student guide

Parachute Challenge

name: _____

Vocabulary

force, drag, gravity, surface area, design criteria, design constraints

Step 1: Research

What do you already know about parachutes and the properties of air and wind?
Watch some videos and research to learn more!

1. Explain how a parachute works

2. What are the forces associated with a parachute?

Step 2: Define

1. What design criteria should you take into consideration when designing a parachute?

2. How does surface area affect parachutes? Does a large parachute fall slower or faster than a smaller one?

3. What materials might be best for designing a parachute?

Step 3: Plan and Prototype

Here's where you get to design your own parachute! Your goal is to design the parachute that stays in the air for as long as possible.

The parachute with the longest flight time will win.

Flight time will be measured from the time that a team member releases the parachute in the tunnel to the time that the parachute falls onto the ground.

Before building anything, you need a ***plan***.

Discuss with your team how you can design the best parachute given what you learned today.

1. Sketch your parachute design. Think about the ideal shape, size, and materials for your parachute. Make sure to label the different parts of your parachute.

teacher initial

Once your sketch has been approved, you'll receive your materials.
Discuss with your team how you can build the parachute you designed given the limited materials you were given.

2. Sketch a new and improved design for your parachute. How do material constraints change your design? *Make sure to label the different parts of your parachute and include the materials you'll be using for each part*

teacher initial

Now that your secondary sketch has been approved, it's time to build! Work as a team to bring your design to life. Feel free to iterate on your design as you go.

3. What changes did you make while building as a result of your material constraints?

Step 4: Test

The competition is about to begin. You will get two timed trials for your parachute. Make some predictions about how you think your parachute will fly.

1. How long do you predict your parachute to stay in the air? How fast do you think it will move and how long for it to fall?

2. What do you think the flight pattern will look like? Spin around? Fly right up?

Record your data in the table below.

Trial	Time

After your first timed trial, get back together with your team to assess your design.

3. What worked about your parachute? What didn't work?

4. What can you improve about your design before the next trial?

- **Discussion**

  Get back together with your group. What went well about your parachute design process? What could be improved next time you are presented with a design challenge?