Case Details

Case Title:

Lift off!

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Grade Level(s):

Middle School

Subject(s):

Physical Science

Summary:

In light of global warming projections, Margarite & Marc decide to answer NASA's call for amateur scientists to design rockets which can orbit Earth or travel to another planet. They are up for the challenge to become Certified NASA Rocket Scientists . . . .

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Notes:

This is the third in a series of four cases addressing physical/earth science concepts in sixth-grade. See the next case in the series: Mars.

Learning Objectives:

1. Conduct research using textbooks, dictionaries, online encyclopedias and web sources to investigate: What is a force?; Why does a rocket have to overcome gravity?; What is gravity?; What is an atmosphere? How does a rocket "overcome" it?; What is an orbit?; How does something get into orbit?; What are satellites?; amateur; civilian; Homeland Security.
2. Prepare research reports on the above learning issues, giving complete definitions, citing sources of information, and explaining concepts in your own words.
3. Identify definitions and examples of Newton's Laws.
4. Recognize the scientific definition of pressure.
5. Write a paragraph describing observations during the Demo Launches in terms of Newton's Laws and using technical vocabulary (correctly) including "force," "gravity," and "trajectory."
6. Design and draw a scale model of a bottle rocket, complete with SI unit

measurements of size, water volume, and target PSI for launch.
7. Select materials and build a bottle rocket according to design specifications and using lab safety skills.
8. Cooperate with team to launch bottle rocket using lab/field safety practices.
9. Record & graph class launch data (PSI & time-in-air for each rocket).

National/State Standards:

Georgia Performance Standards Addressed:

S8CS1. Students will explore the importance of curiosity, honesty, openness, and skepticism in science. (NSES Content Standard A)

S8CS2. Students will use standard safety practices for all classroom laboratory and field investigations. (NSES Content Standard F)

S8CS3. Students will use computation and estimation skills necessary for analyzing data and following scientific explanations. (NSES Content Standard A)

S8CS4. Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities. (NSES Content Standard A)

S8CS5. Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters. (NSES Content Standards A, F, & G)

S8CS6. Students will communicate scientific ideas and activities clearly. (NSES Content Standards A & E)

S8CS9. Students will understand the features of the process of scientific inquiry. (NSES Content Standard A)

SCS10. Students will enhance reading in all curriculum areas (NSES Content Standards A, D, F, & G):

a. reading in all curriculum areas (e.g. technical texts in science)

c. building vocabulary knowledge

d. establishing context

S8P2. Students will be familiar with the forms and transformations of energy. (NSES Content Standard B)

S8P3. Students will investigate relationships between force, mass, and the motion of objects.

(NSES Content Standards B & D)

S8P5. Students will recognize characteristics of gravity, electricity, and magnetism as major kinds of forces acting in nature. (NSES Content Standards B & D)

a. Recognize that every object exerts gravitational force on every other object and that the force exerted depends on how much mass the objects have and how far apart they are.

S6E3. Students will recognize the significant role of water in earth processes. (NSES Content Standard D)

S6E4. Students will understand how the distribution of land and oceans affects climate and weather. (NSES Content Standard D)