



METEOROLOGY B - EVERYDAY WEATHER

See General Rules, Eye Protection & other Policies on www.soinc.org as they apply to every event.



1. **DESCRIPTION:** Participants will use scientific process skills involving qualitative and quantitative analyses to demonstrate an understanding of the factors that influence Everyday Weather through the interpretation of meteorological data, graphs, charts and images.

A TEAM OF UP TO: 2

APPROXIMATE TIME: 50 minutes

CALCULATOR: Class II

2. **EVENT PARAMETERS:**

- Each team may bring one three-ring binder of any size containing information in any form and from any source attached using the available rings. Sheet protectors, lamination, tabs and labels are permitted.
- Each team may bring two Class II calculators.
- If the event features rotation through a series of stations, no material may be removed from the binder during the event.
- Students are expected to have a U.S. map with the state names in their binder.

3. **THE COMPETITION:**

- The event may be either in a written exam format or teams may move from station to station, with the length of time at each station predetermined and announced by the Event Supervisor. Participants may not return to stations but may change or add information to their original answers while at other stations.
- At least fifty percent (50%) of the questions shall be based upon interpretation of weather data displayed in maps, graphs, images, photographs, charts, and/or tables to analyze Everyday Weather.
- The questions will address the following Everyday Weather topics:
 - The atmosphere: structure including temperature profiles of the troposphere and stratosphere, including inversions, thickness, composition and atmospheric pollutants
 - Incoming solar radiation (insolation) & seasons: atmospheric influences on insolation, daily (diurnal) & seasonal temperature patterns, Earth's revolution, rotation and axial tilt
 - Properties of Water: specific heat, density, sensible & latent heat along with effects on the weather
 - Atmospheric moisture: relative humidity, dew point & wet bulb temperatures, water vapor, atmospheric rivers, virga, clouds, dew, frost & fog
 - Clouds:
 - formation of high, middle & low clouds and clouds with vertical development
 - cloud types limited to the following: cirrocumulus, cirrus, cirrostratus, altostratus, nimbostratus, stratus, cumulus, stratocumulus, cumulonimbus, lenticular/cap, orographic and pyrocumulonimbus clouds
 - Fog types and formation limited to: advection, frontal, freezing (ice), precipitation, radiation, steam & valley
 - Precipitation:
 - intensity and how various types form, including: snow, snow grains, rain, drizzle, ice pellets (sleet), hail, graupel, freezing rain, & freezing drizzle
 - precipitation hazards: training thunderstorms, flooding (flash & river) and storms (snow & ice)
 - Atmospheric optical effects limited to: sunrise, sunset, sundogs, rainbows, halos, crepuscular rays, green flashes, auroras & mirages
 - Atmospheric pressure: horizontal & vertical gradients, troughs & ridges, cyclones (lows) & anticyclones (highs) with their circulations, including Coriolis Effect & the effect of friction
 - Origin and characteristics of air masses:
 - maritime, continental, tropical, polar, Arctic
 - temperature, density, moisture & atmospheric stability
 - Types of fronts and their characteristics: warm, cold, occluded (complex) & stationary as well as dry line boundaries
 - Local winds: Chinook & Santa Ana winds, sea, lake & land breezes, and valley & mountain breezes
 - Effects of topography on wind & precipitation patterns
 - Storms and other hazardous weather not considered severe
 - cyclogenesis & cyclolysis
 - permitted types of weather events: Alberta Clippers, panhandle hook, nor'easters, Lake Effect snowstorms, ice storms, winter storms, blizzards, thunderstorms (not severe), fire weather, heat waves, drought, dust storms, & dust devils



- (3) NOT permitted weather events considered severe, such as: tropical storms, hurricanes, typhoons, severe thunderstorms, derechos, downbursts, tornadoes & waterspouts
- xv. Weather instrumentation & technology: thermometers, hygrometers, sling psychrometers, anemometers, barometers, satellite imagery (visible, infrared & water vapor), radiosondes, rawinsondes, Doppler radar, wind profilers, rain gauges, & snow boards
- xvi. Weather data: meteograms, radiosonde soundings, station models & METAR observations
- xvii. Interpretation of surface weather maps: highs, lows, fronts, dry lines, station models, isobars, isotherms, isohyets, & areas of precipitation
- xviii. Upper air charts: 850, 700, 500 & 300 mb, location of jet streams, including amplitude and width of ridges & troughs
- xix. Weather forecasting:
- (1) use of weather forecast maps, isolines/isopleths, Doppler radar images, model predictions, radiosonde soundings & Stueve diagrams
 - (2) National Weather Service (NWS) non-severe forecast products: (e.g., Zone forecasts, Public Information Statements, Special Weather Statements)
 - (3) hazard maps, advisories, watches and warnings (e.g., dense fog, flooding, high winds, associated with non-severe weather).
 - (4) National Only: Skew-T/Log p diagram and Lifting Condensation Level (LCL)
- xx. Temperature indices: wind chill, heat index, and heating & cooling degree days
- xxi. Nationals only - Space Weather and its impact on Earth's atmosphere: limited to solar winds, coronal mass ejections, solar cycles and sunspots, solar radiation storms, and geomagnetic storms

4. **SCORING:**

- a. High score wins.
- b. Points will be awarded for the quality of responses, the quality of supporting reasoning, and use of scientific techniques.
- c. Point values of each question or section may be specified.
- d. Preselected questions/sections will be used as tiebreakers.

Recommended Resources: The Science Olympiad Store (store.soinc.org) carries a variety of resources to purchase; other resources are available on the Event Pages at soinc.org.

In partnership with the National Oceanic and Atmospheric Administration (NOAA) and the North American Association for Environmental Education (NAAEE)