**Building a Parachute**  
4th Grade  
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**Benchmark:**  
SLC 7: Students will select appropriate resources and tools to make accurate observations to gain desired results given the stated conditions (i.e., if a desired result is to build an outdoor greenhouse to start seeds, the design would have to promote the correct amount of sunlight.)

**Objectives:**  
Each team must construct a parachute out of the given materials in a set amount of time that will take the longest amount of time to fall.

**Materials:**
- Stopwatch
For each group:
  - 1 Large trash bag
  - 1 Plastic grocery bag
  - String (unlimited)
  - Large washers (unlimited)
  - Scissors
  - Scotch tape (optional)

**Initial Demonstration:**
Use a toy parachute attached to a toy man and demonstrate the parachute falling slowly to the ground. Ask why he falls to the ground, what makes him fall slower/faster, what if he weighed more or less – how would that affect the speed of his fall, what if the parachute were larger/smaller – how would that affect the speed of his fall, etc…

**Target Observations:**
- The parachute falls to the ground because of gravity.
- The parachute is slowing him down by catching air.
- The weight of the man may cause him to fall slower/faster.
- The size of the parachute may make the parachute fall more slowly/faster.

**Target Model:**
- The parachute falls to the ground because of the force of gravity
- The parachute is slowing him down by catching air and creating friction.
- The larger weight of the man the faster he will fall, the smaller the weight of the man, the slower he will fall.
- The bigger the parachute, the more slowly he will fall, the smaller the parachute, the faster he will fall because there will be a decrease of increase in the amount of air resistance (friction).
Procedure:

Instruct the students that they will be working in groups of four to design a parachute that will take the longest amount of time to fall to the ground. Explain where the parachutes will be launched from so the class has an idea of the distance they will be covering. (Our school used the top of a stairwell, which allowed the parachutes to fall 3 stories). Each group will be given the same amount of materials, except washers and string, of which they may decide how much they want to use based on their design. Split the class up into groups and after they have divided up, show the class the materials they will be given and have each group come up with an initial plan. After they have discussed a strategy and have it approved, the groups may come up and gather their supplies. This initial strategy may change, it is just to get them thinking before they jump in and start working without having a plan. Allow the class all of this class period to work.

For testing purposes one group member may stand on a chair and launch the parachute while the rest of the group looks on. The next class period, the groups may be given 15 minutes to finish up any small details and then the launch will be held. One member from each team will stand at the top of the stairwell and launch when given the signal. A teacher standing at the bottom will time the parachutes with a stopwatch. Do the results confirm our predictions (model) of what will affect the parachute’s descent rate? If not, what is different?