

## SHOCK VALUE

1. **DESCRIPTION:** Students will compete in activities involving basic 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 3-hole punched and 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. 50% of the score must be from the practical portion (hands-on tasks/applications), and 50% must be from the theoretical portion (written questions).
- 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)
  - 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. Topics that must not be included in the competition are: semiconductors, AC circuit theory and devices, capacitors, inductors.



4. **EXAMPLES OF SHOCK VALUE STATIONS/ QUESTIONS:**

- a. The Event Supervisor provides circuit components including wires, batteries and a light bulb. Students will be asked to connect the components in such a way that that the light bulb shines the brightest it can.
- b. Students may be asked to draw a diagram of this circuit and label it and give a description of why this is the optimal configuration of this circuit.

5. **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). The event supervisor will identify the tie breaker question(s) or task(s) on the answer form provided to the students at the beginning of the competition period. If more than one competition period is used, the tie breaker(s) will be the same for all periods.

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