BUILD IT! Strong Tower

Challenge:

It is Mrs. Bucyk's birthday. During lunch, a fourth grader gave her a plate of chocolate chip cookies. Just then, the cafeteria's sink sprung a leak. As Mrs. Bucyk headed off to the kitchen to check on the sink, she placed the cookies on the floor. The cafeteria is now in danger of being flooded. Can you build a ***Strong Tower*** using only the materials here to hold Mrs. Bucyk's gift off the cafeteria floor so it doesn't get ruined?

Materials needed:

- Coffee stirrers
- Marshmallows
- Scissors
- One paper plate
- Weights (juice boxes weigh 125 grams each! NOT for drinking)
- Paper & pencils
- Strong Tower data sheet
- Calculator
- Baby wipes (for hand cleaning)

Procedure: PART 1 – Build it! STRONG (until 7:30)

1. Talk with your group about the best way you imagine building your *Strong Towe*r. Remember ideas about compression, tension and load and the shapes of strong structures. Brainstorm **IDEAS** for a **DESIGN** for a structure that will be strong enough to bear weight and be is ***AT LEAST*** *15 cm (about 6 inches) tall*.
2. Use the paper to sketch out an idea if you like. After deciding on a plan, **BUILD IT** using the materials provided.
3. When your structure is ***AT LEAST 15 cm (about 6 inches) tall***, use your paper plate as a tray to hold weights. Estimate the weight you think your structure can hold. **TEST** your structure to see if it can bear weight *gently*! When you are confident of the strength of your structure, complete the data sheet.

Procedure: PART 2 – Build it! TALL (until 7:45)

4. After adding your data to the chart, get more building materials at the stage if needed. Put the weights aside.
5. Using your structure as a **BASE**, try to build the tallest tower you can. Now the only LOAD your structure will bear is the DEAD LOAD of the structure itself.

GOOD LUCK!

Adapted from "Leaning Tower of Pasta" at http://www.teachenginnering.org

BUILD IT! Strong Tower
DATA SHEET

Team name _____

Can you help Mrs. Bucyk and save her cookies?
As engineers, let's design a solution to this problem.

Tension
A force that PULLS on a material

Compression
A force that PUSHES on a material

PART 1 – Build it! STRONG

1) Are stirrers stronger in tension or compression? _____

   Are marshmallows stronger in tension or compression? _____

2) How tall is your structure after part 1? ☐ cm

3) What is the maximum weight your structure held? ☐ grams

4) Calculate the ratio: weight (g) to height (cm) as follows:

$$\frac{\quad}{\quad} = \frac{\quad}{\quad} = \square$$

Remember: Ratios can be written as fractions or decimals.

Use your calculator to convert your fraction into a decimal.

5) Go up to the stage and record your ratio on the chart. How does your ratio compare to that of other teams?

6) Now, collect your additional building materials for Part 2.

PART 2 – Build it! TALL

7) How tall is your structure after part 2? ☐ cm

8) What changes would you make in your design to make it taller or stronger?

Congratulations you've designed, built and tested a structure that solved a problem. You're now an engineer!