



## Mathematics

### Sizing Up Rockets

# STEP 1

## LEARN (15 minutes)

### Objectives

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

### Materials

1. Tape measures, rulers, meter sticks, yardsticks, protractors
2. Paper and pencil 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 (with blank labels) worksheet for each student

### Time

One class session

### Background

Students will need to know the parts of a model rocket so they can make a rocket 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. All remaining parts are attached to the body tube. The engine holder assembly holds the engine in place inside the rocket. Fins give directional

### NATIONAL STANDARD

#### Standard 4

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

#### Benchmark 6

Selects and uses appropriate units and tools, depending on degree of accuracy required, to find measurements for real-world problems



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 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, measure and record the length and width of:
  - a. body tube
  - b. nose cone
  - c. fins (all 5 sides)
  - d. streamer
  - e. shock cord
  - f. total length of rocket

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

## STEP 3 ■ LAUNCH (30 minutes)

### Activity

1. Assign and post launch jobs for students. Launch jobs are in the *Estes*

### KEY WORDS

body tube  
drag  
engine holder assembly  
fins  
full scale  
launch lug  
measurement  
nose cone  
recovery system  
shock cord  
stability  
units



*Educator Guide for Teachers & Youth Group Leaders.*

2. Prepare rockets for launching inside before going out 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. When all rockets are launched, students will locate their rocket and measure the distance from the rocket's location to the launch pad. Whose rocket was closest to and farthest from the launch pad?
2. Students will identify other measurement tools that can be used to measure other parts of a model rocket and measurements at the launch field.

### Extensions

1. Students will find the area and perimeter of the six rocket parts they measured.
2. Students can make a line or bar graph to show each part's length, width, 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 estimate, measure and record the length and width of six 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](http://www.esteseducator.com)