LESSON 23

BRIDGE PROJECT: TESTING PHASE

The moment of truth has arrived: it's time to put your bridge to the ultimate test! Prepare to witness the culmination of your engineering prowess as you gradually add weight to your bridge's center, pushing its limits until it reaches its breaking point. This hands-on experiment will provide valuable insights into structural engineering and the forces at play.

Supplies

- Sand, rocks, small weights, or any objects with known weight amounts
- Cord (optional)
- Scale
- Safety glasses
- Small bucket with a sturdy handle
- Ruler

Instructions

1. Sketch your final bridge.
2. Measure and label the length, width, and height of the bridge on your sketch.
3. Measure and record the mass of the bridge.
4. Find a good area for testing (such as two tables placed a foot apart) and set the bridge on the testing area.
5. Hang the bucket from the center of the bridge. It can hang directly from the bridge if there is room to add weight to the bucket, or you can tie a cord around the center of the bridge and loop it through the bucket handle to hang it.

6. Put on your safety glasses before adding any weight to the bridge. Slowly add weight to the bucket until your bridge fails.
7. Record the weight at which the bridge breaks. If necessary, convert your weight from pounds to grams. (Use an online tool to do this if needed.)

Bridge Design

Bridge mass: _____

Questions

1. Calculate the strength-to-mass ratio of your bridge. Divide the breaking load measured in grams by the mass of the bridge in grams.

2. Why do you think engineers in the real world would want high strength-to-weight ratios for the bridge they design? In other words, why do they want bridges to have smaller masses but be able to withstand higher masses?

3. How does this project relate to what we've been learning about forces? Think of at least two things from lessons 21-23 that could be applied to this project.

4. What was the main cause of failure for your bridge? What caused it to break in the end?

5. Based on your experience designing and testing your bridge, what could you have done differently to improve your design and give your bridge a greater strength-to-weight ratio? List at least two improvements you could have made.