



# PARACHUTES



## Lesson Plan: Does Weight Affect Drag?

**Grade Level:** 6-7

**Subject Area:** Science and Math

**Time Required:** *Preparation:* 1 hour  
*Activity:* 2-3 class periods

**National Standards Correlation:**

**Science (grades 5-8)**

- Science as Inquiry Standard: Abilities necessary to do scientific inquiry.
- Physical Science Standard: Motions and forces.

**Math (grades 6-8)**

- Measurement Standard: Apply appropriate techniques, tools, and formulas to determine management.
- Data Analysis and Probability Standard: Develop and evaluate inferences and predictions that are based on data.



**Summary:**

In this lesson students will investigate how weight affects a parachute's rate of fall. Students should be able to determine from their results that the size of a parachute also affects the amount of drag that is produced during descent. Students will complete three trials with a different amount of weight attached to the same parachute. They will chart the time of descent for each, compute the average descent time, and graph the results.

**Objectives:**

Students will:

- Test a given parachute with three different weights
- Conclude that added weight results in a faster descent
- Measure time, average results, chart and graph the results
- Conclude ways they can improve the amount of drag to compensate for the increased weight

**Background:**

Free fall is the term applied to an object falling freely towards the earth. When an object is allowed to free fall for a given amount of time, it reaches the maximum speed it can achieve. This maximum speed is called terminal velocity. Parachutists rarely reach this maximum speed due to the drag created by their bodies. The weight of an object is directly proportional to the amount of time it takes to reach this maximum speed. Parachutists must understand this effect and apply it to their weight to allow the parachute to guide them safely to the earth.

**Materials:**

For Warm-up:

- Paper napkins
- String
- Paper clips
- Reinforcement labels or adhesive dots

For Activity:

- One parachute shape from related lesson – “Does Shape Affect Drag?” (see <http://www.nationalmuseum.af.mil/shared/media/document/AFD-090710-039.pdf>)



- Washers
- String
- Reinforcement labels or adhesive dots
- Stopwatches

**Procedure:**

**A. Warm-up**

1. Ask: What are some ways we can affect the rate at which something falls?
2. Utilizing the paper napkin parachutes from the lesson, “Does Shape Affect Drag?”, direct students to attach one washer to the paper clip on the napkin and drop it with arm outstretched overhead.
3. Have them conduct three trials and record the results.
4. Then attach two washers to the paper clip and repeat the same experiment.
5. Again, have students conduct 3 trials and record the results.
6. Ask: Which set of trials allowed for a slower, safer descent to the earth? How could we make the other trial fall at the same rate?

**B. Activity**

1. Have students utilize the top performing nylon parachute from the lesson, “Does Shape Affect Drag?”
2. Test the drag of the parachute by placing a washer on the paper clip.
3. Then have students test the parachute by timing and recording the amount of time it takes to reach the ground.
4. Conduct three trials and record the results.
5. Have students repeat steps 1-4 by placing two and then four washers on the parachute.
6. Average the trials, record and then graph the results on a line graph.
7. Have students estimate the time for three washers by using the line graph and interpolation (between data points). Test a parachute with three washers. Compare the estimated and actual times.

**C. Wrap-up**

1. Have students compare results among group members.
2. Brainstorm ways they could counteract the rate of fall of an object when more weight is added to the parachute. (Different materials or changing the size of the parachute).

**Assessment/  
Evaluation:**

Students should be assessed on classroom participation as well as completion of the chart recording their results. Their graph should reflect an accurate representation of their results.



**Extensions:**

1. Use different materials to make parachutes.
2. Make parachutes a different size to increase drag and slow the rate of fall.

