APOLLO CAPSULE DROP

OVERVIEW

In this indoor/outdoor activity, learners will make observations about forces of flight acting upon the Apollo Capsules that returned to Earth during the Apollo project of 1969-1972.

From 1969-1972, Project Apollo was a program created by NASA with the single goal of getting Americans to the moon and back safely. This lesson focuses on the mode of transportation used when returning to Earth - the Apollo Capsule! Three astronauts would be inside of this capsule as it dropped into our atmosphere and hurtled toward the ground. The main force acting upon the capsule is known as gravity. In order to slow the capsule down and help the astronauts to land safely, the force of drag was introduced. This force was created by the parachute that was attached to the capsule. Once the parachute was opened, it created drag by catching lots of air as it moved toward the ground slowing the capsule down. This allowed for a soft splashdown in the ocean.

LEARNING OBJECTIVES

- Students will learn about the effects of gravity and drag, two forces of flight.
- Students will observe how the capsule floats to the ground.
- Students will identify when the two forces of flight are acting upon the capsule.

VOCABULARY

- **Observation** – to look very closely at something and notice things about it
- **Describe** – to represent or give an account of a thing using words
- **Identify** – to know or name what something is
- **Drag** – the backward force created as an object moves through the air
- **Gravity** – the downward force of the Earth on an object

MATERIALS

- Table or clear space to spread out your materials
- Apollo Capsule Template (included in this packet)
- Step-by-Step Instruction Sheet (included in this packet)
- Tape
- Scissors
- Markers
- (3) 12” pieces of string
- (1) plastic bag

SET-UP

- Print the Apollo Capsule Template on paper – heavy paper like cardstock works best.
- Gather tape, scissors, and markers.
- Cut your plastic bag into a rectangle by cutting along the seams.
- Cut sections of string – you need (3) strings per parachute.
LESSON PLAN

1) Before building your capsule, talk about the Apollo Program and its purpose. Ask questions to gain a group understanding.

   Example Questions:
   a) What was the Apollo Program?
   b) What do you think the purpose of the capsule might be?
   c) What forces are acting upon the capsule as it heads toward Earth?

2) Talk about how to construct the capsule, using the **Step-by-Step Instruction Sheet** (included).
3) Build your capsule using the **Apollo Capsule Template**! Discuss how drag and gravity will act on your capsule and its parachute.
4) Find a spot to launch your capsules.
5) Make observations about how they landed.
6) Experiment with adding weight or wind and observe how this affects the landing of the capsule.
7) Discuss what you saw when dropping your capsules.

   Example Questions:
   a) Did you feel like your capsule did what you expected?
   b) What do you think you could do to improve or change your design to make it act differently?
   c) How did the capsule look while it was floating to the ground? What might it feel like to be an astronaut inside the capsule?

FURTHER EXTENSION

_In the Museum_
During your visit to The Museum of Flight, make sure to visit our Apollo Gallery to learn more about the story of the Apollo Program. Also visit the Charles Simonyi Space Gallery to explore what it’s like to live in space.

_Other Museum Programs_
Aerospace Camp Experience

**SUGGESTED READING/ ADDITIONAL RESOURCES**

- *Go for the Moon: A Rocket, A Boy, and the First Moon Landing* by Chris Gall
- *Moon’s First Friends: One Giant Leap for Friendship* by Susanna Hill
CAPSULE TEMPLATE
## Apollo Capsule Assembly

*Follow these steps to splash down!*

<table>
<thead>
<tr>
<th>Steps</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut the capsule pattern out of the template sheet. Make sure you do not cut the two circles apart! Save the scraps from the template sheet; you’ll use them in a later step.</td>
<td><img src="image1" alt="Diagram" /></td>
</tr>
<tr>
<td>Decorate and design your capsule. What special features will you add? Who is riding inside? What space program built your capsule?</td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td>On each of the two circles, cut the solid line bordering the shaded area from the outside to the center point.</td>
<td><img src="image3" alt="Diagram" /></td>
</tr>
<tr>
<td>Pinch the spots marked <strong>A</strong> and <strong>B</strong>, on either side of the line cut in step 3. Bring spot <strong>A above</strong> the shaded area and spot <strong>B below</strong> the decorated area until spot <strong>A</strong> reaches the dotted line. This will force the center point of the circle to rise up from the edge and become a three-dimensional, mountain-like cone. Place a piece of tape on the seam to hold your cone closed.</td>
<td><img src="image4" alt="Diagram" /></td>
</tr>
<tr>
<td>Repeat with the smaller half of the pattern, which will form the bottom of the capsule. Make sure that this cone goes in the same direction as the other one.</td>
<td><img src="image5" alt="Diagram" /></td>
</tr>
<tr>
<td>Complete the capsule by closing the two halves together, open side to open side. Crumple up the scraps of your template sheet and put them inside to add some weight for stability. Then, tape the two sides together to hold them closed.</td>
<td><img src="image6" alt="Diagram" /></td>
</tr>
<tr>
<td>Tape one of the four strings in your bundle to each of the four corners of your parachute material.</td>
<td><img src="image7" alt="Diagram" /></td>
</tr>
<tr>
<td>Tape the knot end of your string bundle to the pointy tip of your capsule.</td>
<td><img src="image8" alt="Diagram" /></td>
</tr>
</tbody>
</table>

*Now you’re ready to try dropping your capsule!*