Diagram of Setup:



### Procedures:

\*\* Follow GLOBE Soil Protocols \*\*

1. Go to a planted garden
  - Find a sunny, flat, and non-rocky location for taking measurements
  - Label the planted garden location on the map
  - Using the soil thermometer, insert the prong 5cm into the ground. Use the metal can to ensure you are at a depth of 5cm. Record one measurement at this depth and location.
  - Remove the metal can and insert the prong the remaining 5cm into the ground. This will be 10cm into the ground. Record one measurement at this depth and location.
  - Move to a different location within the zone and repeat until you have nine measurements for 5cm and nine measurements for 10cm within the planted garden.
2. Go to a prairie
  - Find a sunny, flat, and non-rocky location for taking measurements
  - Label the prairie location on the map
  - Using the soil thermometer, insert the prong 5cm into the ground. Use the metal can to ensure you are at a depth of 5cm. Record one measurement at this depth and location.
  - Remove the metal can and insert the prong the remaining 5cm into the ground. This will be 10cm into the ground. Record one measurement at this depth and location.
  - Move to a different location within the zone and repeat until you have nine measurements for 5cm and nine measurements for 10cm within the prairie.
3. Return to the site to analyze the data.



Expert Reviewed (signature)

# SCIENCE INQUIRY PLANNING GUIDE ~ CONDUCTING THE INVESTIGATION: **PUT ALL THIS INFO ON YOUR GOOGLE SHEET GROUP DATA TAB.**

Label the Table (column and row headings) & Graph (Title, X and Y Axis) prior to approval. After Approval, Record your observations in the data table, graph the results, and communicate your results.

Measurement #	Garden		Prairie	
	5cm Depth	10cm Depth	5cm Depth	10cm Depth
1	22.4 °C	22.3 °C	22.1 °C	21.5 °C
2	22.4 °C	22.0 °C	23.0 °C	21.5 °C
3	22.7 °C	22.5 °C	23.1 °C	21.5 °C
4	22.3 °C	22.1 °C	23.2 °C	21.8 °C
5	22.0 °C	21.7 °C	22.7 °C	21.7 °C
6	22.4 °C	21.9 °C	23.7 °C	22.0 °C
7	23.2 °C	23.0 °C	23.2 °C	22.0 °C
8	22.2 °C	22.0 °C	23.2 °C	22.1 °C
9	21.8 °C	21.3 °C	23.7 °C	21.9 °C
<b>Average</b>	22.4 °C	22.09 °C	23.1 °C	21.8 °C

**Conclusions: What did you find?**

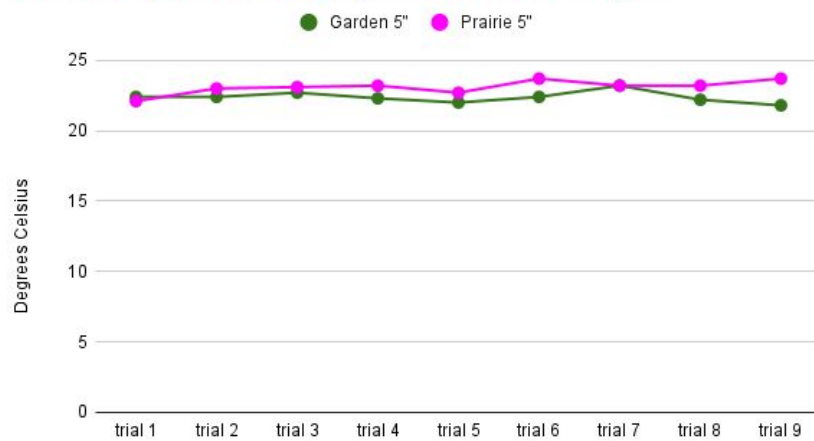
We found that the prairie soil was cooler at 10cm, but the garden soil was cooler at 5cm.

**Discussion: What does this mean?**

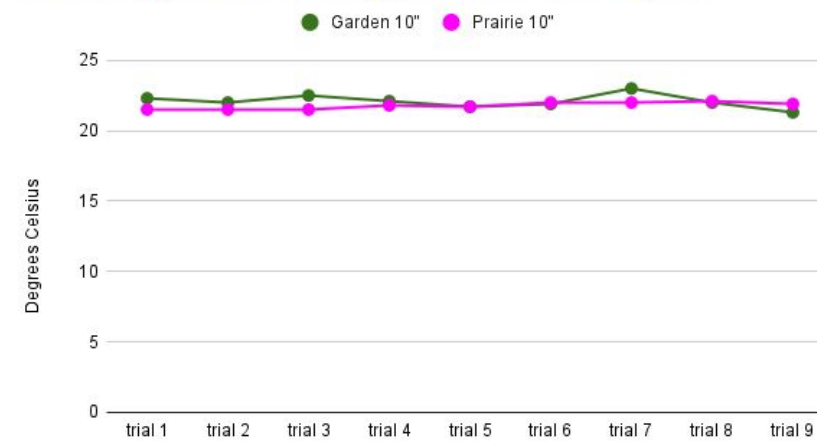
We believe that the prairie soil may be cooler because of its dynamic root system and ability to withhold water. The shade and covering that is produced from the plants may also keep it cooler. This would need more studying. As for the garden, we believe that the mulch protects the immediate surface from the sun, though the data was so close marginally that it may be insignificant.

Graph: MAKE a graph of your results. Be sure to Title and label the graph.

**Soil Temperature Comparison at 5" Depth**



**Soil Temperature Comparison at 10" Depth**



## Procedures

1. Go to garden space.
  - Find sunny spot
  - Take 9 measurements at 5cm and 10cm. Record data.
2. Go to prairie space. Repeat directions above.
3. Compare data.

## Materials

- GDEALER meat thermometer
- 5cm metal can
- Pencil
- Recording sheet

## Research Methods



It's getting cool down  
**HERE!**

By: \_\_\_\_\_  
**Introduction**

How does soil temp in the prairie compare to the soil temp of the garden area?

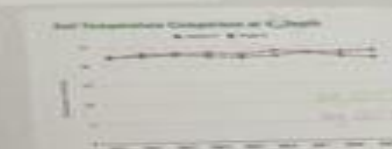
We think that the prairie soil will be cooler because the plants are taller and make more shade.

## Testing Environment



## Results

Location	5cm	10cm
Garden	18.5°C	15.5°C
Prairie	15.5°C	12.5°C



## Discussion

We believe the prairie soil may be cooler because of its dynamic root system and ability to withhold water. As for the garden, we believe the mulch protects the immediate surface from the sun.

## Conclusions

The prairie soil was cooler at 10cm, but the garden soil was cooler at 5cm. It confirmed our hypothesis.

## Resources

[www.googlemaps.com](http://www.googlemaps.com)

[www.globe.gov](http://www.globe.gov)