STEM Connections

Parachutes

Below are ideas for connecting the Parachutes activity to STEM concepts and principles. For more ideas and detailed STEM lessons, consult the *Parachutes Teacher's Guide*.

ACTIVITY OVERVIEW

Students design, build, and test parachutes constructed from tissue paper and string.

SCIENCE

Experimental Design

Have students construct a simple tissue paper parachute and drop it from a balcony, or use the Pitsco Rip Cord to drop it from a high ceiling or gymnasium girder.

When students are familiar with the construction process, have them think through the process of experimenting with the length of the strings on the parachute.

Provide some guidance but also some leeway in their experiment, as they can learn as much from a failure as they can from a success. Here are some common ideas for experiments to try, based on string length:

- Strings at 1/2 of original length
- Strings at 3/4 of original length
- Strings 50% longer than original length
- Strings twice as long as original length

Students should be encouraged to keep all other variables the same and only change the one independent variable. They can add a mass to the parachute strings, but the mass should be the same throughout the experiment.

Typical experimental measurement is the time of descent, as measured by a stopwatch.

ENGINEERING

Iterative Design

In this activity, students will do a number of design iterations on a simple parachute to find a design that will have the longest time of descent for a specified load.

Have students construct a simple tissue paper parachute and drop it from a balcony, or use the Pitsco Rip Cord to drop it from a high ceiling or gymnasium girder. The load for the parachute can be a large metal washer or a small toy figure attached to the parachute.

Have students use a stopwatch to determine the time of descent and record the time in a data table.

Have students go through the Engineering Design Loop process to change at least one aspect of the parachute that they think might increase the descent time. Students will prototype their design change, and repeat the drop under the same conditions as the original drop (height and load). Students will record the results in the data table.

Have students go through as many design iterations as possible in the time you allot (two class periods recommended). The descent time for each iteration through the process should be recorded. Students should note how each iteration affected the descent and why they chose the next iterative change.

TECHNOLOGY

Measuring Time

In this activity, students will measure the time that their parachutes take to descend from the drop point to the ground.

Have students construct a simple tissue paper parachute and drop it from a balcony, or use the Pitsco Rip Cord to drop it from a high ceiling or gymnasium girder.

Have students use at least three different methods to measure the descent time, such as:

- Stopwatch (mechanical)
- Stopwatch (digital)
- Stopwatch phone app
- Counting by thousands
- Clock with second hand
- Photogate
- Pitsco Drop Zone
- Hourglass

Have students record their results and describe why the results with different measuring devices are different.

As an extension, students can research time-measuring devices – or make a time line (pun intended) of the history of time-measuring devices.

MATH

Calculating Rate

Have students construct a simple tissue paper parachute and drop it from a balcony, or use the Pitsco Rip Cord to drop it from a high ceiling or gymnasium girder.

Have students use a stopwatch to record the amount of time for the parachutes to descend to the ground. Have them also measure the height that the parachutes dropped. The load for the parachute can be a large metal washer or a small toy figure attached to the parachute.

Students should repeat the drop three times; record those times and find the average time for their parachutes to descend. Using this average time, students use the rate formula (rate = distance ÷ time) to determine the rate of descent of the parachutes.

Have students change the load and repeat the drops with their parachutes, recording the descent times in their data tables. Again, students will use the rate formula to determine the average rate of descent with the different load.

If time allows, have students change the load one more time and determine the average rate of descent again.

Rates for various loads can be compared and graphed by students.

PITSCO EDUCATION

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