

PHYSICS LAB



DESCRIPTION: Students will compete in lab activities in the areas of **linear motion**.

EVENT PARAMETERS: Students may use any non-programmable calculator. No other resource material may be used unless provided by the event supervisor.

A TEAM OF UP TO: 2

APPROXIMATE TIME: 50 Minutes

THE COMPETITION: The competition will consist of experimental tasks and questions related to motion along non-rotational trajectories in one or two dimensions. Some mathematical relationships may be provided the supervisor, but students are expected to know the basic concepts, definitions and mathematical statements, involved. They are expected to know: the basic equations of motion involving constant acceleration, Newton's Laws of Motion, the basics of describing motion, momentum, impulse, work, power, kinetic energy, gravitational potential energy, potential energy stored in springs, work done by a constant friction force, the conservation of momentum and conservation of mechanical energy (including energy lost due to friction). All answers must be in SI units (such as watt, joule, newton, kilogram, meter, and second) with proper significant figures.

SAMPLE STATIONS:

- 1 Analyze motion of a cart or a steel ball on an inclined plane to determine acceleration and/or velocity at various locations.
- 2 Analyze a graph of linear motion to determine the initial velocity and/or launch angle and/or x and y-component velocities at various locations and/or times.
- 3 Analyze the collision of two carts to determine the velocity change of each cart, impulse on carts, average force during collision and/or kinetic energy loss.

Where feasible, supervisors are encouraged to provide students with brief demonstration(s) of data collection by computer and/or calculator sensors/probes followed by distribution of previously prepared data sets. If used, data will be presented to students in a tabular and/or graphic format(s) and students will be expected to analyze and/or interpret the data.

SCORING: Points will be awarded for correct answers, measurements, calculations and analysis of data. Supervisors are encouraged to provide a standardized form on which students can show all measurements and calculations. Ties will be broken using a designated task(s) or question(s) that may be noted on the student answer form.

National Science Education Standards: Physical Science CONTENT STANDARD B: As a result of their activities in Grades 9-12, all students should develop an understanding of interactions of energy and matter.

