Introduction

The following tasks were designed to supplement the first two units of an introductory high school physics class. These units cover Kinematics and Dynamics. Kinematics is the study of the motion of an object and Dynamics is the application of Newton’s Laws. Each task addresses one or more standards that are drawn from the NGSS and the AP Physics-1 standards. Two of the standards are process standards which describe processes that reach beyond the physics classroom and into other parts of a student’s educational career and life. The ten authentic tasks ask students to demonstrate skills that are aligned with the standards and are assessed using a rubric aligned with the task and standards. Many of the tasks can be modified to be used as formative or summative assessments. Below is the list of standards and tasks. Each task is labeled with the standard it addresses.

Standards

The students will be able to:

1. Express the motion of an object using narrative, mathematical, and graphical representations.
2. Design an experimental investigation.
3. Apply Newton’s 2nd Law to predict the motion of an object.
4. Identify the forces acting on an object.
5. Communicate clearly and effectively through writing. (Process Standard)
6. Effectively use technology to analyze data. (Process Standard)

Tasks (Standard that is addressed)

1. Organizing Data into Tables (Standard 6) Formative Assessment to Process Standard
2. Representing Data Graphically (Standard 6) Formative Assessment to Process Standard
3. Toy Car Discovery Lab (Standards 1, 2, 5, 6) Formative Assessment to Process Standard
4. Graph Matching (Standard 1)
5. Kinematics Story (Standards 1, 5)
6. Car Crash Physics (Standards 1, 2, 6) Process Standard Summative Assessment
7. Free-Body Diagrams (Standard 4)
8. Catch Phrase (Standard 4)
9. Forces Table (Standard 4)
10. Atwood Machine (Standard 1, 3, 4)