

# Trial/Pilot Event

Contact the organizers of your tournament to find out what trial/pilot events will be held.

## CIRCUIT LAB

1. **DESCRIPTION:** Students will compete in activities involving knowledge of direct current (DC) Electrical Circuits. The event may include hands-on experimentation and/or problem solving. **A typical event will consist of both a theoretical portion (e.g., questions requiring knowledge in circuit analysis techniques such as Ohm's Law) and a practical portion (e.g., questions requiring knowledge in the use of equipment such as a multimeter).**

**A TEAM OF UP TO:** 2

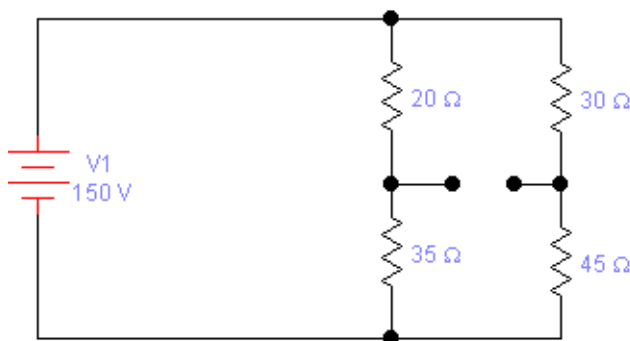
**APPROXIMATE TIME:** 50 minutes

2. **THE COMPETITION:**

- a. The competition will consist of tasks and questions related to DC electrical circuits. The event supervisor will provide a sheet of any needed mathematical relationships.
  - i. DC circuits concepts, definitions and principles (e.g., voltage and current sources, EMF, resistance, and applications of series and parallel circuits)
  - ii. DC circuit analysis theory (e.g., Ohm's Law, parallel and series resistors, Kirchhoff's Laws)
  - iii. DC circuit analysis practice (e.g., the use of voltmeters, ammeters, ohmmeters and multimeters, resistor color codes and their uses in series and parallel circuits, wheatstone bridges)
  - iv. Intermediate DC circuits concepts, definitions and principles (e.g., electrical SI base and derived units, capacitance, ideal diodes, electron current)
- b. Supervisors are encouraged to use measurement equipment (e.g., computer and/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 will be presented in a tabular and/or graphic format and students will be expected to interpret the data.
- c. Students are only allowed to use a non-programmable calculator. **Notes, books, or computers are not allowed. The event supervisor will provide any needed measurement equipment such as multimeters or computer probes.**

3. **EXAMPLES OF CIRCUIT LAB STATIONS/ QUESTIONS:**

- a. The Event Supervisor provides a pre-assembled circuit consisting of resistors in parallel and/or series and one or more DC voltage sources. Students will be asked to determine electric potential difference between specified locations within the circuit, currents, resistance, and power dissipation in different parts of the circuit.
- b. Given the circuit diagram below, students are asked to calculate the current, voltage and/or power in various labeled components.



4. **SCORING:** Points will be awarded for correct answers and/or proper technique. 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

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**National Science Education Standard:** 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.

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