



Lesson Plan: The Relationship Between Science and Technology

Overview

Students will learn how technology can help scientists solve a problem. One of the challenges scientists face with any spacecraft is attitude control. Students will be introduced to the problem of attitude control in space and two different ways scientists address it.

Objectives

Students will

- Discuss the technology(ies) that powers satellites and enable(s) them to move through space
- Be introduced to the concept of “attitude control” and the role technology has in the design of spacecrafts
- Engage in an angular momentum experiment

Assessment Strategies

Facilitate student discussion to recommend the best way that scientists can get the Swift satellite to change directions. See [Teachers Notes](#) PDF Document for elaboration.

Grade Level: 5-8

Suggested Time

30 minutes

Multimedia Resources

- [Gamma-ray Burst Theories](#) QuickTime Video

Materials

- A swivel chair
- A gyroscope
- A bicycle wheel with handles (see [Teachers Notes](#) PDF Document for an example of this, p. 3)

Note: Most physics teachers at your high school will have this bicycle wheel with handles.

Note: YouTube often contains videos on angular momentum as an alternative exercise.

Procedures

See [Teachers Notes](#) PDF Document for elaboration.

Part 1: Ask students how satellites change orientation in space. After discussing various ways it can be done, show Video 4:

[Gamma-ray Burst Theories](#) QuickTime Video

[Time – 4:11]. Then, ask them questions regarding role of technology and movements of Swift satellite.

Part 2: Explain the concept of attitude. Then, by using a swivel chair, illustrate the problem that the scientists face with getting a satellite to change its pointing direction.

Part 3: See [Teachers Notes](#) PDF Document for further elaboration. First, ask students what might solve the problem. Explain using thrusters as one possible solution and the disadvantages of using thrusters. Next, explain the second possible solution that momentum wheels can be used to change the direction. Facilitate two students demonstrate angular momentum: one student is rotating the bicycle wheel, while the other student is holding the wheel on a swivel chair. Further, explain the twisting motion, torque.