

Experience Physics

Christopher J. Moore
University of Nebraska, USA

Experience Kinematics: Using Real Data to Understand Motion

Long trails terminated by heavy rocks called “sailing stones” were discovered along smooth valley floors in Nevada, California, and the surface of Mars. How are these heavy rocks moving across what seems to be desert? In this workshop, you'll learn what productive representations your students can use to assist them in bridging phenomena, words, pictures, and mathematics in kinematics.

Can your students solve complex kinematics problems using pictures, graphs, and deep understanding?

They will.

Can they use real data from recently published journal articles to answer authentic questions in kinematics?

They will.

Can you assess them based on their performance with real data, instead of rote algebra?

You will.

It's Not Just Algebra: Assessing Student Thinking in Physics Problem-Solving

Good problem-solving in physics is more than algebraic manipulation. Students can learn and be assessed on problem-solving through multiple avenues, including graphs, representations, and more. Through group activities and discussion, attendees will learn what productive representations students can use to assist them in bridging phenomena, words, pictures, and mathematics in the context of kinematics, force, and energy.

For example, we will discuss activities and assessments where students solve complex kinematics and energy problems using pictures, graphs, and real data.

Based on research on expert-like problem-solving, the framework attendees will work through takes a three-dimensional approach, requiring science practices and crosscutting concepts that go deeper than the rote algebraic manipulation often aligned with “using mathematics,” and will include examples of assignments, student work, and assessment rubrics.