



# PARACHUTES



## Lesson Plan: Parachute Drop

**Grade Level:** 2-3  
**Subject Area:** Science and Math  
**Time Required:** *Preparation:* 1 hour  
*Activity:* 1½ hours

**National Standards Correlation:**

**Science (grades K-4)**

- Science as Inquiry Standard: Abilities necessary to do scientific inquiry.
- Science and Technology Standard: Understanding about science and technology.
- Physical Science Standard: Position and motion of objects.

**Math (grades K-2)**

- Problem Solving Standard: Apply and adapt a variety of appropriate strategies to solve problems.

**Math (grades 3-5)**

- Data Analysis and Probability Standard: Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.



**Summary:**

Students will work in small groups to construct square parachutes of various sizes. Students will predict and record the number of seconds they think it will take the different size parachutes to fall to the ground. Students will then take turns dropping the parachutes, observing the drops, and timing and recording their observations on a data sheet. The students use the data obtained to create a bar graph so that comparisons can be made.

**Objectives:**

Students will:

- Work in small groups to construct parachutes
- Measure sides of a square in inches
- Predict how long it will take the parachutes to descend to the ground
- Work cooperatively to obtain and record data
- Complete a bar graph using collected data
- Use data to draw conclusions about the relationship of parachute size to the time of descent

**Materials:**

Each group of students will need:

- Pencils
- Scissors
- String
- Tape
- Glue stick or rubber cement
- Ruler
- White plastic garbage bags (24" x 28")
- Self-adhesive reinforcement labels



- Permanent markers in assorted colors
- Clock with second hand
- Data sheet
- Drawing paper (to make paper sky divers)

Each parachute requires:

- 1 square piece of plastic garbage bag
- 48" string, cut into 4 (12") lengths
- 4 self-adhesive reinforcement labels
- 1" piece of tape
- 1 Popsicle stick
- Small sheet of paper to make sky diver (to attach to popsicle stick)

**Safety Instructions:** Remind students not to put plastic garbage bags in their mouths or over their faces. Each group of students needs ample floor space to perform the parachute drops.

**Procedure:**

**A. Warm-up**

1. Since plastic garbage bags can be difficult to work with, the teacher should measure and outline (in permanent marker) the four different size parachutes (10" square, 11" square, 12" square and 13" square) on a white kitchen garbage bag. Cut out enough squares for each student to have one. Cut out several extras, one for a demonstration model and others to have in case of irreversible mistakes.
2. Cut one piece of string (48" long) for each student.
3. Construct a demonstration parachute (see instructions below).
4. Have the demonstration parachute and a separate popsicle stick handy before you begin.
5. Ask students to answer the following questions:
  - What is a parachute?
  - What does a parachute look like?
  - How are parachutes used?
  - What would happen to a person or an object if a parachute was not used during a fall?
  - What is gravity?
  - What effect does a parachute have on gravity?

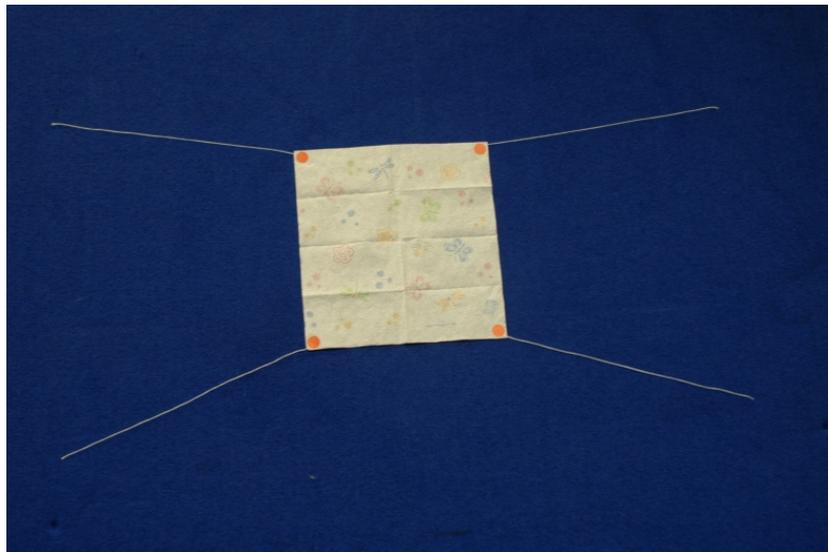
*Note: If students do not understand the concept of gravity, read Gravity is a Mystery (see Resources).*
6. Use the demonstration parachute and the popsicle stick to show what happens when two objects (one with a parachute and one without) are falling. In one hand, hold the popsicle stick (with parachute attached), and in your other hand, hold the popsicle stick (without a parachute).
7. Ask students which will take longer to reach the floor and why. Listen to several predictions and then drop the sticks simultaneously. Students will observe that the popsicle stick without a parachute falls to the ground much faster than the one with the parachute.
8. Discuss what conclusions can be drawn from the demonstration. Refer back to the questions about gravity, drag and parachutes.



9. The second demonstration requires students to time how many seconds it takes each stick to fall to the ground. This step will give students a reference point for making predictions about the number of seconds it will take their parachutes (with popsicle sticks attached) to fall to the ground.
10. Explain to students that they will be working in small groups to construct parachutes of different sizes. They will compare the time of descent of the various size parachutes.

### **B. Activity**

1. Organize students in groups of four.
2. Distribute the necessary materials to each group. Before construction begins, students need to measure one side of their square to obtain the appropriate label for their particular parachute. The label (10", 11", 12", and 13") should then be written in permanent marker on one edge of the square, without blocking any corners.
3. Review safety instructions. Stress the importance of taking turns to drop parachutes so that there are no accidents among people or parachutes.
4. Construct parachutes. The directions for constructing a parachute are fairly simple, but it might be helpful to students if you sketch each step on a chalkboard or piece of chart paper:
  - a. Cut the long string into four equal pieces by folding it to make the ends meet and then folding it to make ends meet again. Demonstrate and then circulate and assist.
  - b. Lay the plastic square flat and attach one string to each corner with a reinforcement label.



- c. Gather the four loose ends of string and place them on one end of the popsicle stick, covering about half an inch of the stick. Try to keep the tips of the strings as even as possible and wrap the piece of tape around the stick to hold the strings down.



5. When everyone has made a parachute and attached it to a popsicle stick, review the technique for dropping parachutes. Pinch the top of the parachute gently, hold the parachute at arm's length above your head, and drop.
6. After students spend a few minutes practicing how to hold and drop a parachute, review how to time a drop.
7. Review the data sheet together. Answer questions.
8. Each student records his or her predictions about the duration of fall for the various parachutes.
9. Students take turns dropping parachutes while other group members time and record actual data.
10. When drops and record-keeping are complete, discuss findings and conclusions. Make a bar graph to represent the different size parachutes and their time of descent. Note: Students should conclude that the larger the parachute, the slower it will drop because it catches more air (more air in the parachute creates more drag; therefore slowing the rate of descent).

### ***C. Wrap-up***

Decorate parachutes with permanent markers and make paper sky divers to attach to the popsicle sticks.

### **Extensions:**

1. Cut a hole in the top center of the parachute and drop. What happens to rate of descent? Cut hole in one side of another parachute--what happens?
2. Attach other small objects, (such as pencils or crayons), and test. How does a change in mass affect time of descent?
3. Construct parachutes out of different materials (colored tissue paper, fabric). How does this change affect time of descent?
4. Construct and test parachutes of different shapes (circle, ellipse, pentagon, etc).

### **Resources/ References:**

- Branley, Franklyn M. *Gravity is a Mystery*. New York: Harper & Row, Publishers, Inc., 1986.
- Colby, C.B. *Chute: Air Drop for Defense and Sport*. New York: Coward, McCann & Geoghegan, Inc., 1973.
- Horan, Michael. *The Evolution of Freefall*. Richmond, Virginia: Parachuting Resources, 1980.
- Raven, Margot Theis. *Mercedes and the Chocolate Pilot*. Chelsea, MI: Sleeping Bear Press, 2002.
- Wellnitz, William R. *Be a Kid Physicist*. Blue Ridge Summit: TAB Books, 1993.



## Parachute Drop Data Sheet

A. Your name: \_\_\_\_\_

1. Predictions and Observations

Parachute	Predicted Time (seconds)	Actual Time (seconds)	Difference (seconds)
10"			
11"			
12"			
13"			

2. Use the data from the Actual Time column to fill in the bar graph below.

