Mini Straw Rockets:

Engineering Design Process

**PLAN:**

1. Build basic rocket and record data (distance flown and smoothness of flight)
2. Modify one element at a time and record data
3. Build a revised rocket and complete final challenge

# CHALLENGE 1: Build Basic Rocket

**🚫 IMPORTANT: Rockets may only be tested at the Launch Zone. Never fire a rocket at another person. 🚫**

## STUDENT DATA:

Quantitative data: how far did the rocket fly?

Qualitative data: did the rocket fly straight through the air?

What shape was its path?

# CHALLENGE 2: Modify the Rocket

* Choose one element to change about the rocket:

1. Add fins of varying sizes
2. Add weight to the rocket: add paperclips to the front and/or back

* Make a hypothesis about the chosen modification.
  + - Will the rocket fly farther? Straighter?
* Test the new rockets and record data.

## Student Questions:

What is the independent variable? (Either the fins or the weight)

What are the dependent variables?

What was held constant?

**Hypothesis:** If \_\_\_\_\_\_\_, then \_\_\_\_\_\_\_\_.

**Student Data table:** distance traveled and observations for 3 trials.

# CHALLENGE 3: Revise Rocket Design and Compete

* Using the data collected, design a new rocket.
* Launch the rockets, trying to get as close to the center of the target as possible.

Students make a **design sketch.**

**ENGINEERING EXPLORATION:**

|  |  |
| --- | --- |
| What do engineers do? | Engineers use math, science, and technology to solve problems. |
| What are the steps of the  **engineering design process** that you completed? | Identify a problem. Develop possible solutions. Build a prototype. Test and evaluate a prototype. Redesign and improve as needed. |
| What is **momentum?** | Momentum measures how easy it is to change an object’s motion.  Momentum = mass x velocity  Heavy objects and fast moving objects have more momentum. |

Mini Straw Rockets:

Forces, Energy, and Momentum

**PLAN:**

1. Build basic rocket and record data (distance flown and smoothness of flight)
2. Modify one element at a time and record data
3. Build a revised rocket and complete final challenge

# CHALLENGE 1: Build Basic Rocket

* Cut straw body, attach the brad.
* Tape fins to the end of the rocket.
* Assemble the slingshot.
* Test the rocket by shooting it as far as possible in the Launch Zone.

## DATA:

Quantitative: how far did the rocket fly?

Qualitative: did the rocket fly straight through the air?

What shape was its path? Look from the front and from the side.

# CHALLENGE 2: Modify the Rocket

* Choose one element to change about the rocket:

1. Add weight to the rocket: add paperclips to the front and/or back
2. Use different rubber bands in the slingshot.

* Make a hypothesis about the chosen modification.
* Test the new rockets and record data.

## DATA:

What is the independent variable?

Which physics concept relates to that variable?

# CHALLENGE 3: Revise Rocket Design and Compete

* Using the data collected, design a new rocket.
* Launch the rockets, trying to get as close to the center of the target as possible.