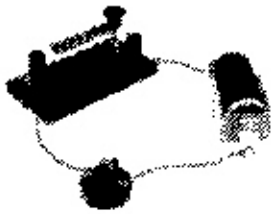
SHOCK VALUE

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 a non-programmable calculator. Computers are not allowed. Each team may bring one 8.5" x 11" two-sided page of notes that contain information in any form from any source.
   b. The event supervisor will provide any needed equipment.

3. **THE COMPETITION**:
   a. The competition will consist of hands-on tasks and questions related to electricity, magnetism and electrical devices such as light bulbs, batteries and motors. Teams should be able to describe that electrical current in a circuit can produce thermal energy, light, sound and/or magnetic forces and trace how electrical current travels by creating a simple electric circuit that will light a bulb.
   b. Supervisors are encouraged to use equipment (e.g., compasses, voltmeters, etc.) wherever possible or provide students with data sets collected by equipment following demonstration of the data collection. If used, data will 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:
      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).

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. Students will also draw a diagram of their circuit and be able to label and give a description of why this configuration is the optimal one.
   b. Students may be asked to connect the components supplied in such a way that the light bulb(s) light in a series or parallel circuit.
   c. Students may be asked to draw a diagram of this circuit and label it and give a description of why this in 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.