

## PHYSICS LAB

1. **DESCRIPTION**: Students will compete in lab activities in the areas of work, energy and power.

**A TEAM OF UP TO:** 2

**APPROXIMATE TIME**: 50 Minutes

2. **EVENT PARAMETERS**: Students may bring and use any non-programmable calculator. No other resource materials or electronic devices may be used unless provided by the event supervisor.
3. **THE COMPETITION**: The competition will consist of experimental tasks and questions related to **energy and alternative energy**.
  - a. Students are expected to know concepts, definitions and basic equations for work, kinetic energy, gravitational potential energy, spring potential energy, power, electric energy stored in capacitors, electrical power, heat produced in electrical resistance, work done by fluids, fluid power, rotational work, rotational power, efficiency of conversions based on work, energy, and power.
  - b. All answers are to be provided in SI units (such as Watts, Joule, Newton, Kilogram, meters, and seconds) with proper significant figures. The event supervisor will provide any equations beyond those listed above.
  - c. Students may be asked to collect data using probeware that has been provided, set-up and demonstrated by the supervisor.
4. **SAMPLE STATIONS**: (This list is not intended to be an exhaustive list of possible stations.)
  - a. Electric Energy to Mechanical Energy (Motors)
  - b. Electrical Energy to Electrical Energy (Transformers)
  - c. Solar Energy to Electric Energy (Photovoltaic Cells)
  - d. Gravitational Energy to Kinetic Energy
  - e. Rotational Energy to Gravitational Potential Energy
  - f. Pressure Volume Change to Kinetic and/or Gravitational Potential Energy
  - g. Spring Energy to Kinetic and/or Gravitational Potential Energy
  - h. Wind Energy to Electric Energy
  - i. Energy stored in Capacitor to Mechanical Energy
  - j. Efficiency of collisions (e.g., bouncing ball)
5. **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 designated tasks or questions 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.

