

Jack-o-chutes

Materials:

- Paper, coffee filter, fabric, or another parachute material
- String
- Pencil
- Scissors
- Tape
- Marshmallow, Lego figure, or another object to serve as your Jack-o-trooper



Activity Overview:

Parachutes come in many different shapes and sizes and are made from many different types of materials. Even though there are all sorts of parachutes, they are all made to do the same thing, catch air and slow an attached object down.

Can you safely land your Jack-o-trooper on the ground? Design a parachute that will bring down your Jack-o-trooper and keep making modifications to your parachute to keep slowing down their descent.

You can either:

1. Drop the Jack-o-trooper from a high location like the top of the stairs.
- Or
2. Fold your parachute together close to your Jack-o-trooper and throw both as high into the air as you can.

The Science:

How does a parachute work? A parachute works by slowing down its movement through the air. It is slowed by air resistance or drag. When most parachute falls through the air, the molecules of air don't want to move around the parachute, so they push back, slowing the parachute.

The bigger something is, the larger its surface area, and the more drag it creates. That's why a parachute works so well—it's very light, and it has a very big surface area. It catches lots of air in it as it falls, so it creates lots of drag that slows it down.

Drag is more than just the parachute interacting with the air. When an object is dropped, the force of gravity will cause it to speed up as it falls. But, friction with air also causes drag and will slow the object down. The faster an object moves through the air the more drag there is. What an object is made of also affects the drag—smooth, tightly compressed objects will experience less drag than objects of the same mass that are spread out and rough.



As a falling object speeds up, drag increases until it is equal to gravity. At that point, the object continues to fall at a constant speed. With an open parachute, the shape of the falling mass is changed and spread out so that drag is much greater.

How to build your own:

Jack-o-trooper

1. Decide what you want to use to be your Jack-o-trooper. We recommend a marshmallow, a Lego figure or something else about that size. Decorate it to look like a Jack-o-lantern or something else with a Halloween theme.

Parachute

1. Decide what you want to make your parachute out of and mark out a circle on it. This will be the canopy for the parachute.
2. Decide how many suspension lines you are going to have. It is best to have three to six lines depending on the size of your canopy.
3. Mark dots on your canopy where you will string the suspension lines through. These dots should be equally spaced around the canopy. It is recommended that you make these dots approximately 1 inch from the edge of the canopy, so the holes do not tear when weight is placed on them.
4. Use your scissors or a pencil to make the holes.
5. Cut enough string to serve as your suspension lines. These lines should be at least 12-18 inches long. Remember that once you tie things off the lines will be much shorter.
6. Tie off your suspension lines and make sure that they are all equal length below the canopy.
7. Tie the bottom of your suspension lines together into either one knot or into two knots.
8. Connect your Jack-o-trooper to these bottom suspension lines using tape, paper clips, or another method that firmly connects the parachute to the Jack-o-trooper.
9. Some parachutes have a vent at the top. This vent allows a slow escape of air from the top of the main chute. This prevents air from leaking out of the sides of the canopy, which tends to rock the parachute wildly as it falls. If your parachute is rocking a lot, consider putting a small hole at the top.

