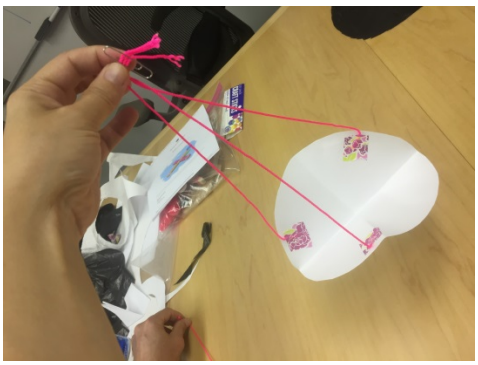
Classroom Central SUPPLYING OUR STUDENTS STEM LESSON KITS

STEM – Forces and Motion—Project Parachute



Suggested Grade Level: 5th

NC Standard – 5.P.1 Understand force, motion and the relationship between them.

Words and Phrases to Discuss – Gravity, air resistance and aerodynamics; systems—a group of parts working together to perform a function; criteria for success and contraints; failure as part of the engineering process

Materials List:

- 5 Facial tissues
- 6 straws
- 2 pieces of copy paper
- Yarn or string (1 yard)
- 1 plastic or paper cup
- Plastic shopping bag
- 2 coffee filters
- Tape
- A target (can be a bulls-eye printed or drawn on a piece of paper)
- Cargo—binder clip, piece of candy, washer, etc.

Instructions: Introduce the lesson by dropping a flat sheet of paper and a crumpled paper ball from the same height and ask "what happened?" Provide background information on air resistance and aerodynamics to build interest. Discuss the importance of a sky diver having a parachute. You can show a video or photos to form a frame of reference for students. Explain how the force of gravity is always pulling us to the center of the Earth. When the parachute opens, air resistance counteracts the force of gravity. This slows the rate at which the sky diver is being pulled toward the ground. The parachute, alongside of air resistance allows for sky divers to land safely.

Activity: Explain to students that they are going to use the Engineering Method to understand the process that a parachute engineer uses to construct a new design. Break the class into three Science Design Teams to engineer parachutes. Instruct students that they will be designing and building a parachute that will safely transport an object (candy, paper clip, etc.) to land on a target. Guide student groups through the design process by: defining the problem (sky divers need a safe way to fall to Earth), doing background research, specifying criteria for success as well as constraints. Criteria for success include: parachute needs to land safely on the target, it needs to drop from a defined height, it needs to drop as slowly as possible and it needs to stay together. Explain that constraints are that each team is limited to only using the materials they are given when building their parachutes. Have students get their design ideas on paper (individually) then collaborate as a team. Have students take into consideration the available materials, their research and the steps they will take to make the parachute according to their plan. After students have constructed their parachutes, move to the testing phase by having one student stand on a chair to release the parachute; a second student tracks the amount of time it takes for the parachute to land its cargo and hit the target. Allow students 30 minutes to build and test their prototypes; documenting their failure points and improvements. Next have each group present its findings to include an explanation of one failure point and improvement and a demonstration of their parachute dropped on the target.

Science Notebook Helper - During the lesson, students can document their designs and record their failure points and improvements. They can also record the results of each test flight.

Guiding Questions

- What happened when the flat sheet of paper and the crumpled piece of paper fell? Which was slower? Which hit the floor first? Why didn't they hit the floor at the same time?
- What patterns have you noticed?
- Why do you suppose ____?
- What have you found so far?
- Has your thinking changed?
- What evidence do you have?
- How did you decide _____?
- What conclusion can you draw about ____?
- What are the most important parts in your parachute system?