



# Solar Boats

## Lesson 9: Analyze Data and Develop Conclusions

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**DESCRIPTION:** Students have performed the investigation. They will now analyze their data, refer to their initial predictions, and develop their conclusions. Students will have the opportunity to discuss the usefulness of both quantitative and qualitative data forms, determining where each is most useful in drawing specific types of conclusions. This discussion will be used as a method of allowing for students to make direct applications of the vocabulary they have been using throughout the course of the unit (forces, energy transformation, etc). Additionally, they will have the opportunity to practice scientific talk through a journaling activity.

**GRADE LEVEL(S):** 4, 5, 6

**SUBJECT AREA(S):** Science, energy, energy transfer, energy transformation, analysis, conclusions, writing frames, quantitative analysis, qualitative analysis, observations, writing

**ACTIVITY LENGTH:** 1 hour

**LEARNING GOAL(S):** Students will analyze data from the solar boat races and develop conclusions. Students will write out their conclusions in a clear, articulate manner that demonstrates the usage of evidence from their own observations. Students will determine specific uses for quantitative vs. qualitative data in science experiments.

### NEXT GENERATION SCIENCE STANDARDS:

- 5-PS3-1. Energy can be transferred in various ways and between objects.
- 5-LS2-1. A system can be described in terms of its components and their interactions.
- 5 -PS2-1. Support an argument with evidence, data, or a model.
- 5 -PS2-1. Cause and effect relationships are routinely identified and used to explain change.
- 3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

### COMMON CORE STATE STANDARDS:

- W.5.1. Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

### STUDENT BACKGROUND:

Students may or may not be familiar with writing frames and methods for this activity.

### EDUCATOR BACKGROUND:

There are some very good writing frames to help you build the foundation for students to analyze data qualitatively and quantitatively. In addition, there is a writing frame to help student develop an excellent conclusion to an investigation.

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### Materials List (30-person class)

- Printed copies of Writing Frames

### Vocabulary

- **Qualitative data**
    - Deals with descriptions.
    - Data can be observed but not measured.
    - Colors, textures, smells, tastes, appearance, beauty, etc.
    - **Qualitative → Quality**
  - **Quantitative data**
    - Deals with numbers.
    - Data which can be measured.
    - Length, height, area, volume, weight, speed, time, temperature, humidity, sound levels, cost, members, ages, etc.
    - **Quantitative → Quantity**
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### Lesson Details

#### Activity – Make Qualitative and Quantitative Observations in Order to Draw Conclusions

- **Focus Question:** What is the difference between quantitative data and qualitative data? (Quick write in science journals.)
  - a. Describe and define the differences in journals.

- b. You may want to access website examples. There are many great ones out there. The following link illustrates a side-by-side example.

<http://regentsprep.org/regents/math/algebra/AD1/qualquant.htm>

- Pass out Writing Frames: Paste/tape in science journals. (Depending on where you are in the school year, your students may be familiar with these from previous investigations).
- Once these writing frames are reviewed, students should be able to analyze the data on their own and draw conclusions. This can be done in class or out of class as an assignment!

## References

Writing Frames: Adapted from ***Writing in Science*** by Betsy Rupp Fulwiler:

<http://regentsprep.org/regents/math/algebra/AD1/qualquant.htm>