Student Writer's Notebook: Building Bridges

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Bluefield High School
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Student Name: YOUR NAMES HERE

The Task:

After researching informational texts on the structure and function of bridges, developing a hypothesis, and conducting an experiment examining live load forces on bridge stability, write a laboratory report that explains your procedures and results and confirms or rejects your hypothesis. What conclusions can you draw?

Task I: Task Engagement

Generate a list of things that you already know about forces. Include what you know about bridges and the weight they support.

Task Analysis

1. What are you going to write about?

2. How are you going to get the information?

3. What is the final product that you will turn in to your teacher? (an essay? A poem? A list?)

4. What do you want to ask your teacher about the task?

5. Re-write the prompt in your own words.

6. What will your teacher need to teach you before you can work on this task? Be specific!

BRIDGE TYPE:

REAL WORLD EXAMPLE:

LENGTH:

WIDTH:

CONVERSIONS TO METRIC

LENGTH:

WIDTH:

SCALED DOWN RATIO AND MEASUREMENTS:

Web Quest: To be completed before beginning your lab

Directions: Go to the websites. Answer the questions that follow.

SITE I: http://www.pghbridges.com/basics.htm

Site II: http://science.howstuffworks.com/engineering /civil/bridge.htm

For each type of bridge, list the following information:

- Main characteristics (use your own words)
- 2 examples of each type of bridge including the name of the bridge, the location, and the span

Beam and Girder types

Main Characteristics:

Example 1:

Name:

Location:

Span:

Example 2:

Name:

Location:

Span:

Arch Types

Main Characteristics:

Example 1:

Name:

Location:

Span:

Example 2:

Name:

Location:

Span:

Truss Types

Main Characteristics:

Example 1:

Name:

Location:

Span:

Example 2:

Name:

Location:

Span:

Suspension types

Main Characteristics:

Example 1:

Name:

Location:

Span:

Example 2:

Name:

Location:

Span:

Go to http://www.pbs.org/wgbh/buildingbig/lab/forces.html.

Define the following terms in your own words:

Compression

Tension

Bending

Shear

Torsion

Loads

There are seven different types of loads that can affect a bridge. Name and briefly describe each type of load.

Weight of Structure Definition:

Weight of Objects Definition:

How to reinforce a bridge to support more weight:

Soft Soil Definition:

How to reinforce a bridge to account for soft soil:

Temperature Definition:

How to reinforce a bridge to account for temp. changes:

Earthquake Definition:

How to reinforce a bridge for earthquake protection:

Wind Definition:

How to reinforce a bridge to account for strong winds:

Vibration Definition:

How to reinforce a bridge to account for vibration:

Video: Modern Marvals-The Golden Gate Bridge

Watch the video and answer the following questions:

1. What was the purpose of building the bridge?

2. What were the safety concerns while the bridge was under construction?

3. What is done to keep the bridge updated and up to safety regulations?

4. What structural changes have been made to the bridge?

5. Why is the bridge painted? How was the color chosen?

6. What information from the video will assist you in building your bridge?

What's Going to work? TEAMWORK!!

- At this point in the module, you need to collaborate with you team and delegate tasks. Consider the following:
  - What roles will each of you play in constructing the bridge?
  - Who will record the steps taken as you build? Who will take pictures?
  - Who will be present for bridge force testing?
  - Who will ensure that you are collecting enough information to write your formal lab report?
  - Who will type the report?
  - Who will proofread the report?
  - Who will submit the report? (MUST be submitted by email or share on google drive or presented to teacher on flash drive)
  - Who will revise the report upon receiving feedback from the teacher?
- Use the space below to write your collaboration notes and answer the questions above:

The Lab Report

In this experiment your will have an opportunity to apply what you have learned about bridges and forces. The objective of this experiment is to build the strongest bridge possible given a set of predetermined constraints. Each group will present their design to the class and then test the maximum weight that the bridge can hold.

Constraints:

- Bridges have to be between 55 cm and 60 cm long and width must be between 7 cm and 10 cm wide. The bridges must be less than 30 cm high.
- The only materials you will have are an x-acto knife, ruler, popsicle sticks, and hot glue.

TITLE

Consult with your group and decide on a title for your report. Write the title in the space below:

Hypothesis

Write the hypothesis for your inquisition in the space below. The hypothesis must include the type of bridge you are building and the relevant terms that you learned from doing the web quest. An *example* of a hypothesis would be "After researching the types of bridges and the forces that they can support, a truss type bridge will support the most weight given the dimensional constraints of construction provided by the teacher. " (do not copy this hypothesis as it is written)

Organization for Introduction

Describe the Problem:

(Topic Sentence) Entity to be Studied:

(Topic Sentence) Independent Variable:

(Topic Sentence) Dependent Variable:

(Topic Sentence) Overview of Method used to test the hypothesis:

Methodology

What materials will you use for your investigation? Be very specific. Include units if applicable.

***NOTE: MAKE SURE THAT EACH MATERIAL IS INCLUDED IN THE METHODOLOGY SECTION

METHOD: How *exactly* will you conduct the investigation from beginning to end? Write this as though someone else is going to replicate your investigation.

Steps:

How will you collect data? (Do not include the data table in this section-just describe *how* the data was collected.)

What photographs can you include in this section? Label each photo as a figure. Assign a number and a title to each figure (i.e. Figure 1 Completed Bridge)

Include:

- The amount of force added to the deck of the bridge in Newtons
- Your observation of what happened each time additional force was added

NAME	LOCATION	DIMENSIONS	WEIGHT HELD /FORCE
		LENGTH: WIDTH:	
		LENGTH: WIDTH:	
		LENGTH: WIDTH:	
		LENGTH: WIDTH:	
		LENGTH: WIDTH:	
		LENTH: WIDTH:	
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Results

Summarize your data in paragraph form. Include information relevant to the following talking points:

- Begin with main findings and then describe other relevant results.
- Round numbers to the nearest hundredth (two decimal points).
- As a result of _____ force being added to the bridge, _____ was observed.
- What was the force required to break the deck of the bridge?
- When you use any tables or figures, refer to them in the text of the results section: e.g., "see Table 1" or "as shown in Figure 1."
- NOTE: Do not discuss the implications of your results in this section

Conclusion/Discussion Section

First, summarize the results and state whether or not they support your hypotheses.

Relate the results to previous research, discussing whether they are similar or dissimilar to previous findings.

Discuss any weaknesses in the design or procedures and how this may have affected your results.

Discuss implications of the findings and any potential directions for future research.

End this discussion by commenting on the significance of your research.