



Mathematics

Do Rockets Measure Up?

STEP 1

LEARN (15 minutes)

Objectives

- Students will construct a snap together Estes model rocket (Firestreak SST™).
- Students will select a measuring tool to use and will take various measurements of their rocket.
- Students will launch individual model rockets.

Materials

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

Time

One class session

Background

Students will need to know the parts of a model rocket so they can make their own and analyze 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

NATIONAL STANDARD

Standard 4

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

Benchmark 2

Selects and uses appropriate tools for given measurement situations (e.g., rulers for length, measuring cups for capacity, protractors for angle)



assembly holds the engine in place inside the rocket. Fins give directional stability 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 Visual/Overhead to show the main parts of a model rocket and its purpose.
2. Students will label the rocket parts on their worksheet.

2 ■ BUILD (15 minutes)

STEP

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. After rocket is built, students will choose a measuring tool to use to measure and record the length of:

a. body tube	d. streamer
b. nose cone	e. shock cord
c. fins (all 5 sides)	f. total length of rocket

KEY WORDS

body tube
 drag
 engine holder assembly
 fins
 full scale
 launch
 launch lug
 length
 measurement
 measuring tool
 nose cone
 purpose
 recovery system
 results
 shock cord

Note: Older or advanced students can estimate first, then measure in both inches and centimeters or millimeters.

3 ■ LAUNCH (30 minutes)

STEP

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.
3. Launch rockets outside at a soccer field, football field, baseball field, green grass area or blacktop area.

Wrap Up - Touch Down & Recovery

1. Students will find their rocket on the launch field and measure the distance from the rocket to the launch pad. Whose rocket was the farthest from the launch pad?
2. Ask students if there are other measurement tools that can be used to measure other parts of a model rocket. What other measurements can be taken at the launch field?

Extensions

1. Students can make graphs or diagrams to show their measurements.
2. Compare and contrast the parts of an Estes rocket to the parts of a full scale rocket.
3. Compare the Firestreak SST™ and a full scale rocket in both metric length and our customary inch/foot/mile length.

Evaluation/Assessment

- Students will complete the Model Rocket Nomenclature worksheet.
- Students will assemble the Firestreak SST™ model rocket.
- Students will measure and record the length of six model rocket parts.
- Students will launch and measure their rocket's distance from landing to the launch pad.

References

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