QuickView

Students vary the length of a straw rocket to investigate the effect length has on the rocket's range.

Standards Addressed

NSTA 5-8
Students develop abilities necessary to do scientific inquiry.

- Students identify questions that can be measured through scientific inquiry.
- Students use appropriate tools and techniques to gather, analyze, and interpret data.
- Students think critically and logically to make the relationships between evidence and explanations.
- Students communicate scientific procedures and explanations.

NCTM 6-8
Students develop and evaluate inferences and predictions that are based on data.

ITEEA 6-9
Students develop abilities to assess the impact of products and systems.

Students learn to design and use instruments to gather data.

Time Required

45-90 minutes (will vary with class size)

Content Areas

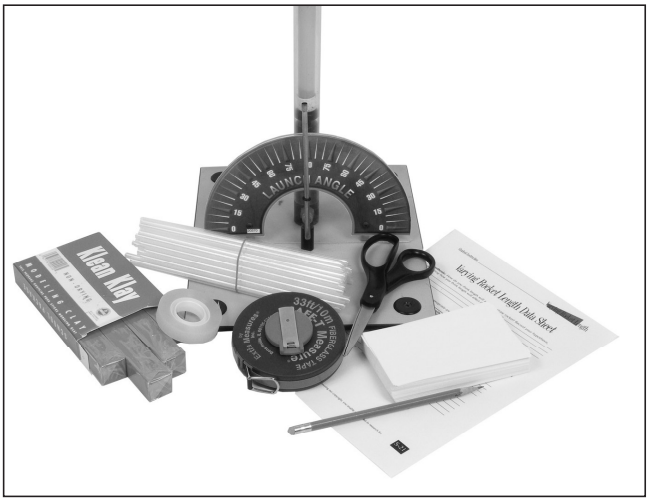
Primary: Technology
Secondary: Math, science, language arts

Vocabulary

- altitude
- apogee
- conclusion
- constraint
- control
- design
- fin
- hypothesis
- nose cone
- range
- rocket
- trajectory
- variable

Materials

- Pitsco Straw Rocket Launcher
- Precision Straws
- Index cards
- Modeling clay
- Ruler or measuring tape
- Scissors
- Transparent tape
- Pencil
- "Varying Rocket Length Data Sheet"



Procedure

1 Locate the "Varying Rocket Length Data Sheet" and write a hypothesis stating how you think variations in the length of the rocket's body will affect the rocket's range.

Middle school students should understand hypotheses. However, you may wish to explain that a hypothesis is a prediction based on prior knowledge or experience.

2 Construct two straw rockets of different lengths. The difference in lengths should be a minimum of five centimeters and a maximum of 10 centimeters. The other main components should be the same for both rockets (for example, same number of fins, same fin size and shape, same nose cone size and shape) and should stay within the design constraints (see the Construction QuickView for design constraints).

In this experiment the variable is the length of the rocket body, and the controls are the fins and nose cone.

3 Label one rocket "Rocket A" and the other rocket "Rocket B."

The rocket can be labeled by using a marker on the rocket body, by using a piece of tape, or by writing on one of the fins.

4 Slip the first rocket over the launch tube.

5 Adjust the launch tube and rocket to the trajectory angle of 45 degrees.

6 Raise the launch rod to the fifth calibration line (calibration lines are the black lines on the launch rod).

Count calibration lines by starting at the top of the launch rod.

7 To launch, release the launch rod so that it falls to the bottom of the cylinder.

8 Measure the rocket's range using the measuring tape.

9 Record the rocket's range on the "Varying Rocket Length Data Sheet."

10 Repeat Steps 4-9 twice more for "Rocket A" and three times for "Rocket B."

11 Analyze the data generated from the launches and write a conclusion explaining how the difference in rocket body length affects the rocket's range. Compare your hypothesis to your conclusion.

Conclusions should be supported by data.