Activity: Marshmallow Launcher

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This activity demonstrates how thrust works by seeing how far you can propel a marshmallow (or other item, like cotton balls) out of a cardboard tube using only your breath.

Materials:

- paper towel tube

-toilet paper tube

-marshmallows or other small, light objects for launching (cotton balls, paper balls, etc.)

Before starting the activity, ask the student what would happen to a paper airplane if they simply dropped it instead of throwing it. They will probably say that it would drop right down to the ground. If you asked them why, they would likely say because they need to throw it to give it power. That would be exactly right! The “power”, or forward force, is called thrust and all flying objects need it in order to sustain flight.

Experiment:

* Have the student place the marshmallow at the end of short tube (toilet paper tube), hold it horizontally, put their mouth to the end with the marshmallow, and blow! How far did it go?
* Try placing the marshmallow in the middle and beginning of the tube and blowing. Does it make a difference?
* Place the marshmallow in the longer tube (paper towel tube) and repeat steps above. Did the marshmallow go farther? Did they need to blow harder? Ask them what they think is happening.
* Note: when investigating distance, make sure you are conducting fair tests by always starting from the same position!
* Explain that blowing into the tube increases the air pressure in the tube. As soon as it leaves the tube, the blowing no longer affects it. The faster the marshmallow is going when it leaves the tube, the farther it will go. In the longer tube, the marshmallow has more time for your blowing to speed up the marshmallow before it leaves the tube. That’s why it launches farther! However, you will need to blow harder and longer to propel it all the way out of the longer tube! This is also why the marshmallow doesn’t launch as far when placed in the middle or beginning of the tube. Let them experiment a few more times so they can see for themselves.

How does this apply to flight? Flying objects like planes, birds, and helicopters need that force of thrust to overcome the force of drag. Drag slows down the flying object, so they need something that will help speed them back up. The force of thrust will need to be equal to or greater than drag to sustain flight. How do they do it? Birds use their breast muscles and wings to create thrust. Airplanes use engines, and helicopters use propellers. Each of these creates thrust in a different way, so take some time to research how they work!