

Group Names _____

STEM: Parachute Design Project

Grades 5-9



Lesson Focus

- This lesson focuses on parachute design. **(S)**
- Teams of students construct parachutes from everyday materials. **(E)**
- During a class contest, students will test their parachutes to determine whether they can transport a paper clip to the ground with the slowest possible rate of descent. **(M)**

Students will:

- Research information about how parachutes work
- Create a parachute by modeling the teacher
- Practice launching parachute
- Collect data
- Change one variable on their parachute that will extend the air time
- Participate in a class contest
- Design a parachute from scratch
- Participate in class discussion about their findings

This project will take 3 class periods of 1 ½ hours per class.

Scientific topics covered in this lesson:

Air resistance, friction, drag, freefall, velocity, terminal velocity, constant velocity, force of gravity, acceleration, surface area & Newton's Laws of Motion

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Teacher instructions:

Activity 1 - Begin lesson with the video on parachutes found at the following website. <http://gmsmavs.com/Page/11038> Students will take notes while watching the video. **(See Activity 1: Parachute Video Notes sheet in this packet.)**

Activity 2 - Assign students parachute and the students following modeling the **Parachute with Teacher**



to groups of 3. The teacher will build a parachute and the students will build the same parachute teacher. **(See Activity 2: Build a Parachute sheet in this packet.)**

Students will practice launching the parachute. They will launch the parachute 3 times and will use a stopwatch to time from launch to touchdown. They will calculate the average of the 3 launches and record all of the data in the data table on their worksheet.

Activity 3 - Students will change one variable on their parachute (for example, the paper clip, and the napkin or string size) that they think will keep their parachute in the air the longest. They will repeat the 3 launches and record their findings in the data table on the **(See Activity 3: Change One Variable on Your Parachute sheet in this packet.)**

Hold a class contest to see which parachute will stay in the air the longest. (Do this by having students stand on chairs or from a staircase.)

Activity 4 - Students will now design and build a parachute from scratch from a table of materials. (Provide sample materials such as: plastic bags, napkins, coffee filters, paper, craft sticks, paper towel rolls, cotton balls, tape, yarn, balloons, paper clips, etc.)

Hold another class contest to see which parachute will stay in the air the longest. **(See Activity 4: Design a Parachute worksheet.)**

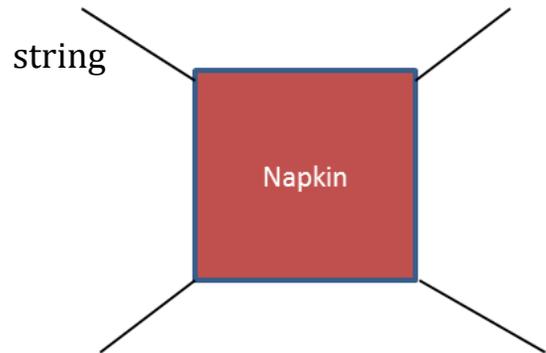
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Student Worksheet

Activity 2: Build a Parachute with Teacher

Materials:

- Napkin
- Roll of string – 10 inches
- Ruler
- Scotch tape
- Paper clip



Open napkin and place upside down on the table

Cut string into 10 inch strips

Tape strings to the 4 corners of the napkin

Tie bottom of strings together and insert the paper clip

Launch 3 times – time your launches & record information in the table:

| Launches | Time |
|----------------|------|
| Launch 1 | |
| Launch 2 | |
| Launch 3 | |
| Average of 1-3 | |

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Student Worksheet

Activity 3: Change One Variable on Your Parachute (so that it will stay in the air the longest).

What did you change?

Launch 3 times – time your launches and record information in the following table:

| Launches | Time |
|----------------|------|
| Launch 1 | |
| Launch 2 | |
| Launch 3 | |
| Average of 1-3 | |

Which parachute stayed in the air the longest?

What variable did they change?

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Student Worksheet

Activity 4: Design a parachute from scratch that has the longest hang time.

You are a team of engineers who have been given the challenge to design a parachute out of everyday items. Your challenge is to design a parachute that will hang in the air the longest. (30 minutes)



I. Planning Stage

1. Meet as a team and discuss the problem you need to solve. Then develop and agree on a design for your parachute. You'll need to determine what materials you want to use.
2. Draw/label your design in the box below, and be sure to indicate the description and number of parts you plan to use.

****Be sure to label the materials in your sketch****

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II. Construction Phase

Build your parachute. During construction you may decide you need additional materials or that your design needs to change. This is ok – just make a new sketch and revise your materials list.

III. Testing Phase

Each team will test their parachute. Launch your parachute about chest high and record your data in the table below.

| Launch Number | Time |
|---------------------------|------|
| Launch 1 | |
| Launch 2 | |
| Launch 3 | |
| Average of the 3 launches | |

IV. Class Contest



V. Evaluation

Answer the following questions for a class discussion:

1. If you could have had access to materials that were different than those provided, what would your team have requested? Why?
2. If you had to do it all over again, how would your planned design change? Why?
3. What designs or methods did you see other teams try that you thought worked well?
4. Do you think you would have been able to complete this project easier if you were working alone? Explain...

Lesson Extension: have students design a parachute that drops its payload on a specific target