

MY SO STEM SHOWDOWN

CONTENT, RECOMMENDED MATERIALS & SCORING

STEM SHOWDOWN CONTENT

The STEM Showdown will consist of a series of online multiple-choice questions. Participants at both levels will be expected to demonstrate their knowledge of rocks and minerals. A Showdown participant will have 50 minutes to login and answer as many questions as possible.

The Rocks & Minerals content and skills covered by the Showdown this month are as follows:

1. Minerals:

- Identification - specimens or images used should show observable properties. Where observable properties are insufficient to identify a specimen, other diagnostic characteristics will be provided
- Physical Properties - color, hardness, luster, streak, cleavage/fracture, density/specific gravity/ heft, diaphaneity, tenacity
- Other properties - reaction with acid, fluorescence, magnetism, smell, taste, double refraction, piezoelectricity, radioactivity
- Mineral habit - limited to acicular (needlelike), bladed, botryoidal, cubic, dendritic, dodecahedral, doubly terminated, druzy, geodic, hexagonal, hopper, massive, micaceous, octahedral, pisolitic, prismatic, radiating, rosette, stalactitic, twinning, and tabular
- Chemical composition
- Polymorphs (e.g. diamond/graphite and orthoclase/microcline)
 - Division C Only - Solid solution series (e.g. feldspar ternary diagrams)
- Classification - mineral families based on composition. (see Rock and Mineral List)
 - Mineral groups (e.g. feldspars, garnet, tourmaline) - similarities of chemical composition and shared properties
 - Division C Only - Silicate classifications and their structures limited to the following groups: isolated tetrahedra (nesosilicates), chain silicates (inosilicates), sheet silicates (phyllosilicates) and framework silicates (tectosilicates)
- Methods of formation (e.g. hydrothermal, crystallization from magma, evaporites, alteration under heat & pressure)
- Minerals associated with rock-forming environments (e.g. evaporite minerals in sedimentary settings; mafic minerals in oceanic crust; minerals that form under metamorphic conditions)
- Bowen's Reaction Series - relationship between mineral crystallization and temperature in magma
- Economic importance and uses of minerals (e.g. ores, industrial uses, jewelry)

2. Rocks

- Identification - specimens or images used should show observable characteristics. Where observable characteristics are insufficient to identify a specimen, other diagnostic characteristics will be provided (e.g.; mineral composition of fine-grained igneous rocks)
- Classification - igneous, sedimentary, and metamorphic including observable diagnostic characteristics that facilitate classification (e.g. glassy or vesicular texture in igneous; rounded grains, fossils, or layers in sedimentary; and foliation or banding in metamorphic)

- Igneous:
 - Textures - including but not limited to aphanitic (fine-grained), glassy, vesicular, porphyritic, pyroclastic, phaneritic (coarse-grained), pegmatitic
 - Composition and essential minerals - felsic, intermediate, mafic, ultramafic
 - Intrusive and extrusive environments - including but not limited to batholith, dike, sill, volcanic neck, lava flow, pyroclastic flow, laccolith
 - Relationship between textures and environments of formation (e.g. intrusive/plutonic, extrusive/volcanic and relative rates of solidification.)
 - Sedimentary:
 - Textures - limited to clastic (detrital), chemical, and biochemical/organic
 - Composition and essential minerals
 - Grain sizes (e.g. clay, silt, sand, pebble, cobble, boulder), sorting, and shape
 - Relationship between textures and composition to environments of deposition
 - Environments of deposition - including, but not limited to alluvial fan, delta, river/stream, swamp, floodplain, beach, shallow marine, deep marine
 - Primary sedimentary structures (e.g. plane bedding, cross-bedding, ripple marks, mud cracks, graded bedding, fossil tracks & trails) and their implications about depositional processes
 - Metamorphic:
 - Textures - foliated and non-foliated
 - Mineral composition
 - Protoliths (parent rocks)
 - Regional and contact metamorphism
 - Grade of metamorphism and metamorphic index minerals (e.g. chlorite, epidote, garnet, staurolite, kyanite, sillimanite)
 - Division C Only - Relationship of temperature, pressure, depth to types of metamorphism and metamorphic facies (e.g. hornfels, zeolite, greenschist, amphibolite, granulite, eclogite) based on interpretation of graphs and charts
 - Division C Only - Environments of metamorphism in the context of plate tectonics - regional metamorphism and mountain building at convergent continental-continental boundary; blueschist and eclogite formation in subduction zones; greenstone/greenschist formation from basalt or gabbro at ocean crust divergent boundaries
 - Rock Cycle – emphasis on the geologic processes that form rocks (e.g. melting and solidification; uplift, erosion & deposition; burial, compaction & cementation; heat & pressure resulting in recrystallization & deformation)
 - Economic importance and uses of rocks
3. Identification and specifics about Rocks & Minerals will be limited to the following:
- Minerals
 - Borate Family
 - Ulexite
 - Carbonate Family
 - Aragonite
 - Azurite
 - Calcite
 - Dolomite
 - Malachite
 - Rhodochrosite
 - Native Element Family
 - Copper
 - Diamond
 - Gold
 - Graphite
 - Silver
 - Sulfur

- Halide Family
 - Fluorite
 - Halite
- Oxide/Hydroxide Families
 - Corundum
 - Goethite/Limonite
 - Hematite
 - Magnetite
 - Pyrolusite
 - Rutile
 - Zincite
- Phosphate Family
 - Apatite Group
 - Pyromorphite
 - Turquoise
 - Vanadinite
- Sulfate Family
 - Barite
 - Celestite
 - Gypsum 4 varieties:
 - Alabaster (massive)
 - Satin Spar (fibrous)
 - Selenite (crystalline)
- Sulfide Family
 - Bornite
 - Chalcopyrite
 - Galena
 - Pyrite
 - Sphalerite
 - Stibnite
- Silicate Family
 - Apophyllite
 - Beryl
 - Epidote
 - Kaolinite
 - Kyanite
 - Olivine
 - Quartz varieties:
 - Aventurine
 - Agate
 - Amethyst
 - Chalcedony
 - Citrine
 - Jasper
 - Milky Quartz
 - Opal
 - Rock Crystal
 - Rose Quartz
 - Smoky Quartz
 - Sodalite
 - Staurolite
 - Stilbite
 - Talc
 - Topaz

- Tourmaline Group
 - Willemite
 - Zircon
- Amphibole Group
 - Actinolite
 - Hornblende
 - Tremolite
- Feldspar Group
 - Plagioclase feldspars
 - Albite
 - Labradorite
 - Potassium feldspars
 - Amazonite
 - Orthoclase/Microcline (pink)
- Garnet Group
 - Almandine
- Mica Group
 - Biotite
 - Lepidolite
 - Muscovite
- Pyroxene Group
 - Augite
 - Rhodonite
 - Spodumene
- Rocks
 - Igneous Rocks
 - Andesite
 - Basalt
 - Diorite
 - Gabbro
 - Granite
 - Obsidian
 - Pegmatite
 - Peridotite
 - Pumice
 - Rhyolite
 - Scoria
 - Syenite
 - Tuff
 - Sedimentary Rocks
 - Banded Iron
 - Bauxite
 - Breccia
 - Chert
 - Conglomerate
 - Diatomite
 - Dolostone
 - Rock Salt (Halite)
 - Rock Gypsum
 - Shale
 - Coal varieties:
 - Anthracite
 - Bituminous
 - Lignite

- Limestone varieties
 - Chalk
 - Coquina
 - Fossil Limestone
 - Oolitic Limestone
 - Travertine
- Sandstone varieties:
 - Arkose
 - Greywacke
 - Quartz Sandstone
- Metamorphic Rocks
 - Amphibolite
 - Gneiss
 - Marble
 - Phyllite
 - Quartzite
 - Schist Varieties
 - Garnet Schist
 - Mica Schist
 - Talc Schist (Soapstone)
 - Serpentinite
 - Slate

Recommended Materials

- Each Showdown participant will need a computer with internet access, scratch paper, something to write with, and a stand-alone calculator of any type
- 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 results to the questions indicated as tiebreakers.

Additional Resources

- The Science Olympiad Store (store.soinc.org) carries a variety of resources for Rocks & Minerals.
- Other resources can be found on the Rocks & Minerals Event Pages at soinc.org.