

# LOOK OUT BELOW

## EXPERIMENT: PARACHUTE DESIGN

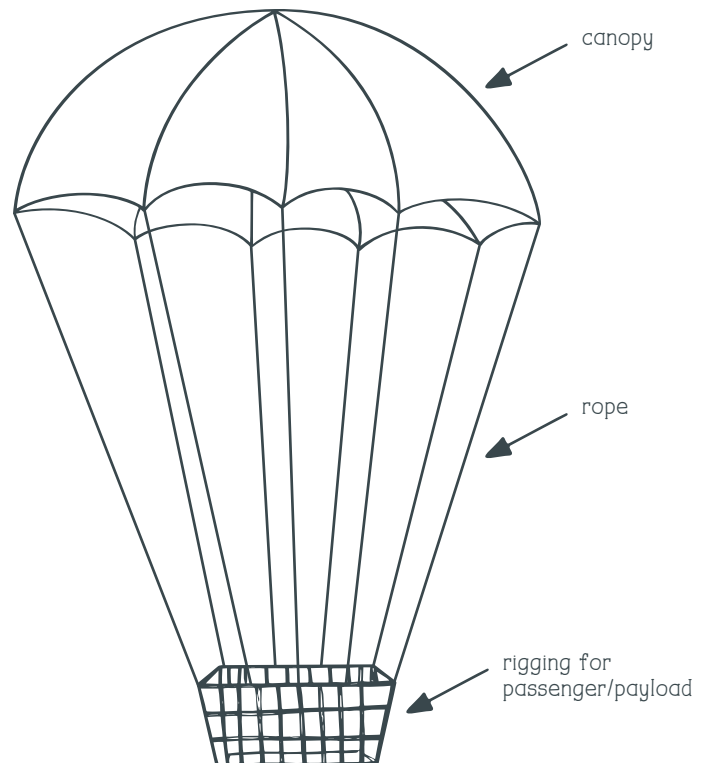
Whether they are used for safety or sport, all parachutes work essentially the same way to help a passenger land softly on the ground. Think like an engineer and design a parachute that lets you land your passenger safely on a target.

### MATERIALS

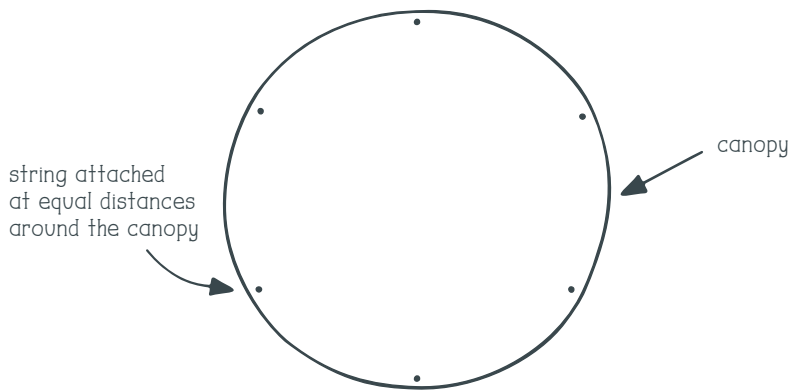
- String
- Scissors
- Tape
- Paper clip or binder clip
- Passenger, like an action figure
- Pen or pencil
- Pushpin
- Thin, lightweight materials (tissue paper, coffee filters, plastic bags, fabric, napkins, etc.)
- Landing target (download ours at [msichicago.org/summerbrain](http://msichicago.org/summerbrain))
- Lightweight container (small box, plastic cup, etc.)

### INSTRUCTIONS

There are many designs and shapes of parachutes, but all have a few common elements: a canopy that catches air, rope that hangs below, and a type of rigging to attach a payload or passenger. Use our suggestions to get started, then experiment to figure out which parachute design works best.



Make a canopy by cutting a circle from a lightweight material of your choice. Cut at least six pieces of string that are the same length, and tape the string to the canopy at equal distances around the circle. Tie the strings together at the other end.



Make a rigging by using a clip, such as a binder clip or key ring, to attach a toy passenger to the end of the tied strings. Place the landing target on the ground and drop the parachute from a tall height. Did the parachute slow the fall of your passenger? Did the parachute go straight down?

Experiment to improve your parachute design. For the canopy, try different shapes, materials and sizes. Try more or fewer strings. Some parachute canopies have small holes in them. What works best for you? Try dropping the parachute from different heights and timing it as it falls to see which design is most effective.

Make a container to hold your passenger or payload, using a cup or plastic container or small box. How can you attach the container to the strings? What effect does the added weight have on your canopy design?

## WHAT'S HAPPENING?

Parachutes are a lesson in air resistance. The broad surface area of the canopy catches the air and slows the parachute down. If you have ever flown a kite or tried to ride your bike into the wind, you know that air can push hard. Wind can push harder against something that has a broad, flat shape. By experimenting with the weight, shape and size of your parachute, you change how fast and how much air is pushed out of the way. The study of how wind effects the speed of object is called aerodynamics.

## GAME ON

Challenge a friend and see whose parachute can land closest to the target, or which parachute can carry the same weight but take the most time to land.

## TIPS

If your payload swings back and forth as it falls, try adding weight to ensure a smooth, straight drop.

## LEARN MORE

Explore aerodynamics with NASA's beginner's guide at [grc.nasa.gov/WWW/k-12/airplane/](http://grc.nasa.gov/WWW/k-12/airplane/).

## RECOMMENDED READING

*Everything Goes: In the Air*  
by Brian Biggs

*Blown Away* by Rob Biddulph

