

Activity: Design a Parachute



Summary

After a discussion about what a parachute is and how it works, students will create a parachute using different materials that they think will work best. The students will test their designs, which will be followed by a class discussion (and possible journal writing) to highlight which paper material worked best.

Engineering Connection

Aerodynamics and fluid flow concepts are used by engineers to design planes, parachutes and ships. Accounting for drag is an important aspect of these designs - engineers redesign the shape and materials used to get better results.

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Grade Level: 7 (6-8)

Group Size: Not defined

Time Required: 60 minutes

Activity Dependency :None

30 minutes for construction, 30 minutes for testing and classroom discussion/journal writing.

Expendable Cost Per Group : Not defined

Keywords: design, parachute, air resistance, drag, motion, gravity

Related Curriculum :

subject areas Science and Technology

Educational Standards

- Massachusetts Science
- 2.5 Explain how such design features as size, shape, weight, function, and cost limitations would affect the construction of a given prototype. (Grades 6 - 8) [2001]
- 2.4 Identify appropriate materials, tools, and machines needed to construct a prototype of a given engineering design. (Grades 6 - 8) [2001]

- 2.3 Describe and explain the purpose of a given prototype. (Grades 6 - 8) [2001]
- 1.1 Given a design task, identify appropriate materials (e.g., wood, paper, plastic, aggregates, ceramics, metals, solvents, adhesives) based on specific properties and characteristics (e.g., weight, strength, hardness, and flexibility). (Grades 6 - 8) [2001]

Learning Objectives ([Return to Contents](#))

- Techniques for designing a parachute that falls slowly.
- How to determine which type of material works best by testing different options.
- How air resistance plays a role in flying.

Materials List

- Tissue paper
- Napkins
- Construction paper
- Newspaper
- Paper towels
- String
- Tape
- Weights (i.e. washers)

Introduction/Motivation ([Return to Contents](#))

What is the purpose of a parachute? What is the role of a parachute in skydiving? Imagine you are jumping out of a plane 10,000 feet in the air. What type of material would you want your parachute to be made out of and what size would you want it to be? The design of a parachute is extremely important, especially in an extreme sport like skydiving because someone's life is dependent on the parachute functioning properly. Engineers must test the materials and design of a parachute to ensure that it will open properly and be strong enough to withstand the air resistance needed to slow the skydiver down enough to a safe landing speed.

Procedure

Background

A parachute is an umbrella-shaped device of light fabric used especially for making a safe jump from an aircraft. Due to the resistance of the air, a drag force acts on a falling body (parachute) to slow down its motion. Without air resistance, or drag, objects would continue to increase speed until the object hit the ground. The larger the object, the greater its air resistance. Parachutes use a large canopy to increase air resistance. This gives a slow fall and a soft landing.

Recommended Resources:

<http://www.parachutehistory.com/>

<http://www.glenbrook.k12.il.us/gbssci/phys/Class/newtlaws/u2l3e.html>

<http://www.grc.nasa.gov/WWW/K-12/airplane/falling.html>

Directions

1. Buy or gather available materials
2. Discuss with the class what a parachute is and how it works.
3. Have each team brainstorm characteristics of a good parachute document their thoughts and sketch their design before construction begins.

Parachute Construction

1. Cut a circle from the paper chosen (or test another). Make a hole in the center of the shape.
2. Cut six pieces of equal length string and tape them at equal distances around the edge of the shape.
3. Tape the other ends of the string to the weight.



4. To test the parachute, go outside and drop it from a specific height to see if it flies slowly and lands gently.

Investigating Questions ([Return to Contents](#))

- What type of paper is the best material to make a parachute? Why?
- What materials did not work well? Why?
- What changes could you make to improve your design?

Assessment ([Return to Contents](#))

- [Rubric for Performance Assessment \(doc\)](#)
- [Rubric for Performance Assessment \(pdf\)](#)

Activity Extensions ([Return to Contents](#))

1. Using the paper material that worked the best, do the same activity testing the size of the parachute. Have students test circles with different radii to find the optimal size.
2. Try parachutes with and without holes in the top and different sized holes.
3. Make parachutes out of different materials: plastics, cotton, nylon.
4. Have a competition to find a design that can land a toy vehicle most gently.

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Supporting Program ([Return to Contents](#))

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