

### SHOCK VALUE

1. **DESCRIPTION:** Students will demonstrate their understanding of electricity, magnetism and simple electrical devices.

**A TEAM OF UP TO:** 2

**APPROXIMATE TIME:** 50 minutes

2. **EVENT PARAMETERS:**

- a. Students are allowed to use any notes and/or calculators. Notes must be secured in a 3-ring binder of any size, so that regardless of orientation nothing falls out. Calculators must not have external probes or sensors of any type attached to them.
- b. The event supervisor must provide any needed measurement equipment such as multimeters or probes. Students may bring their own basic multimeters for use in place of event supervisor provided ones.

3. **THE COMPETITION:**

- a. The competition must consist of both hands-on tasks and questions related to electricity, magnetism and electrical devices such as light bulbs, batteries and motors. **25-50%** of the score must be from the practical portion (hands-on tasks), and **50-75%** must be from the theoretical portion (written questions). **No single question may count for more than 10% of the score.**
- b. Supervisors are encouraged to use measurement equipment (e.g., computer or calculator sensors/probes, multimeters, etc.) wherever possible or provide students with data sets collected by equipment following demonstration of the data collection. If used, data must be presented in a tabular and/or graphic format and students will be expected to interpret the data.
- c. The event supervisor may provide some mathematical relationships, but the students are expected to know and understand the concepts outlined below. The competition must consist of at least one task/question from each of the following areas:
  - i. Basic electrical DC circuit theory (e.g., concepts of voltage levels, current flow and direction, electrical pathways, volts, amperes, ohms, schematics, ohms law, **history**)
  - ii. Basic electrical device concepts (e.g., battery polarity, parallel vs. series wiring of components, light bulb and motor connections, dry vs. wet cells). No semiconductors will be used
  - iii. Basic electrical circuit construction/analysis (e.g., switches, power source, voltmeter measurements, light bulb/motor connections, 'kitchen' built batteries)
  - iv. Basic magnetism concepts (e.g., North and South poles, Earth's magnetic field, electromagnet principles, magnetic vs. nonmagnetic materials, magnet shapes/types)
  - v. Basic magnetic applications (e.g., use of a compass to determine directions/poles of a magnet, operation of an electromagnet, use of magnets in motors)
- d. **Historical items are limited to items related to named SI units (e.g., namesakes, related laws).**
- e. Topics that must not be included in the competition are: semiconductors, AC circuit theory and devices, capacitors, inductors, **transformers, and non-linear devices.**
- f. **Light Emitting Diodes (LEDs) may be used in the practical portion as a light bulb equivalent only.**

4. **SCORING:**

- a. Points will be awarded for correct answers and/or proper technique.
- b. Ties will be broken using a designated task or question(s), **which will be the same for all teams and will be identified before all periods.**

**Recommended Resources:** All reference and training resources including the **Chem/Phy Sci CD (CPCD)** are available on the Official Science Olympiad Store or Website at <http://www.soinc.org>