

# Parachute Challenge

Have you ever considered skydiving? Skydivers rely on parachutes to slow them down as they fall from scary heights. Use the Engineering Design Process to design, build, and test a parachute to help a stuffed animal skydiver land safely on a target.

## TEKS:

SCI 5.6 D: The student is expected to design a simple experimental investigation that tests the effects of force on an object.

## Materials:

- Canopy material(s): Coffee filter, lightweight fabric, napkin, plastic tablecloth, shopping bag, etc.
- Masking tape
- Paper
- Pencil
- Scissors
- Small and lightweight stuffed animal (your skydiver!)
- Yarn

## How To:

Engineers apply their knowledge of science, math, and more to design and create things that help improve our lives! They do this through the Engineering Design Process, which is a series of steps that can be used to help solve a problem. In this activity, you are going to be an aerospace engineer and create a parachute that allows a stuffed animal skydiver to safely and gently land on the ground.

You will put the Engineering Design Process to the test as you build a parachute! A parachute is a device that helps make jumping out of an airplane possible. Someone that jumps out of a plane is called a skydiver, and skydivers attach parachutes to their backs to help slow their fall to the ground. Parachutes are umbrella-shaped so that they catch a lot of air and are made of lightweight material so that they do not weigh skydivers down.

**31 Days of STEM FUN!**

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Gather the following: masking tape, paper, pencil, scissors, a stuffed animal, and yarn. Then, find a material that you would like to use as the main canopy of your parachute. This could be a coffee filter, an unfolded napkin, a plastic shopping bag, or even a giant plastic tablecloth.

Now, go through the Engineering Design Process to brainstorm, build, test, and create a parachute that allows your stuffed animal to gently land on the ground:

1. **Define:** The first step of the Engineering Design Process is to define the problem you are going to solve. What are you going to build today? What are you trying to accomplish?
  - a. Example: How can I use these materials to design a parachute that allows my stuffed animal skydiver to gently fall to the ground?
2. **Brainstorm:** The second step of the Engineering Design Process is brainstorming. A brainstorm is a time to write down or draw every idea that you have. There are no wrong answers during a brainstorm and *lots* of possible solutions! Think about the materials you have and the different ways you can use them to solve your parachute problem. Use a piece of paper and a pencil to write or sketch your ideas for a parachute design.
3. **Prototype:** The third step of the Engineering Design Process is to build a prototype. A prototype, or model, is an early version of a product built to test your concept or design. Use your materials to build the parachute that you designed during the brainstorm step. After you build your parachute, use yarn to attach it to your stuffed animal skydiver!
4. **Test:** The fourth step of the Engineering Design Process is testing. A test is a time for you to experiment with and evaluate your prototype. Go through the following parachute-testing procedure:
  - a. Hold your parachute in your hands and raise it as high as you can.
  - b. Drop your parachute and observe how it falls.
  - c. Can you stand on a chair and drop your parachute from that height? Ask your parents for help testing your parachute from even taller heights, like a ladder!
  - d. Create a target for your parachute to land on, and see if you can hit the target from various heights.
5. **Redesign:** The fifth step of the Engineering Design Process is redesigning. When you redesign something, you try to improve it, or make it better.
  - a. Did your parachute fall slowly and land directly on the target? If so, great!
  - b. If not, what changes can you make to your prototype to make it even better? Can you add tape to make the parachute stronger or adjust the length of the yarn for more stability? Can you change the placement of the yarn tied to your stuffed animal to balance the parachute?
6. **Share:** The sixth and final step of the Engineering Design Process is to share your solution. Take some time to show your parachute creation to family members or friends, and let them know about all of the important steps you followed to solve your parachute design challenge.

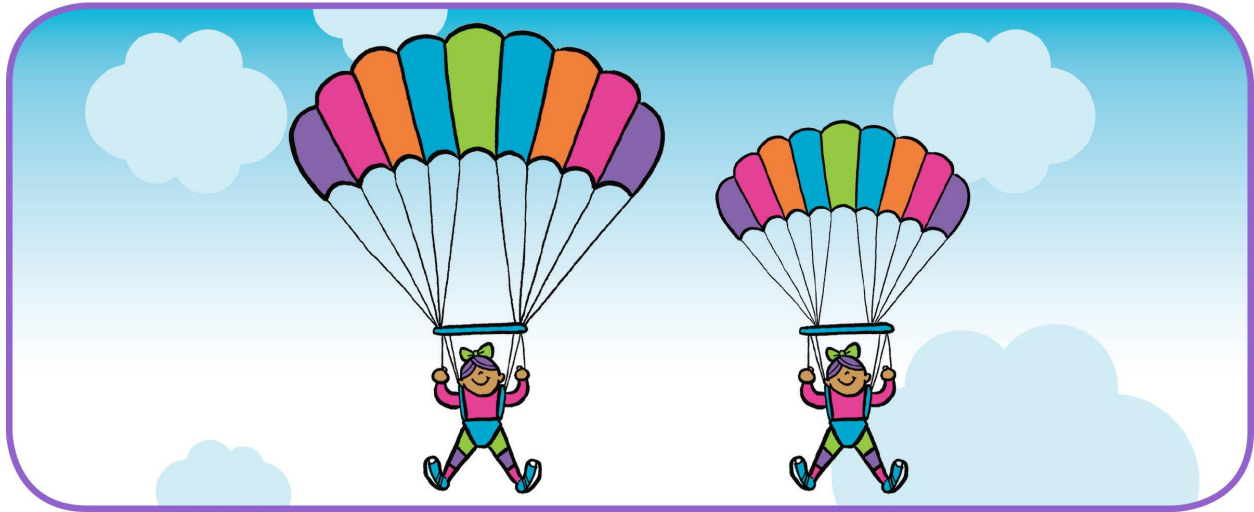
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## STEM Explanation:

Here's a fun trivia question! Look at the photo below and assume that these two girls are the exact same size. Who do you think will hit the ground first, the girl on the right or the girl on the left?



If you guessed the girl on the right with the smaller parachute, you are correct! But why will the girl on the right hit the ground first? It has to do with two forces: gravity and air resistance.

Gravity is a force that attracts objects to the earth. In the case of the two skydivers above, gravity is pulling both of them down to the ground. Air resistance is a force that acts in opposition to gravity and slows down the fall of the skydivers. Parachutes are made from lightweight materials that can "catch a lot of air." The larger the parachute, the more air that it can catch, and the greater the force of air resistance. More air resistance means a slower fall, so a large parachute falls more slowly than a small parachute. The skydiver with the smaller parachute will fall more quickly, which means she will hit the ground first! Parachutes must be made of very thin material because skydivers carry them in a small backpack when jumping out of a plane. A long time ago, parachutes were made from canvas or silk, but most parachutes today are made from nylon, a lightweight but *super* strong fabric.

## Career Connection:

*Aerospace engineers* design planes, spacecraft, missiles, rovers, and more. They help create, test, and modify all types of flying machines, ensuring these vehicles are safe and effective. Aerospace engineers use their knowledge and skills to design and create things that help improve our lives! They utilize the Engineering Design Process to problem-solve as they make new products.

## Resources:

<https://www.explainthatstuff.com/how-parachutes-work.html>

<https://skydiveparacletexp.com/2019/07/18/science-behind-parachutes/>

<https://www.technicaltextile.net/articles/an-overview-of-parachute-fabric-7170>

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