



Mathematics

The Measure of a Rocket

STEP 1

LEARN (15 minutes)

Objectives

- Students will construct a snap together Estes Firestreak SST™ model rocket.
- Students will determine what measuring tool and units to use to measure a model rocket.
- Students will take various measurements of their rockets.

Materials

1. Rulers, tape measures, meter sticks, yardsticks, protractors
2. Pencil & paper for each student
3. Firestreak SST™ Rocket Lab Pack™ (24 pack) - 1 or more
4. Rocket Engine Lab Pack™ (24 pack) - 1 or more
5. Electron Beam® Launch Controller - 1 or more
6. Porta-Pad® II Launch Pad - 1 or more
7. Visual/Overhead: Model Rocket Nomenclature
8. Model Rocket Nomenclature worksheet (blank labels) for each student

Time

One class session

Background

Students will need to know the parts of a model rocket so they can make their own and decide what to use to measure the parts. The main parts of a model rocket are the body tube, engine holder assembly, fins, launch lug, nose cone, shock cord and recovery system. Model rockets are made of lightweight materials like paper, balsa wood and plastic. The body tube is the main structure of the rocket. It determines the main shape of the rocket and is usually long and slender. The remaining parts are attached to the body tube. The engine holder assembly holds the engine in place inside the rocket. Fins give directional sta-

NATIONAL STANDARD

Standard 4

Understands and applies basic and advanced properties of the concepts of measurement

Benchmark 3

Selects and uses appropriate direct or indirect method of measurement in a given situation



ROCKET LAB™

bility and help the rocket fly straight. The launch lug is the hollow tube that slips over the launch rod. The nose cone is attached to the top of the rocket and is tapered to cut through the air more efficiently and reduce drag. The rubber shock cord attaches the nose cone to the body tube so the rocket is recovered in one piece. The recovery system returns the rocket to the ground.

Activity

1. Use the Model Rocket Nomenclature visual/overhead to show the main parts of a model rocket and its purpose.
2. Students will label the rocket parts on their worksheet.
3. Discuss how the parts of a model rocket compares to the parts of a full scale rocket.

STEP 2 ■ BUILD (15 minutes)

Activity

1. Build the Firestreak SST™ together with students, using step-by-step procedures. This is a snap together rocket that needs no gluing or cutting.
2. While building the rocket, students will determine what measurement tool they will use to measure and record the length, width or diameter of:
 - a. white body tube - length and diameter
 - b. nose cone - length and diameter
 - c. fins - length of all 5 sides and width
 - d. streamer - length and width
 - e. shock cord - length and width
 - f. purple body tube - length and diameter (inside and outside)
 - g. entire length of rocket

KEY WORDS

body tube
dimensions
drag
engine holder assembly
fins
launch lug
measurement
nose cone
recovery system
shock cord

Note: *Students will use Metric units (cm's or mm's). Students can estimate each length, width and diameter before they do the actual measurements.*



3 STEP

■ LAUNCH (30 minutes)

Activity

1. Assign and post launch jobs for students. Launch jobs are in the *Estes Educator Guide for Teachers & Youth Group Leaders*.
2. Prepare rockets for launching in your classroom before going outside to launch. Follow the Engine Preparation steps located in the Firestreak SST™ Instructions.
2. Launch rockets outside at a soccer field, football field, baseball field, green grass area or blacktop area.

Wrap Up - Touch Down & Recovery

1. When all rockets are launched, students will locate their rocket and measure the distance from the rocket's landing location to the launch pad. Whose rocket is closest to and farthest from the launch pad?
2. Students will determine if there are other measurement tools that can be used to measure other parts of a model rocket and other measurements at the launch field.

Extensions

1. Students will find the perimeter and area of the rocket parts they measured.
2. Students can make a line or bar graph to show each part's length, width, diameter, area and perimeter.
3. Compare a full scale rocket to the Firestreak SST™ in both metric length and width and our customary inch/foot/mile units.

Evaluation/Assessment

- Students will complete the Model Rocket Nomenclature worksheet.
- Students will make the Estes Firestreak SST™ rocket.
- Using metric units, students will measure and record the length, width and diameter of model rocket parts.
- Students will launch and measure their rocket's distance from landing spot to launch pad.



References

- *Estes Educator™ - Guide for Teachers and Youth Group Leaders*
- Estes Educator™ Website - www.esteseducator.com