Activity: Making Parachutes

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This activity is designed to get students thinking about and experimenting with drag using home-made parachutes. There will be a focus on making modifications to parachutes to either increase or decrease drag. What materials make better parachutes? Does size or shape of the canopy matter?

Materials:

- Parachute: paper, plastic bags, cloth, etc.

-strings: dental floss, twine, ribbon, string, etc.

-weight: marble, Dinkie car, ball, washer, toy figurine, etc.

-optional: yogurt cup basket for holding weights

-stopwatch (can find one on most cell phones)

Before getting into how parachutes create drag, we want to see what the student already knows about drag. Chances are they have felt drag before, they just didn’t have a word for it! Start with this demonstration:

* Get the student to hold a piece of paper above their head (as if they were holding a sign at a concert), the larger the better (preferably Bristol board), and run with it. Did they feel any resistance on the paper? Ask them to explain what they think was happening. They will probably say that the air is hitting the paper and slowing them down.
* Explain that this is correct, and that backward force is called drag. It is responsible for slowing things down.

Other examples of drag:

* when you put your hand out of a moving car’s window. When you put your hand out, the moving air hits your hand and tries to push it back. This is drag!

Experiment: Testing Parachute Designs

To get students thinking about how design helps increase and decrease drag, they create and test various parachute designs.

* Ask the student what factors that might increase and decrease the amount of drag on a parachute.
* Using three different pieces of paper of the same size, have students create a different shape parachute canopy with each piece of paper. They could also try plastic or cloth!
* Attach strings to the canopy and tie all strings to a weighted object.
* Next, students should make a prediction of how each parachute will act in a free fall and why they think that.
* Have the student drop their parachutes from a decent height (a deck would work perfect!) It can be inside or out providing the parachute is dropped from the same height each time.
* Students will record how long each parachute takes to fall to the ground. Test each parachute at least 2 more times to ensure a fair test! Record all times and take the average (mean) of all trials for each parachute.
* How can they modify a parachute to either slow it down or make it drop faster? Have students determine whether they want to have an efficient parachute that has more drag or one with less drag. What is the goal? Do they want the parachute to fall quickly or slowly? Why is it important that it falls quickly or slowly?
* Have them make a new design and test it (3 times) and record the time. Were they successful in speeding up or slowing down the new parachute?

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| Parachute Design | Prediction | Time to reach the ground (seconds) | Average time for each design (mean) |
| Parachute 1, Trial 1 |  |  |  |
| Trial 2 |  |  |  |
| Trial 3 |  |  |  |
| Parachute 2, trial 1 |  |  |  |
| Trial 2 |  |  |  |
| Trial 3 |  |  |  |
| Parachute 3, Trial 1 |  |  |  |
| Trial 2 |  |  |  |
| Trial 3 |  |  |  |
| Modified Parachute, Trial 1 |  |  |  |
| Trial 2 |  |  |  |
| Trial 3 |  |  |  |