Images of the Past

Sioux Falls Area Snowstorm of 1909

Teaching Tip

Terminal Velocity: Coffee Filter

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Sioux Falls - Courtesy: Siouxland Heritage

During this activity your students will learn about memorable South Dakota blizzards. They will also use coffee filters to investigate air resistance, friction, and terminal velocity.

In South Dakota we are always talking about the last big snowfall or storm. We all have memories of a particular storm, but how do they really compare? On February 8th and 9th, 1909 the Sioux Falls region experienced one of the largest snowfalls on record. The storm began in Sioux Falls at about 2:00 PM on Monday and ended early Wednesday morning. Officially the storm dropped 21" of snow in Sioux Falls. The snowfall was accompanied by high winds which created large drifts. View photos and learn more about this storm and other South Dakota storms at the following website - South Dakota Snowstorms. (Must See - Devastating 1881 Snowstorm and Flood)

Process:

- Materials:
  - Coffee filters
  - Tall object
  - Calculator
  - Stopwatch
  - Tablet to record results
- Introduce the activity by teaching the students about memorable South Dakota snowstorms above. Visit with the students about different sized snowflakes they have seen in the past. Excluding wind, discuss the rates at which different sized snowflakes fell.
- The students should watch the following video which introduces and explains terminal velocity. (PBS LearningMedia – Earth's Gravity)

SDPB South Dakota Public Broadcasting

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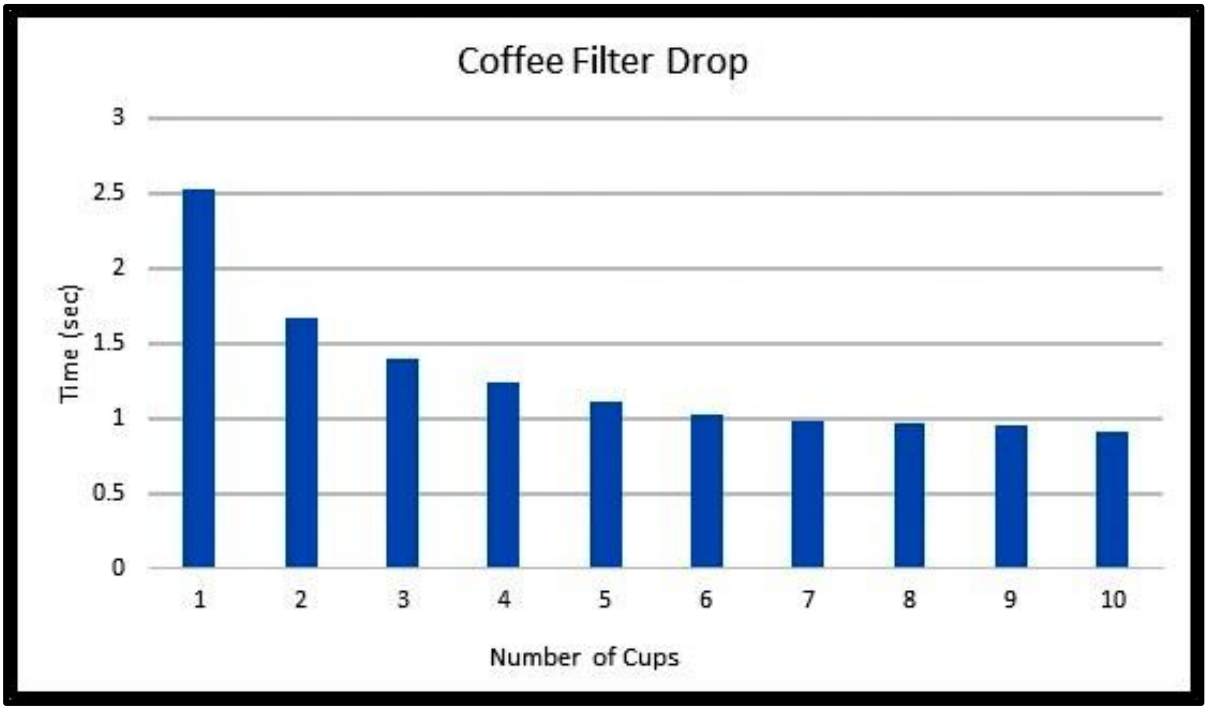
- Show a simple demonstration in which a full sheet of paper is dropped at the same time as a crumpled up a piece of paper. Compare the drop rate of the two pieces of paper that have the same weight, but a different surface area.

- Your students will design and conduct an experiment in which they will drop coffee filters to see how an increase in weight affects the rate at which the filters drop. They should design an experiment in which one filter is dropped multiple times. The time taken for each drop should be recorded and averaged. They should continue the experiment by stacking additional filters, recording the amount of time the filters take to fall the same distance. They will increase the weight without increasing the surface area. The air resistance (drag force) does not change. Example results shown below. (The greater the distance dropped, the easier it will be to observe time.)



Resources: Falling Objects Additional resources about falling objects, including lessons and video, are located below.

- PBS LM: Galileo's Falling Bodies (air resistance)
- PBS LM: Physics in Motion
- PBS LM: Gravity and Falling Objects