

# 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 Severe Weather and Storms content and skills covered by the Showdown this month are as follows:*

1. Environmental conditions leading to severe weather including large-scale circulation patterns, jet streams, atmospheric stability, and boundaries (e.g., fronts & drylines)
2. Clouds: identification & interpretation of cloud types, related to severe weather events
3. Severe thunderstorms: types (e.g., multicell & supercell), characteristics, structure & life cycles
4. Precipitation from severe storms, including the relationship of precipitation intensity, duration, and frequency to impacts of heavy precipitation
  - a. Solid precipitation (e.g., snow, sleet, hail) & impacts (e.g., avalanches, travel hazards, whiteouts)
  - b. Liquid precipitation (e.g., freezing rain/drizzle, heavy rain) & impacts (e.g., debris flows & mudslides and flash, river, & urban flooding)
  - c. State and National Tournaments - Intensity-duration-frequency (IDF) curves and return periods for precipitation events
5. Squall lines & mesoscale convective complexes
6. Straight-line winds: downdrafts, downbursts, microbursts, macrobursts, gust fronts, derechos, downslope winds
7. Electrification of clouds, all types of lightning strikes and lightning direction finders/systems
8. Tornadoes & Waterspouts: life cycles, climatology, characteristics, structure, Fujita & E-Fujita Scales
9. Severe winter storms & characteristics: blizzards, nor'easters, lake effect snowstorms & freezing rain
10. Hurricanes, Typhoons and Cyclones: life cycles, climatology, characteristics, structure, origin/distribution, Saffir-Simpson Scale & storm surge
11. Hazards from all of the above (3 – 10)
12. Observation technologies, including surface observation networks (e.g., ASOS, high-resolution mesonets), radiosondes, buoys, Doppler radar, aircraft, satellite (e.g., water vapor, visible, & IR) m. Types of data used to forecast & monitor severe events, surface & upper air (850, 700, 500, & 300 mb) maps, computer model predictions & Doppler radar images, including interpretation of severe features (e.g., such as bow echo, tornadic vortex signature (TVS), hook echo, & debris ball)
13. Weather safety: NOAA warnings/watches, dependable weather information sources for preparedness & during severe weather
14. Severe Weather Events & Cases - 2020 Hurricanes plus Dorian, Florence, Harvey, Irma, Maria, Michael; 2020 & 2021 Blizzards plus U.S. Mar./Apr. 2019; 2020 & 2021 Floods plus 2019 Midwest U.S.; 2020 & 2021 Tornado outbreaks plus U.S. Mar./Apr. 2019

## **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](http://store.soinc.org)) carries the Meteorology CD and Bio/Earth Science CD.
- Other resources can be found on the Meteorology Event Page at [soinc.org](http://soinc.org).