



## Technology

### Easy E2X®

# STEP 1

## LEARN (First class session: 15 minutes)

### Objectives

- Students will test the design features of the Estes model rocket E2X® skill level.
- Students will determine if there is a way to improve the E2X® design.
- To evaluate the design tests, students will make and launch an Estes E2X® model rocket.

### Materials

1. Generic E2X®, Alpha III® or UP Aerospace™ SpaceLoft™ Rocket Lab Pack™ (12 pack) - 2 or more
2. Rocket Engine Lab Pack™ (24 pack) - 1 or more
3. Electron Beam® Launch Controller - 1 or more
4. Porta-Pad® II Launch Pad - 1 or more
5. Paper, pencil, white or carpenter's glue or plastic cement, scissors, modeling knife, ruler and masking tape for each student

### Time

Two class sessions

### Background

Students will need to understand the parts of a model rocket and their function so they can make a rocket and observe the design features unique to an E2X® Skill Level rocket. 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 other parts are attached to the body tube. The engine holder assembly holds the engine in place inside the rocket. Fins give directional stability and help the rocket fly

## NATIONAL STANDARD

### Standard 11

Students will develop the abilities to apply the design process.

### Benchmark F

Students should learn to test and evaluate the solutions for the design problem.

### Benchmark G

Students should learn how to improve the design solutions.



# ROCKET LAB™

straight. The launch lug is the hollow tube that slips over the launch rod. The nose cone 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.

For many years, if you wanted to begin making and launching model rockets you would start with a Skill Level 1 model rocket. A Skill Level 1 rocket kit has balsa wood fins, requires sanding, gluing and painting. In 1992, Estes designed a new beginner's skill level rocket and named it the E2X® Series. E2X is an acronym for Easy to Execute. Specific design features of the E2X® Series are:

1. Pre-colored nose cone, fins and body tubes (no painting)
2. Plastic nose cones
3. Plastic fins and fin units
4. Pre-slotted body tubes for perfect fin alignment (models with individual fins)
5. Colorful, self-stick decals for decorating

These design features make the E2X® kits very quick to build – usually in about 30 – 40 minutes.

## KEY WORDS

body tube  
decals  
design features  
drag  
engine holder assembly  
fins  
launch lug  
nose cone  
recovery system  
shock cord  
stability

### Activity

1. Ask students why they think the E2X® Series, easy rockets to build, were designed?
2. Before class, make the E2X® rocket (Alpha III®, Generic E2X® or UP Aerospace™ SpaceLoft™) your students will build. Using this rocket, show the main parts of a model rocket and the special design features of an E2X® rocket.
3. Let students hypothesize and generate their own reasons for each part and why it's made like it is. They will list each part, then write their own reason for it and why it is made like it is.



## BUILD

(First class session: 35 - 40 minutes)

### Activity

1. Build the E2X® rocket of your choice (Alpha III, Generic E2X® or UP Aerospace™ SpaceLoft™) together with students, using step-by-step procedures.
2. While building the rocket, students should observe the special E2X®



design features to determine if they make building the rocket easy.

## STEP 3

### LAUNCH (Second class session)

#### 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 rocket 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. Discuss with students if the E2X® design features worked as stated and helped them build and launch the rocket easily.
2. Students will list the special design features of an E2X® Series rocket.
3. Students will list any design changes they would do to improve the E2X® Series.

#### Extensions

1. Students will build and launch a Skill 1 rocket or use a teacher Skill Level 1 demonstration rocket. Students can compare the designs and launches of the E2X® rocket to the Skill Level 1 rocket.
2. Students can use the Estes Rocket Designer's Plan Sheet to design a new E2X® rocket.

#### Evaluation/Assessment

- Students will complete a written record listing each model rocket part and the reason for it.
- Students will demonstrate they understand the special design features of an E2X® rocket by listing them and their design changes
- Students will successfully assemble and launch an Estes E2X® model rocket.

#### References

- *Estes Educator™ - Guide for Teachers and Youth Group Leaders*
- Estes Educator™ Website - [www.esteseducator.com](http://www.esteseducator.com)