



Parachutes: Does Size Matter?

Areas of Science	Aerodynamics & Hydrodynamics (http://www.sciencebuddies.org/science-fair-projects/project-ideas/aerodynamics-hydrodynamics)
Difficulty	
Time Required	Very Short (≤ 1 day)
Prerequisites	None
Material Availability	Readily available
Cost	Very Low (under \$20)
Safety	No issues
Strength of Match	This project is in your personal top 50. See how we rank projects. (http://www.sciencebuddies.org/science-fair-projects)

Abstract

How does a parachute work? Do bigger parachutes work better than smaller parachutes? Find out in this science project if the size of a parachute affects its fall.

Objective

Test different sized parachutes to see how changes in the size of the parachute affect flight.

Credits

Sara Agee, Ph.D., Science Buddies

Sources

- This project was inspired by content from the NASA Explorers School program and Schlumberger's SEED program.

Cite This Page

General citation information is provided here. Be sure to check the formatting, including capitalization, for the method you are using and update it as needed.

MLA Style

Science Buddies Staff. "Parachutes: Does Size Matter?" *Science Buddies*, 12 Jan. 2020, https://www.sciencebuddies.org/science-ideas/Aero_p017/aerodynamics-hydrodynamics/parachutes-does-size-matter. Accessed 6 Mar. 2020.

APA Style

Science Buddies Staff. (2020, January 12). *Parachutes: Does Size Matter?* Retrieved from https://www.sciencebuddies.org/science-ideas/Aero_p017/aerodynamics-hydrodynamics/parachutes-does-size-matter

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Introduction

In the sport of skydiving, a person jumps out of an airplane from a very high altitude, flies through the air, and releases a **parachute** to help them fall safely to the ground, as shown in Figure 1. The parachute slows down the skydiver's fall so that they can land on the ground at a safe speed. How does the parachute do this?

As the skydiver is falling, the force of **gravity** is pulling the skydiver and their parachute towards the earth. The force of gravity can make an object fall very fast! The parachute slows the skydiver down because it causes **air resistance**, or **drag force**. The air pushes the parachute back up, and creates a force opposite to the force of gravity, slowing the skydiver down. As the skydiver falls slowly to the earth, these "push and pull" forces are nearly in balance.

In this aerodynamics science project, you will test whether the size of the parachute is important for slowing down the speed of the fall. You will make a series of parachutes from small to large and test how quickly they fall from the same height. Will the large parachutes fall more slowly than the small parachutes?

Figure 1. As and drag a

Terms and Concepts

- Parachute
- Gravity
- Air resistance
- Drag force
- Surface area
- Load

Questions

- How does a parachute work?
- How will increasing the diameter of the parachute increase its size, or **surface area**?
- Do bigger parachutes have more air resistance, or drag force, than smaller parachutes?
- How do you think the amount of drag force a parachute has will affect how well it works?

Bibliography

This project idea was inspired by:

- Schlumberger Excellence in Educational Development, Inc. (n.d.). *Make a Parachute*. Retrieved September 4, 2012, from (<http://www.planetseed.com/node/20132>)

These resources provide additional information about the physics of parachutes:

- The Physics Classroom. (n.d.) *Skydiving*. Retrieved October 19, 2010 from <http://www.physicsclassroom.com/mmedia/newlaws/sd.cfm>
- Schlumberger Excellence in Educational Development, Inc. (2010). *Adventures in Skydiving*. Retrieved September 4, 2011: <http://www.planetseed.com/science/articles/air-and-space/adventures-in-skydiving> (<http://www.planetseed.com/science/articles/air-and-space>)
- Aerocon. (n.d.) *Calculating Drag*. Retrieved October 19, 2010 from http://www.aeroconsystems.com/chutes/drag_calculator.htm

For help creating graphs, try this website:

- National Center for Education Statistics, (n.d.). *Create a Graph*. Retrieved June 2, 2009, from <http://nces.ed.gov/nceskids/createagraph/>

Materials and Equipment

- Heavy weight garbage bags
- Metric ruler
- Scissors
- Light weight string (at least 6.4 m, or 21 ft)
- Washers (4) and twist ties (4) *or* pennies (8) and tape
- A safe, high surface about 2 m from the ground. A good place for your test might be a secure balcony, deck, or playground
- Stopwatch, accurate to at least 0.1 sec
- Optional: Helper
- Lab notebook



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https://www.sciencebuddies.org/science-fair-projects/project-ideas/Aero_p017/aerodynamics-hydrodynamics/parachutes

(http://www.sciencebuddies.org/science-fair-projects/project-ideas/Aero_p017/aerodynamics-hydrodynamics/parachutes-does-size-matter)

PDF date: 2020-03-06

Experimental Procedure

1. Each parachute will be made out of the garbage bag material, so first cut open the garbage bags to make a flat sheet of pl
2. You will make a series of four parachutes of different sizes, from large to small. Each parachute will be square in shape, sc length. Table 1 below shows the list of parachute sizes you will try.

Parachute	Length of Each Side (cm)	Surface Area (cm ²)
1	20	400
2	30	900
3	40	1600
4	50	2500

Table 1. In this science project you will try a variety of different sized parachutes. This table shows the different sizes you will try,

3. Cut out each of the four differently sized parachutes from the garbage bag material.
 - a. *Tip:* One trick is to fold the plastic sheet in half twice so that it is four layers thick. Then cut the two edges (opposite length you want your square to be. When you unfold it, you will have your square!
4. For each parachute, tie a knot in each of its four corners.
 - a. The knots will be used to anchor your string.
5. Cut 16 pieces of string, making each be 40 cm long.
 - a. Each parachute will need four pieces of string.

6. For each parachute, tie one end of each piece of string around one of the four knots, positioning the string right above the the



Figure 2. For each parachute, tie a piece of string just above each knot.

7. For each parachute, hold the center of the plastic sheet in one hand and pull all strings with the other to collect them. Tie t overhand knot, as shown in Figure 3 below.



Figure 3. For each parachute, tie the ends of the strings together using an overhand knot, as sh

8. Attach 1 washer to each bundle of strings with a twist tie. Alternatively, if you are using pennies and tape instead, tape 2 p
- Be sure that each parachute has the same number of washers or pennies attached, or this will alter your results!
 - Your parachutes should now look like one of the parachutes in Figure 4 below.

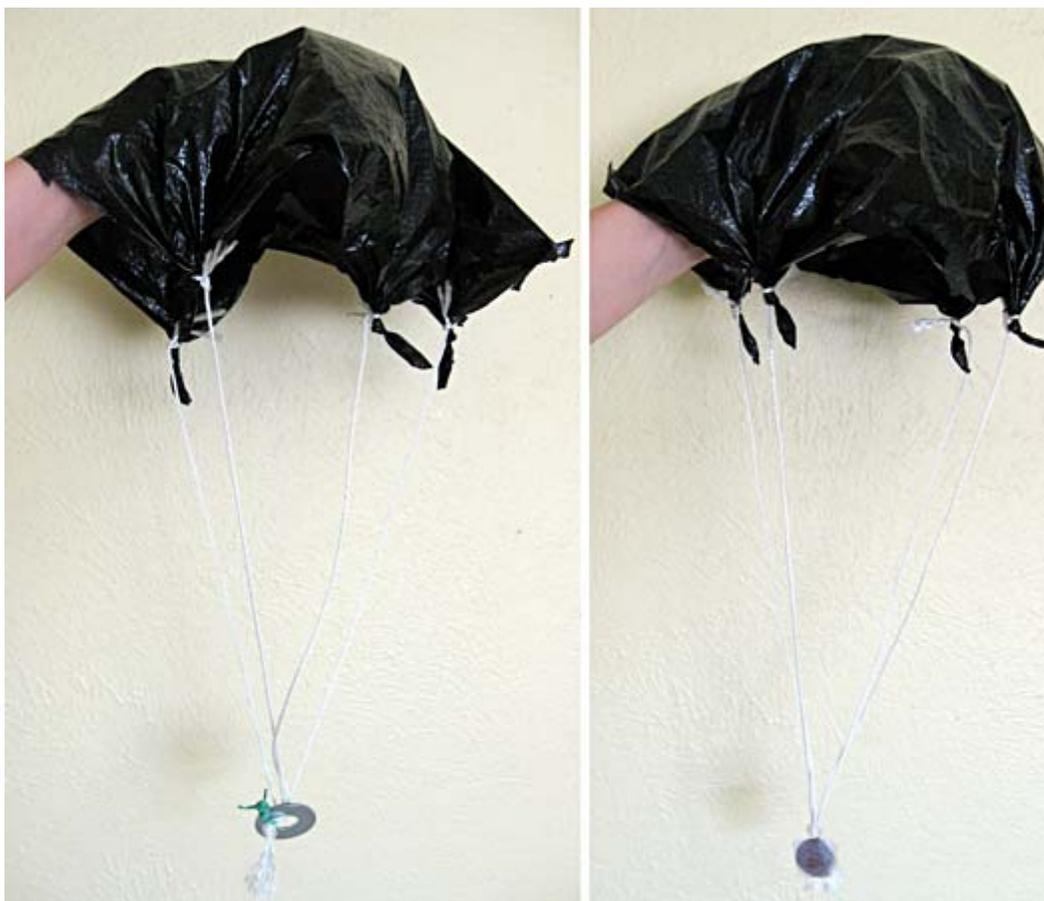


Figure 4. Your completed parachutes should look like one on the left if you used a washer and twist tie or the one on the right if you used a purple washer and twist tie.

9. In your lab notebook, make a data table that looks like Table 2 below.
 - a. You will be recording your results in this data table.
10. Bring a stopwatch, the parachutes, and your lab notebook to a safe, high surface for your tests, about 2 meters from the ground.
 - a. A good place for your test might be a secure balcony, deck or playground platform.
11. Using your stopwatch, time how long it takes in seconds for each parachute to fall to the ground. Be sure to release the parachute gently. You may want to have a helper help time the parachutes when you release them.
 - a. If the parachute does not open during a trial, just do that trial over so that when you are finished you have three trials.
 - b. Test each parachute three times. Each time record your results in the data table in your lab notebook.
 - c. Make an average of your data. Calculate the average by adding together your three times, and then dividing your average by three.
 - d. You can also increase the number of trials above three to get better data and organize your data table accordingly.
 - e. *Tip:* If the parachutes seem to be falling too fast, you could try using a smaller washer or fewer pennies for each parachute. If the parachutes do not stay at the bottom as it falls, you could try using more washers or pennies for each parachute. Be sure to use the same washer or number of pennies on each parachute when you test them.

Parachute #	Trial 1 (seconds)	Trial 2 (seconds)	Trial 3 (seconds)	
1				
2				
3				
4				

Table 2. In your lab notebook, make a data table like this one to record your results in.

12. Now make a graph of your data. Make a line graph of time vs. surface area. "Time (in seconds)" should be on the y axis (the vertical axis) and "Surface Area (in square cm)" should be on the x-axis (the horizontal axis).
- a. You can make a graph by hand or use a website like [Create a Graph](https://nces.ed.gov/nceskids/createagraph/) (<https://nces.ed.gov/nceskids/createagraph/>) to make a graph.
13. After you connect the dots on your graph, your line may slope up or down. What does this tell you about the relationship between surface area and how long it takes the parachute to reach the ground? Which parachute was the most effective one? How do you think surface area affects air resistance?

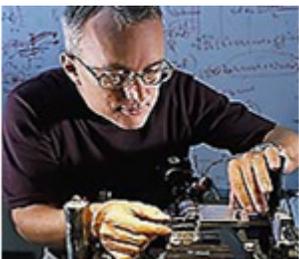
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(<http://www.sciencebuddies.org/science-engineering-careers/earth-physical-sciences/aviation-inspector>)



(<http://www.sciencebuddies.org/science-engineering-careers/engineering/aerospace-engineering-operations-technician>)

Aerospace Engineering & Operations Technician (<http://www.sciencebuddies.org/science-engineering-careers/engineering/aerospace-engineering-operations-technician>)

Aerospace engineering and operations technicians are essential to the development of new aircraft and maintain parts for air and spacecraft, and assemble, test, and maintain the vehicles as well as the launch readiness team, preparing space vehicles for launch in clean rooms, and on the launch pad. They investigate failures by testing suspect parts. [Read more](http://www.sciencebuddies.org/science-engineering-careers/engineering/aerospace-engineering-operations-technician)

Variations

In this experiment you tested one variable, the surface area of the parachute. What other variables could be tested? Try an experiment with the following variations:

- **Load** - change the number of washers to change the weight of the load
- **Height** - drop the parachute from different heights
- **String Length** - change the length of the supporting strings from short to long
- **String Weight** - change the type of string from thin to thick
- **Material** - use different material for the parachute (nylon, cotton, tissue paper, etc.)
- **Shape** - try making parachutes of different shapes (circle, rectangle, triangle, etc.)

Ask an Expert

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