LESSON 10:
ORION SPLASHDOWN

SUPPLIES

LESSON KIT #10
- String (2 rolls)
- Keychains (20)
- Hole Punch (1)

HANDOUT FOLDER
- Tissue Paper (40)
- Construction Paper (20)

PENCIL BOX
- Scissors
- Tape
- Ruler

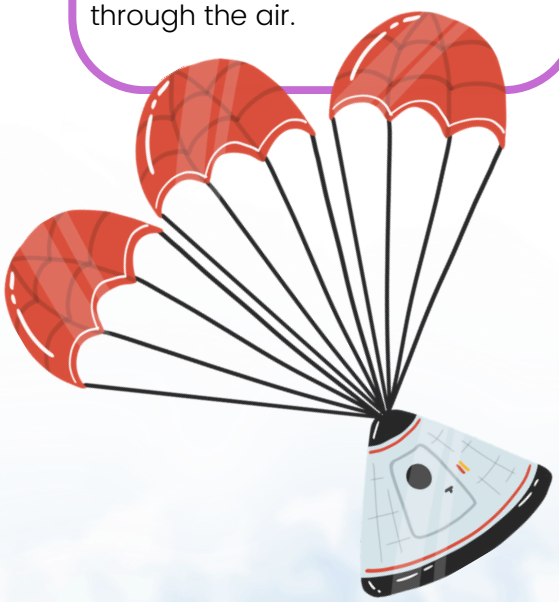
OBJECTIVES

- [x] Understand the meaning of air resistance
- [x] Create a parachute

HOOK

2 min

Have you ever stuck your hand out of the window of a moving car and felt the wind pushing against it? That's air resistance! Just like how the wind pushes your hand back, air resistance pushes against objects when they move through the air.



INTRODUCTION

3-5 min

In April 2027, NASA launched a mission called Artemis II. It was the first time astronauts flew all the way around the Moon and back since the 1970s! Four astronauts traveled in a spacecraft called Orion on a 10-day journey nearly 700,000 miles through space. Getting to space is hard, but getting back is even harder! When Orion returned to Earth, it was zooming through the sky faster than 23,000 miles per hour — much faster than a race car or a jet! If Orion hit the ocean going that fast, it would be like hitting concrete. So how did NASA slow it down safely?

Parachutes! As Orion fell back toward the Pacific Ocean, it popped open 11 parachutes in stages--first small ones, then bigger ones--until three giant main parachutes caught the air and slowed Orion all the way down to just 17 miles per hour. Splash! The astronauts landed safely in the ocean.

LET'S LEARN ABOUT AIR RESISTANCE

Have you ever wondered why parachutes slow down a falling object? The answer is air resistance, a force that pushes against objects as they move through the air. When an object falls, gravity pulls it downward, but air resistance works in the opposite direction, slowing the fall. The larger the surface area of an object, the more air resistance there is.

By creating a parachute for our spaceship, we'll see how air resistance affects how quickly objects fall!



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ORION SPLASHDOWN

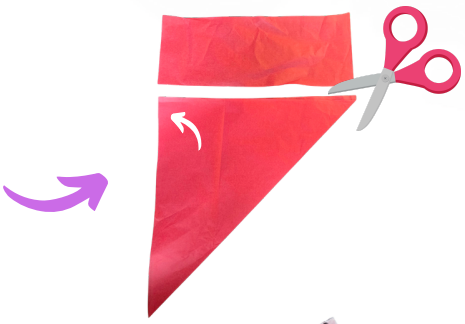
DISCUSSION

3 min

Air isn't empty! Air pushes back on things moving through it. That push is called air resistance, and the slowing force it creates is called drag. The bigger and flatter an object is, the more drag it creates, which is exactly why parachutes are wide and round instead of narrow and pointy. It's why a flying squirrel makes its body flat and wide when it falls, or why a frisbee falls through the air slower than a baseball. This is the same aerodynamic idea that brought the Artemis II astronauts home safely!

ASSEMBLY DIRECTIONS

30 min



1. Pass out materials to each student.
2. Instruct students to fold in one corner of their tissue paper to create a perfect square and trim the excess paper. Alternatively, they can use their ruler to measure a 12 inch x 12 inch square and trim the excess paper.



3. Place a small piece of masking tape at each corner to reinforce and provide tissue paper with structural integrity.
4. Share the hole punch to place a small hole in each corner over the masking tape.
5. Instructor: use your ruler to measure four 12 inch pieces of string per student.



6. Tie one piece of string to each hole punched corner.
7. Fold parachutes into fourths, so that you a have a smaller, evenly layered square. Ensure your string does not tangle and comb with your fingers so that all pieces of string are in a straight line.
8. Tie a small knot at the end of your joined string pieces.

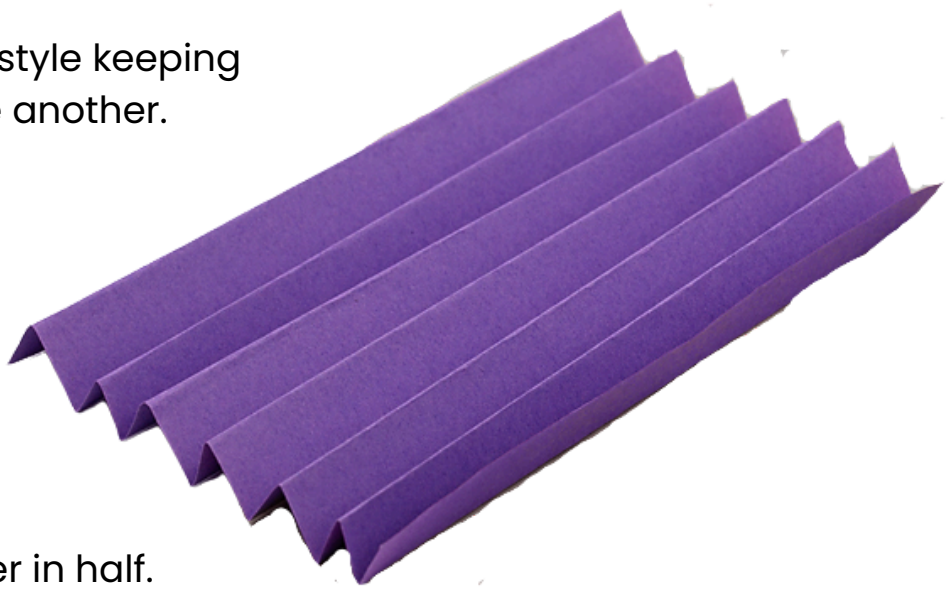


9. Using the knot, tie your string to your keychain.
10. Using the fan template, create a paper fan to use during the testing phase of our floating parachute project.

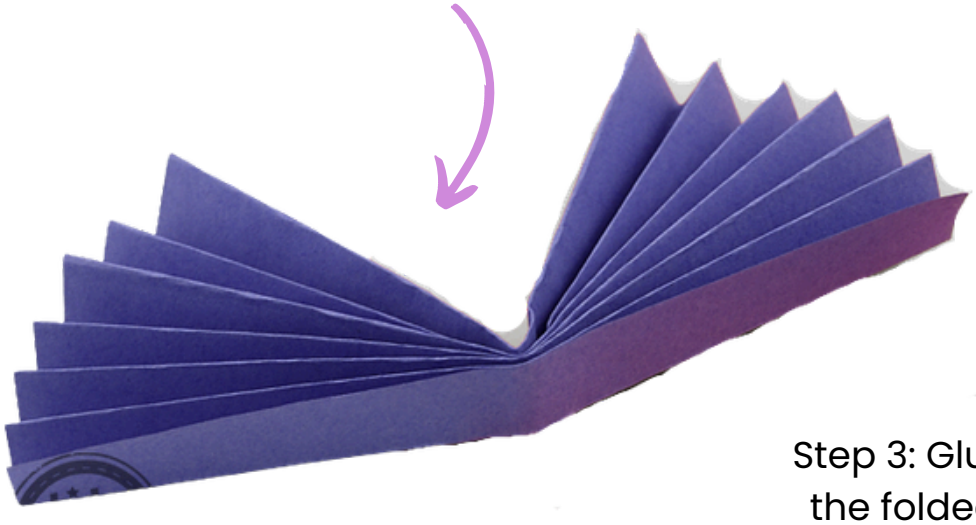
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ORION SPLASHDOWN
FAN TEMPLATE

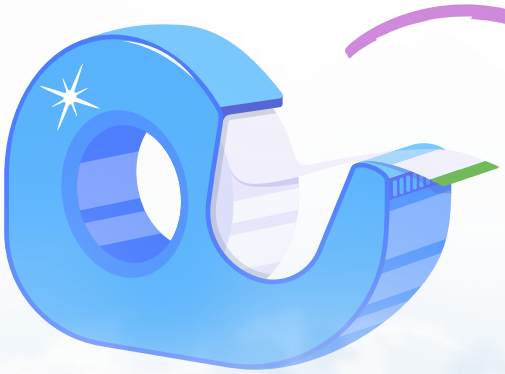
Step 1: Fold paper accordion style keeping each layer even with one another.



Step 2: Fold accordion paper in half.



Step 3: Glue or tape the top edges of the folded paper in order to create one seamless crescent fan.





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ORION SPLASHDOWN

FLIGHT TEST

10 min

Designate an area of the classroom as the testing zone.

Allow students to test their parachutes by dropping them. For additional hieght, students can pinch the parachute in the center and throw upward. Make sure students DO NOT stand on tables or chairs. The insturctor can release parachutes for additional hieght.

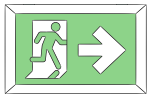
Discuss how air resistance slows the effect of gravity on a falling object by opposing its motion. Allow students to use their fans to test how additional wind resistance can increasingly slow the descent of their parachute. After initial tests, allow students to continue their design adding creative finishes in an attempt to further slow the descent of their parachute.

OBSERVE & EXPLAIN

3-5 min

Ask students if their parachutes were effective. What could they do to mkae their parachutes slow the fall of their spacecraft even more? Would a larger paracute help? What about adding additional parachutes?

Conclude the class with discussion regarding what we have learned. Today, we've explored the fascinating world of parachutes and how they rely on air resistance to slow down falling objects. Air resistance is the force that pushes against objects moving through the air, working against the pull of gravity to slow their descent. The larger the surface area of an object, the more air resistance it encounters, which is why parachutes are designed with wide surfaces to maximize this effect. By understanding how air moves around an object, engineers can design parachutes that efficiently slow down a fall while keeping people safe.



Exit Ticket



Ask each student one of the following questions as they walk out the door.

- Q: What is air resistance?
  - A: a force that pushes against objects as they move through the air
- Q: Can you define gravity?
  - A: Gravity is the natural force of attraction that pulls objects toward one another. It is responsible for keeping objects grounded on Earth,

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ORION SPLASHDOWN: STUDENT DIRECTIONS

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4



5



6



7



ORION SPLASHDOWN: STUDENT DIRECTIONS

1



2



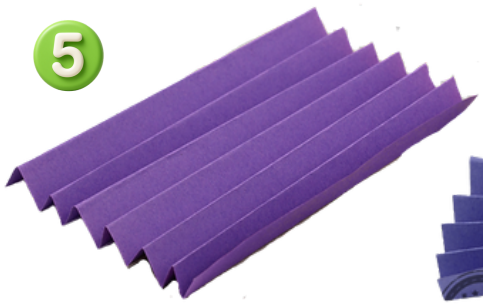
3



4



5



6



7

