

# Science Investigation Project

## GUIDELINES

### Charlotte Beach Science Investigation: Celebrating the ‘Messiness’ of Science

Your investigation for this class is an opportunity to conduct an inquiry project into an authentic local problem. The driving question for your study is as follows: *Why does Charlotte Beach close and what can we as a community do about the problem?* As you know, scientific investigations are complex and challenging, so to make the project doable, we have broken this activity into three phases: design, conduct, and communicate. These phases are described below and are designed to help your group create a high quality investigation.

#### 1. Design

Your goal during this phase of the activity is to design a scientific investigation around a question of your own choosing in order to provide insight into the closings at Charlotte Beach. As a class, we will research some background information about the beach, its location on the lake, possible factors that contribute to the closings, previous research conducted, and some of the needs of the Monroe County Environmental Resources Department. A major focus of your task is to situate your study within this larger corpus of research in order to help inform this important issue.

*Assignment:* Planning is an important component of successful disciplined inquiry. To that end, you will develop a research plan prior to carrying out your study. Your plan (one per study group) should be a 3-5 page typed document (double-spaced, length not as important as substance) that includes the following elements:

- A brief description of the issue that your investigation addresses. This provides context for your study.
- A clearly stated investigable question. Include possible hypotheses and possible correlation between variables being studied.
- Your methods of data collection. This section should include consideration of multiple methods and a description of your resulting experimental procedure, a description of collection methods and the amounts of data to be collected, materials needed for collection, the role of technology in the collection of data, and how your data collection relates back to your research question.
- A description of the methods you will use for analyzing your data. Include data representations such as graphs (not actual graphs, just descriptions), mathematical and/or statistical analyses that you will use, and an explanation as to why your analysis is appropriate for your research question.

*Evaluation.* Your study design will be evaluated based upon the inclusion of the above criteria in your report. Due to the importance of the study design, both your peers and your teachers will address any shortcomings of your design. You will be asked to resubmit your design until all of the above criteria are met. **10% of final grade.**

#### 2. Conduct

During this phase, your study group will follow your investigation plan in order to conduct your study. As you may know, science is not a linear process. Scientists confront challenges, changes in direction, they use their imaginations and intuition in order to gain insights, and socially construct science with others while doing studies. Journaling about the events that occur during an experiment can provide valuable insights into the personal and social aspects of science. To this end, keep a field notebook using the following guidelines for your entries:

- For first day at lake, notes about possible studies to conduct.

- The process through which your group went through in order to arrive at a study idea, and how this idea changed over time in order to become a question.
- Date, time, and environmental conditions for each data collection period (air temp., wind, sunlight, etc).
- A record of all tests conducted and subsequent data collected.
- Problems or challenges encountered, bumps in the road, the messy parts of the investigation.
- Notes about how the study group worked through problems encountered.
- Changes made to your research plan as a result of unforeseen challenges.
- Personal reflections about the nature of the scientific process. What is this thing we call science? What does it look like in action, outside of the polished report.

*Assignment:* Using your notebook as a resource, **make an entry in your blog that tells the story of your group's study from your perspective.** Feel free to be creative. This is not a technical report. It is designed to help you gain insights into the nature of science.

*Evaluation:* For the completion of a thoughtful narrative into your blog, you will receive full credit for this part of the study. We will not collect notebooks, as the quality of your notebook will be reflected in your blog entry. **Worth 5% of final grade.**

### 3. Communicate

During this phase of the activity, you will communicate your research findings to the class. As you know, science is a public process, so communicating findings is an important aspect of all investigations.

*Assignment:* To this end, **one study group will create a poster to present to the class. The other study group will create a Powerpoint presentation.** For both presentations, use your design plan as a way to frame your presentation, but add conclusions, implications, and ideas for further study. See the study rubric for more details.

- The Powerpoint presentation should contain 10-12 slides.
- Present poster on a three-sided presentation board.

As part of both presentations, address the limitations of your study and the challenges you encountered in conducting your study. The purpose is not to make this process look perfect, but to include limitations, challenges and drawbacks as well in order to make visible the 'real' process of science.

*Evaluation:* Your grade for this part of the project will be determined through a self- evaluation. Your study group will fill out a brief questionnaire and then discuss with your teachers what you think your grade should be and why. The focus for your evaluation will be on the data collection, data analysis, the discussion of your findings, and the implications of your study. **Worth 10% of final grade.**

### 4. Reflection

*Assignment:* During this phase of the activity, you will **write a reflection** on what you have learned through this process of conducting an authentic science investigation.

- A. What did you learn: What did you learn about the science (the concepts of water ecology, etc.)? What did you learn about the process?
- B. What is the value of engaging in this authentic process for you as a person? As a US or world citizen?
- C. How has this experience impacted who you are as a science teacher? How has it impacted how you want to be as a science teacher?

Post your thoughts and supporting stories on your blog.

*Evaluation:* Complete for full credit. **Worth 5% of final grade.**