Teacher's Guide

IMAGE Satellite Scale Model (One Fourth Actual Size)

Introduction

The construction of scale models of spacecraft has, historically, been an important engineering tool in designing spacecraft. Today, powerful 'CAD/CAM' software programs have become popular, but scale model building is still considered an important method of verifying satellite dimensions, tolerances and clearances.

Objective

The students will be able to construct a scale model of the IMAGE Satellite one-fourth of the original size.

Procedure

1) Students are given the scale drawing and the actual measurements.
2) Students are to determine the scale used in the schematic drawing.
3) Students are to determine the dimensions that are needed to construct a scale model one fourth of the original size.
4) Students determine the materials that will be necessary to construct the scale model.
5) Student may begin the construction with either the octagonal top and bottom, or the rectangular side panels:

i) Construct an octagonal panel and cut it out. Trace the second to save time.ii) Construct one rectangular side panel and cut it out.

iii) Trace the other seven and cut them out to save time.

For reasons of safety- again- only the teacher uses the utility knife. Students will need a lot of room to work. Remind the students that when they measure the diameter, the measurement must be from opposite vertices. Duct tape will help to hold the model together better than regular or masking tape.

6)Students construct the scale model.

7)Students will write a summary describing the process required to construct the scale model from the beginning, with the schematic drawing, and concluding with the steps necessary to finish the model.

Materials

—Compass, very big and/or a string and a nail to simulate a compass
—Ruler/ yardsticks
—Cardboard and /or wood
—Duct tape
—Spacecraft Dimension Worksheet
—Colored or regular aluminum foil
—Paper towel rolls or pipe cleaners
—Scissors or utility knives
Note: The teacher may want to be the only one to handle the utility knife for safet reasons.

Conclusions

Students apply concepts in mathematics to a real life event. Students enjoy the hands on activit and are very competitive in making sure that their satellite is the best and the most accurate. Students apply the concept of innovation in creating their scale model, and they are not willing to accept a model that is not constructed correctly. They persevere even when the task is difficult.