

# STEAM Engineering Activity:

## Parachute Away! - Grades 6-8

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Students will create and test a parachute based on their understanding of air resistance in this engineering activity. This lesson is designed for students in grades 6-8, but could be adapted for other age groups.

 Teacher Led	 Requires Computer OR Mobile Device	 Requires <a href="#">SpacesEDU</a>
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SpacesEDU Prep	Create your Activity in SpacesEDU before the lesson. Not sure how to create an Activity? Check out this <a href="#">short video tutorial</a> on assigning and managing activities.
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### Learning Goals

1. Students will **understand** the physics of air resistance.
2. Students will **design, build, and test** a parachute.
3. Students will **reflect** on their parachute design and plan a second iteration.

## Materials

 <b>Student Handouts</b>	<ul style="list-style-type: none"> <li>● <b>Handout [A] - Parachute Design</b> for each student, partnership, or small group (page 5)</li> </ul>
 <b>Technology Requirements</b>	<ul style="list-style-type: none"> <li>● Mobile device, tablet, or laptop</li> <li>● Projector or Smartboard</li> </ul>
 <b>Video/Audio Clips/Images</b>	<ul style="list-style-type: none"> <li>● <a href="#">What is Air Resistance?</a> video</li> <li>● <a href="#">Design a Parachute</a> video</li> </ul>
 <b>Additional Materials</b>	<p>For introductory experiment during video:</p> <ul style="list-style-type: none"> <li>● Two envelopes</li> <li>● Two pieces of paper</li> <li>● Half pieces of paper and pencils or white boards and dry erase markers to write their hypotheses (1 per student)</li> </ul> <p>Have enough for each student, partnership, or small group:</p> <ul style="list-style-type: none"> <li>● Tissue paper</li> <li>● Napkins</li> <li>● Construction paper</li> <li>● Newspaper</li> <li>● Paper towels</li> <li>● Scissors</li> <li>● String</li> <li>● Tape</li> <li>● Weights (such as washers)</li> <li>● Measuring tape and/or rulers</li> <li>● Stopwatch</li> <li>● Pencils</li> <li>● Clipboards</li> </ul>

## Instructions

### *Before the lesson*

1. Start by asking students what they know about air resistance. Solicit student ideas to engage the class in a discussion.
2. Show the [What is Air Resistance?](#) Video.

- This video includes a short experiment and will serve as a complete introduction to air resistance and to the engineering activity that students will engage in; make sure to pre-watch the video and gather necessary materials of two envelopes, two pieces of paper, and half sheets of paper or white boards and markers for students to write their hypotheses on.
- When prompted, start the at-home experiment as a whole-class by following the directions in the video with two envelopes and two pieces of paper.
- When prompted, pause the video and hand out half sheets of paper or white boards and dry erase markers for students to write their predictions.
- When prompted, pause the video to do the short experiment and engage the class in a discussion about whether or not their hypotheses were correct
- Watch the next part of the video and prepare the second part of the experiment as a whole class.
- When prompted, pause the videos and have the students write their second hypothesis on their half sheet of paper or white board.
- Watch the next part of the video, then pause to do the second part of the experiment and discuss students' hypotheses based on the outcome.
- Watch the rest of the video on air resistance and introduction to the parachute design experiment.

### ***During the lesson***

1. Explain that now, students will get to design, create, and test their own experiment based on what they know about air resistance.
2. Show the [Design a Parachute](#) video to the class.
  - If students have access to their own devices, you could also share this video with students digitally so that they can watch at their own pace and more than once, if necessary.
3. You can have students work independently, in partnerships, or in small groups. Allow students to gather materials they want to build their parachute with, and distribute **Handout [A] - Parachute Design** (page 5) to each student, partnership, or small group.
4. Have students build their parachutes, using **Handout [A] - Parachute Design** (page 5) as a guide and filling it out as they go.

5. Once students have built their parachutes and completed **Handout [A] - Parachute Design** (page 5), it's time to test!
  - Pass out **Handout [B] - Parachute Test Data and Reflection** (pages 6), and clipboards and explain to students that they will use side 1 to record data during the experiment.
  - Find a place to drop parachutes from – from a play structure or bleachers works well.
  - Have each student, partnership, or group drop their parachute from the same height, one at a time.
  - Time each fall with the stopwatch and have students record data on side 1 of **Handout [B] - Parachute Test Data and Reflection** (page 6).
    - You can be the timekeeper, or have students keep time for each other.

***After the lesson***

1. Once all students have tested their parachutes, head back into the classroom and have students document their reflection in SpacesEDU.
  
2. If time allows, have students create a second iteration of their parachute and re-test to see if they increased its air resistance.

# Worksheet

## HANDOUT [A]: Parachute Design

Name(s) \_\_\_\_\_

### Parachute Building Directions:

1. Cut a circle from your chosen material.
2. Cut a hole in the center of your circle.
3. Cut six pieces of equal length string and tape them at equal distances around the edge of your circle.
4. Tape the ends of your string to a weight.

As you build, answer the questions about your parachute design.

<u>Question</u>	<u>Answer</u>
<p>What material did you use for the parachute? Why?</p>	
<p>How large is the piece of material you used? (Use a ruler or tape measure to measure.)</p>	
<p>How long did you cut your pieces of string? Why?</p>	
<p>How do you think your parachute will use air resistance to fall slowly?</p>	



## Worksheet

### Documenting in SpacesEDU

**Teacher Tip!** The instructions for this lesson involve adding to the Class or Individual Space in SpacesEDU. You can adapt the instructions if you'd prefer to make this an Activity.

1. Students will document their learning in SpacesEDU by following these guidelines:
  - a. Click **+ Create** > Choose **Camera** > Take a photo of the completed handouts [A] & [B]
  - b. Add a **Title**
  - c. Post a Description > Have students answer the following prompts:
    - Do you notice any patterns in the class data around what material, circle size, and/or approximate string length seemed to work best for air resistance?
    - Based on the data, how would you redesign a second iteration of your parachute? How do you think this would increase its air resistance?
  - d. Click **✓ Next**
  - e. Choose the **Class Space** or **Individual Space**

Click **✓ Post**