

MISSION MISSION POSSIBLE

IMAGINE. DESIGN. CREATE.



MISSION : Operation Parachute

Your mission is to slow the fall of a quarter... by designing and building a parachute!

WHAT YOU'LL NEED

- One quarter (or something that's a similar size and weight)
- Recycled material from around your house (paper, plastic wrap, grocery bags, string, dental floss, plastic bags or anything else you think might work for your parachute)
- Tape
- A ruler, yardstick or tape measure
- A timer
- An area where you can drop your quarter from at least three or four feet above the ground
- Optional: pencil, pen, crayon, or marker and paper to draw on



LET'S READ

Find a comfortable spot and read! Here are some ideas to get you started:

- *Parachutes: How They Work* by Louise Paananen
- *To Root, to Toot, to Parachute* by Brian Clearly
- *Gravity* by Matt Mullins
- *Forces and Motion* by Angela Royston

You can download digital copies of these books for free from openlibrary.org. Here is how!

1. Go to openlibrary.org.
2. Click the blue "sign up" button on the top right to create a free account. You will be sent a confirmation email.
3. Sign in.
4. Type the book title and author into the search bar.
5. Find your book and click the blue "borrow" button.
6. Don't forget to return your book when you are finished reading it!



Sam Noble Home



For more activities visit samnoblemuseum.ou.edu/samnoblehome

Get Started:

- 1) Pick the area where you are going to work (in the kitchen, on the driveway, etc.)
- 2) Gather the quarter, timer and other supplies from around the house.
- 3) In the area you selected, use the tape measure or yardstick to measure at least three or four feet above the ground.
- 4) Hold the quarter at least three or four feet above the ground and drop it. What happened?
- 5) Look at the quarter and the supplies you gathered:

THINK!

- How quickly did the quarter fall without anything to slow it down?
 - How could you use the materials you collected to help build a parachute to slow the fall of the quarter?
 - How will you connect your parachute to the quarter?
 - Will you need any other materials?
 - Optional: Draw what you want your parachute to look like!
- 6) Build it!
 - 7) Once you have built your parachute, connect it to the quarter.
 - 8) Drop your parachute from at least three or four above the ground and see what happens!

WHAT HAPPENED?

- Did your parachute slow the fall of the quarter?
 - Did your parachute stay together when you dropped it?
 - Did the quarter stay connected to the parachute?
 - Did your parachute fall straight down, or move in different directions through the air?
- 9) Try again! Just because your idea didn't work the first time, doesn't mean you should give up. Think about how you can change your idea to build your parachute in a different way so it will better slow the fall of the quarter. Be creative and try as many times as you want. Ask a partner for ideas if you've tried all of yours, or check out the next page if you need some hints.
 - 10) When you're done, share what you did with someone! **TELL THEM**
 - Did your parachute slow the fall of the quarter?
 - How did you change your design to help it work better?
 - How many ideas did you try?
 - What was hard about the challenge?
 - If they wanted to try this challenge, what should they do?



BONUS CHALLENGE

Now that you've built a parachute, see if you can:

- Build a parachute that will slow the fall of something heavier than a quarter. You can try it with two quarters, a food can or even a small toy or action figure!
- Use a timer and try different ideas to see which will keep the quarter from hitting the ground for the longest amount of time.
- Raise the stakes by slowing the fall of something that can break – like an egg!
- Challenge a partner to build a parachute using the same materials and see which can slow the quarter's fall the most.

What do soldiers, space shuttles and skydivers have in common? They all use parachutes! Parachutes are simple devices that slow the descent of an object (or person!) through the air by creating air resistance. As gravity pulls an object through the air down towards the ground, a parachute will catch air in its canopy (the largest part at the top of the parachute, usually made of strong fabric) to resist the force pulling it downwards. This resistance, called drag, can slow the object's fall to the point that it won't break or be destroyed when it finally reaches the ground.

Although parachutes can help an object reach the ground safely, they can also create some challenges of their own. If a parachute catches a lot of air in its canopy as it falls, it can create lift (an opposite force of gravity). Lift can allow the parachute to be pushed in whichever direction the air is moving, instead of falling straight down to the ground. This can be a problem if whatever load the parachute is holding needs to reach the ground straight below it, but sometimes it can be used to intentionally move the parachute to a different location than directly below where it was deployed, or used.

HELPFUL WORDS

Canopy: the large part of the parachute that catches air to create drag

Deploy: to use

Descent: the action of moving, dropping or falling downward

Drag: a force that acts opposite of an object in motion

Gravity: a force that pulls objects towards Earth

Riser(s): the part(s) of the parachute that contains the load it's slowing down (i.e. person, quarter, etc.)

Suspension line: the lines connecting the canopy to the risers

Uplift: to lift or raise something up

Vent: holes in the canopy that let air through to prevent uplift



TIPS

- Adding small holes (called vents) to your parachute will help it fall straight down instead of going in different directions.
- If your parachute doesn't stay connected to the quarter, try building a basket or container to put the quarter in and connect the parachute to that.
- Changing the shape of your parachute's canopy may change how it falls.

Talk like a parachute engineer!

1. When I drop the quarter, gravity causes it to fall to the ground.
2. My parachute slows the descent of the quarter by creating drag.
3. Before deploying my parachute, I placed the quarter in the risers.
4. Though gravity causes my parachute to fall towards the ground, uplift from the air may cause it to not fall straight down.
5. Adding vents to the canopy of my parachute helps prevent uplift.

Want to learn more about operation parachute? Check out the links below:



How Parachutes Work (video)

https://www.youtube.com/watch?v=Ab_g5sLoXoY



How it's Made: Parachutes (video)

<https://www.youtube.com/watch?v=ZQxxAPizvEs>



How Parachutes Work

<https://www.explainthatstuff.com/how-parachutes-work.html>



History of the Parachute

<https://www.smithsonianmag.com/arts-culture/an-early-history-of-the-parachute-951312/>



Sam Noble Home



STEM Activities