Lift Off!

Purpose

Students will use models to illustrate processes that happen too quickly, are too vast to be changed deliberately, and are potentially dangerous.

Materials

For the teacher: chalk, chalkboard, antacid tablets, film canister with lid, water, goggles
For each student: goggles
For each group of 2 students: film canister with lid, water

Activity

A. Pre-Activity Preparation

Arrange for students to go outside during the activity.

B. Pre-Activity Discussion

1. Ask students to think about different kinds of models they have seen that represent certain objects or processes.
2. Discuss examples of models (e.g., Earth, solar system, animal and plant cells, etc.) and list the models mentioned on the chalkboard.
3. Ask students: "Why would scientists use models when studying different phenomena?"
4. Discuss with students why each of the models listed might have been made and used. Record students' ideas next to each model (e.g., they are used to represent a process or thing that happens too slowly, too quickly, on too small a scale to be observed directly, or is potentially dangerous).
5. Discuss with students how it might not always be feasible to study certain phenomena on a direct level. Explain that models become useful in these situations.
6. Ask students: "If we wanted to study how rockets lift off into space, what would be the best way to do it? Why?"
7. Discuss students' answers and explain how one logical way would be to build a model rocket.

C. Lift Off!

1. Ask students: "How does a rocket lift off into space?"
2. Discuss students' answers and inform them that they will make model rockets to investigate, on a much smaller scale, how rockets leave the ground.

(continued)

MEETING INDIVIDUAL NEEDS

Have students who need an extra challenge construct another model rocket using different materials or construct a model of a different real thing.

EXTENDING THE ACTIVITY

Show students the movie *October Sky*. This movie, based on a true story, is about a boy whose passion for building and improving his model rockets earns him a scholarship to college and a career with NASA.

Standards Link
6.1.2

Activity (continued)

3. Show students a film canister with a lid, water, and an antacid tablet and explain that these are the materials they will use to make their model rockets.
4. Give students the following directions for making their rockets: "Place half an antacid tablet into the canister. Quickly pour about five milliliters of water into the canister, replace the lid, and shake. Sit the rocket on the ground, lid facing down, back away, and wait to see what happens."
5. Divide students into groups of two. Distribute a pair of goggles to each student and a film canister with a lid and a small container of water to each group.
6. Take students outside to an open area. Tell them to wear their goggles at all times.
7. Distribute one antacid tablet to each group and instruct students to test out their rockets.
8. Monitor students as they test their rockets and encourage them to use different amounts of water and tablets in their trials. (This affects how high the rocket flies and how fast it moves.)
9. Distribute antacid tablets as students need them.
10. Ask students: "Why does your rocket lift off when the tablet is mixed with water?"
11. Discuss with each group how a chemical reaction takes place when the antacid tablet dissolves in the water. Explain that a gas is released during the reaction which "pushes" the lid off and therefore elevates the canister.
12. Ask students: "How do you think real rockets lift off, compared to your model rockets?"
13. Discuss how real rockets work, explain that the same principles apply, but on a much larger scale. Discuss how studying a real rocket would not have been possible for the class, but studying a model was.

Classroom Assessment

Basic Concepts and Processes

At the conclusion of the activity, ask students questions such as the following:

📖 Can you think of some reasons why it would be easier to make changes to a model, rather than a real rocket, when performing test trials?

What kinds of changes did you make to your rocket?

📖 How might aerospace engineers make changes to real rockets?