

MY SO STEM SHOWDOWN

CONTENT, RECOMMENDED MATERIALS & SCORING

STEM SHOWDOWN CONTENT

The STEM Showdown will consist of a series of online multiple-choice questions. Middle school (Grade 6-9) Participants in both Middle School (Grade 6-9) and High school (9-12) will answer questions about electricity and magnetism. A Showdown participant will have 50-minutes to answer as many questions as possible.

The content and skills for both middle school (Grade 6-9) and high school (Grade 9-12) covered by the Showdown this month are as follows:

1. Historical perspective of the electricity discoveries made by Ampere, Coulomb, Kirchhoff, Volta, Ohm, Tesla, & Faraday
2. Properties of electric charges/fields, sources/hazards of static electricity, Coulomb's Law, capacitance
3. Direct current (DC) characteristics, sources, uses, simple circuit diagrams, DC hazards
4. Alternating current (AC) characteristics, sources, uses, AC hazards
5. Concepts and units of current, voltage, resistance, power, energy, and using Ohm's law
6. Magnetic poles/fields, electromagnets, transformers, motors/generators, right-hand rule
7. Electrical control devices including 3-way light switch circuits
8. Simple calculations, constructions, and configurations of a circuit and individual components
9. Fundamental characteristics and operation of a light emitting diode (LED)
10. Simple circuit analysis using Kirchhoff's Voltage & Current Laws

Additional content unique to high school (Grade 9-12) covered by the Showdown this month includes:

1. Basic digital logic and digital logic operations
2. Basic electrical characteristics of silicon PN junctions (e.g., Diodes, PNP, NPN)
3. Basics and applications of Operational Amplifiers (OpAmps)

Topics not included at either level on this month's STEM Showdown include:

1. semiconductors (beyond those listed above)
2. AC circuit theory
3. Inductance
4. calculations involving direct use of calculus and/or differential equations
5. non-linear devices, three-state logic gates, & sequential logic
6. 3-Phase Power and oscilloscopes

Recommended Materials

- Each Showdown participant will need a computer with internet access, scratch paper, something to write with, and a stand-alone calculator
- Showdown participants may use resources available to help them answer the questions asked during the Showdown. These resources could be a collection of notes on the topics listed below, copies of magazine or journal articles, a textbook, or any combination of these items.

Scoring

- High score wins.
- Ties will be broken using:
 - a. The time it takes to complete the test; and
 - b. The number of test questions attempted.

Additional Resources

- The Science Olympiad Store (store.soinc.org) carries the Chem/Physics CD and National Test Packets
- Other resources can be found on the Reach for the Stars (middle school) and Astronomy (high school) Event Pages at soinc.org.