

## **NSTA Symposium: Force and Motion: Stop Faking It!** **Thursday, November 10, 2005**

**8:00 AM – 8:15 AM**

**Registration**

**8:15 AM – 8:35 AM**

**Welcome, Introductions, Goals for the Symposium**

Al Byers, Assistant Executive Director of Government Partnerships and e-Learning, NSTA

Claire Reinburg, Director NSTA Press, NSTA

Flavio Mendez, Symposia and Web Seminars Program Manager, NSTA

- About NSTA Symposia
- Agenda/Goals
- Forms/Credit Info/Logistics/Introductions

Dr. Bill Robertson, Author, Force and Motion: Stop Faking It!

**8:35 AM – 9:05 AM**

**Constructivism, The Learning Cycle, and Understanding Science**

**9:05 AM – 9:35 AM**

**Newton's First Law: Not as Simple as People Think**

**9:35 AM – 10:05 AM**

**Describing Motion: Position, Speed, Velocity, and Acceleration**

**10:05 AM – 10:15 AM**

**Mid-Morning Break**

**10:15 AM – 10:45 AM**

**Newton's Second Law: Changes in Motion and What Causes It**

**10:45 AM – 11:15 AM**

**Newton's Third Law: Action and Reaction are Not Cause and Effect**

**11:15 AM – 11:35 AM**

**NSTA's Science Object: Force and Motion**

**11:35 AM – 12:00 PM**

**Final Words**

- Post-assessment form
- Evaluation form/Survey
- NSTA Web Seminars
- Raffle of door prizes

## Learning Outcomes:

- Participants will be able to define constructivism in everyday terms and will be able to explain the main stages of the Learning Cycle and how one can use it to develop classroom procedures that incorporate constructivism.
- Participants will be able to explain Galileo's reasoning that led to a formulation of Newton's first law, and be able to apply Newton's first law to everyday situations.
- Participants will be able to define speed, average speed, velocity, instantaneous velocity, and acceleration; and will be able to identify approximate values of these quantities in physical situations. Participants will be able to calculate average speeds.
- Participants will be able to explain what the letters  $F$ ,  $a$ , and  $m$  represent in the mathematical formula that describes Newton's second law and will be able to apply Newton's second law in simple physical situations.
- Participants will be able to provide a thorough definition of Newton's third law and be able to apply it in physical situations.

## Standards Addressed:

### Physical Science

#### CONTENT STANDARD B:

- MOTIONS AND FORCES
  - The motion of an object can be described by its position, direction of motion, and speed. That motion can be measured and represented on a graph.
  - An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.
  - If more than one force acts on an object along a straight line, then the forces will reinforce or cancel one another, depending on their direction and magnitude. Unbalanced forces will cause changes in the speed or direction of an object's motion.

## Science Teaching Standards

### TEACHING STANDARD B: Teachers of science guide and facilitate learning.

#### In doing this, teachers

- Focus and support inquiries while interacting with students.
- Orchestrate discourse among students about scientific ideas.
- Challenge students to accept and share responsibility for their own learning.
- Recognize and respond to student diversity and encourage all students to participate fully in science learning.
- Encourage and model the skills of scientific inquiry, as well as the curiosity, openness to new ideas and data, and skepticism that characterize science.