

Competition Rules



Hosted by Castro Valley Science

2026

Bay Area Regional Elementary Science Olympiad

Welcome to the Bay Area Regional Elementary Science Olympiad! We appreciate your dedication and commitment to your students. We absolutely hope that you and your students will have fun preparing for the Science Olympiad and that your experience during the day of the tournament will be positive and memorable. Long experience has shown that if you approach the day with flexibility and a sense of fun and adventure, your students will have a great experience. This guide includes the complete rules for the 2026 Bay Area Regional Elementary Science Olympiad Competition.

Collaboration and Team Spirit

Competition is a motivating and exciting part of the Science Olympiad, but it is not the most significant outcome of the tournament. A keystone of the Elementary Science Olympiad is to encourage students to explore new concepts and engage in problem solving strategies, employing science and engineering practices in a collaborative environment. Science and engineering practices take place over time, and the Science Olympiad is designed to provide students with long-term opportunities to explore, design, test, collect data, revise, and refine their ideas and solutions.

By the Students, For the Students

Science Olympiad is a student event, where parents and coaches provide knowledge, guidance and assistance. As such, the execution of build projects need to be performed only by the students where reasonably and safely possible. An adult may help the students with the construction and advise them on construction techniques and design principles. An adult may help with some of the tools that facilitate construction. But, the device should be significantly the design and work of the students. We feel strongly that the value of the program to the students is where they build and realize their own designs, and where the parents are guides and coaches who help the students design, build, and experiment, **without doing it for them**.

Remember that at the Science Olympiad, the students must be able to transport, set-up, calibrate, and in every way operate the device. Coaching by adults from the sidelines is not permitted.

Have fun, and good luck!

GENERAL TOURNAMENT INFORMATION

- **Room H-1 will be Headquarters** for coaches who have questions or concerns during the competition. Only head coaches should enter this room.
- **Only student participants are permitted in the competition classrooms.** Parents, coaches, and interested spectators are welcome to watch the open events in the Gymnasium. Please do not enter contest areas for any other events.
- **Site Rules:** Participants may not touch, take, or play with any of the school classroom materials. All teams must clean up their base camp at the end of the day and throw away any garbage in the appropriate garbage receptacles. No alcoholic beverages are allowed on any school premises, including parking lots. BBQ grills, propane tanks, generators, candles, bunsen burners, or other forms of open flames are NOT permitted on school grounds.
- **Bring your own food and beverages to the competition**, but please do not bring these items into the classrooms or competition areas. Teams not cleaning up their areas or found disrespecting the host site by littering, vandalism, etc. may be subject to penalties.

COMPETITION RULES

- Team rosters and participation: Each team can have a maximum of 8 students, and all students must be from the same school. Homeschoolers may participate without school restrictions. A student may only be on one team. There are no alternates allowed.
- Please read ALL event rules very carefully. Rule clarifications may be requested up to April 1. Answers will be communicated to all coaches via email and listed on the competition website.
- Some events are scheduled for a fifty [50] minute block and all teams compete simultaneously during this block. Please be prompt, as late teams will be at a disadvantage.
- **Where eye protection is required, this should be in the form of safety goggles or glasses, marked with the ANSI Z87 (splash protection) or Z87+ (impact protection) certification as appropriate for the event.** If a student normally wears eyeglasses, the safety goggles or safety glasses must fit over the eyeglasses.
- Students are encouraged to collaborate on written tests by whispering or writing notes to each other during the test. However, if an Event Supervisor determines that they are being too noisy or disruptive, penalties may be assessed.
- Overall team scoring is determined as follows: for each event, first place teams receive one point for the event, second place two points, and so on. Ties will be broken using predetermined tiebreakers. Final team rankings will be based on the lowest cumulative point score.
- No coach, parent, or Event Supervisor may assist a team once the event has begun. Such assistance may result in disqualification of the team in that event.
- Competition inquiries should be made only by the head coach to Peter Hung, Regional Director. Any arbitration decisions are final 1 hour after final results are posted.

Above all, competitors, coaches, parents, and Event Supervisors are expected to conduct themselves in the spirit of the Science Olympiad and with the utmost level of sportsmanship. All participants will be respectful of each other and of the space (rooms, auditoriums, facilities, competition areas).

DESCRIPTION: Participants will demonstrate their understanding of human anatomy and physiology by identifying organs and tissues and explaining their functions. The competition will utilize a variety of models, slides, or pictures drawn from three human body systems: Nervous, Sensory Organs, and Endocrine.

1. EVENT PARAMETERS:

- a. The Event Supervisor will provide a written test for each team.
- b. Teams must bring writing utensils. They are also allowed to bring up to two 8.5" x 11" sheets of paper that may contain information on both sides in any form from any source. They may also bring one 4-function calculator per student.

2. THE COMPETITION Students will be tested on the following topics:

a. Nervous System

- i. Structure and function of neurons and different types of glial cells
- ii. Major regions of the brain, including the structure of the cerebrum and its role in cognition, sensation, movement, memory, and language. The structure and function of the cerebellum and brainstem.
- iii. The organization of the spinal cord and nerve roots.
- iv. Cranial and spinal nerves
- v. Sensory/motor pathways and reflex arcs
- vi. Common diseases: Epilepsy, Alzheimer's Disease, Multiple Sclerosis, and Parkinson's Disease.

b. Sensory System

- i. Structure and function of major sense organs:
 1. Major parts of the eye – cornea, lens, iris, pupil, retina, optic nerve
 2. Major parts of the outer, middle and inner ear
 3. Major structures involved in smell – nasal cavity, olfactory epithelium, olfactory receptor cells, olfactory bulb
 4. Major structures of taste: tongue, taste buds, papillae, taste receptor cells, gustatory nerves
- ii. Physiology of vision, hearing, taste, smell, and touch
- iii. Common disorders: myopia, hyperopia, presbyopia, conjunctivitis, color blindness, otitis externa, otitis media, anosmia/dysosmia, dysgeusia. Treatment and prevention of these conditions.

c. Endocrine System

- i. Major endocrine glands and the hormones they produce
- ii. Regulation of body processes by hormone signaling
- iii. Feedback mechanisms (e.g., insulin-glucose regulation)
- iv. Common disorders: diabetes mellitus, hypoglycemia, hyperparathyroidism, hypoparathyroidism, hyperthyroidism, goiter, and hyperaldosteronism. Treatment and prevention of these conditions.

3. SCORING: High score wins. **Selected** questions will be used as tie-breakers.

Are You Sirius!?

A TEAM OF UP TO: 2

DESCRIPTION: Participants will demonstrate their knowledge of celestial bodies by identifying constellations, stars, planets, and answering conceptual astronomy questions. This event emphasizes both visual identification and written explanations of astronomical phenomena.

1. EVENT PARAMETERS:

- a. The Event Supervisor will provide a test for each team.
- b. Teams must bring writing utensils. They are also allowed to bring up to two 8.5" x 11" sheets of paper that may contain information on both sides in any form from any source. They may also bring one 4-function calculator per student.

2. THE COMPETITION:

- a. Part I: Visual Identification - Teams will be provided with star charts, slides, overheads, or photographs. They will identify the following, with reference to the attached constellations and stars list:
 - i. At least 5 constellations
 - ii. At least 5 stars
 - iii. At least 3 planets in our Solar System
 - iv. Earth's Moon and its phases
 - v. The Sun and the totally eclipsed Sun
 - vi. A spiral galaxy, nebula, star cluster, and comet.
- b. Part II: Written Astronomy Concepts - Questions will assess understanding of astronomical facts and concepts, including:
 - i. Stellar evolution and how mass of stars affect evolutionary track
 - ii. The Sun's evolutionary path
 - iii. Role of gravity in stellar formation and role of nuclear fusion
 - iv. Distinguishing rotation vs. revolution
 - v. Effects produced by Earth's rotation and revolution
 - vi. Unit of time and its astronomical basis (day, month, year)
 - vii. Ordering bodies by relative size and distance from the Earth or Sun
 - viii. Knowledge of Earth's seasons and their causes
 - ix. Lunar phases and what produces them
 - x. The celestial sphere: zenith, horizon, directions, meridian, north celestial pole, ecliptic
 - xi. The solar system's members
 - xii. Causes of solar and lunar eclipses.

3. **SCORING:** High score wins. Selected questions will be used as tie-breakers.

The Constellation / Stars List:

- | | | |
|-------------------------|-----------------------------|--|
| • Aquila / Altair | • Draco | • Taurus / Aldebaran, Pleiades, Hyades |
| • Bootes / Arcturus | • Gemini / Castor, Pollux | • Ursa Major/ Merak, Dubhe |
| • Canis Major / Sirius | • Leo / Regulus | • Ursa Minor / Polaris |
| • Canis Minor / Procyon | • Lyra / Vega | • Virgo / Spica |
| • Cassiopeia | • Orion / Betelgeuse, Rigel | |
| • Cepheus | • Pegasus | |
| • Cygnus / Deneb | • Scorpio / Antares | |

Carbon Crunchers

A TEAM OF UP TO: 2

DESCRIPTION: Teams will complete tasks related to environmental problems and solutions related to water, including identification, analysis, and laboratory investigations pertinent to the environment.

1. EVENT PARAMETERS:

- a. The Event Supervisor will provide a test for each team.
- b. Teams must bring writing utensils. They are also allowed to bring up to two 8.5" x 11" sheets of paper that may contain information on both sides in any form from any source. They may also bring one 4-function calculator per student.

2. THE COMPETITION:

Participants will demonstrate their understanding and skills on the following topics:

a. Species and Ecosystems:

- i. Identify and describe the general ecology, life cycle, and feeding habits of these organisms:

Mayfly	Midge	Blood Midge
Caddisfly	Blackfly	Mosquito
Damselfly	Deer/Horse Fly	Water Boatman
Dragonfly		

- ii. Explain the importance of the above-listed species as indicators of water and wetland quality.

b. Water Resources:

- i. Identify the steps in the hydrologic cycle (water cycle).
- ii. Distinguish between aquitards and aquifers, how each works, identify their components, and their environmental significance.
- iii. Understand and interpret data related to testing of salinity, pH and turbidity of water, rain, and soil.
- iv. Given site maps or data tables, draw contamination plumes to show the movement of pollutants through groundwater. Estimate time for contaminant transport from source to water supplies, given flow rates and distances.

c. Waste Management topics:

- i. Waste treatment methods: landfill, incineration, reuse, source reduction. Recycling techniques, including composting, plastic recycling, and the hydrologic cycle's role in resource renewal. Effects of recycling/reuse in reducing waste and energy consumption.
- ii. Contrast unregulated dumps and sanitary landfills referencing structure, regulation, and environmental impact.
- iii. Compare volume and weight in landfill waste disposal scenarios, interpret graphs or data tables as provided.
- iv. Describe methods for remediation or fixing of heavy metal contamination in soils or water.

d. Global Environmental Issues:

- i. Understand the causes and impacts of global warming and ozone depletion. Discuss mitigation and adaptation strategies.

3. SCORING: High score wins. Selected questions will be used as tie-breakers.

DaVinci Decoder

A TEAM OF UP TO: 2

DESCRIPTION: Teams will decode, cryptanalyze, and solve encrypted messages using a variety of classic and modern cryptanalysis techniques, demonstrating skill with ciphers by decrypting messages in a competitive, exam-based format.

1. EVENT PARAMETERS:

- a. The Event Supervisor will provide a test for each team.
- b. Teams must bring writing utensils. They may also bring up to two 4-function calculators. No other materials may be brought.

2. THE COMPETITION:

- a. The Event Supervisors will provide a resource sheet as needed for the problems.
- b. Participants should be prepared to solve problems involving the following ciphers (all in English):
 - i. Monoalphabetic Substitution (Aristocrats): Messages with spaces included; hints may be provided. No letter decrypts to itself.
 - ii. Atbash Cipher
 - iii. Caesar Cipher: Shift of no more than 3 characters in either direction (e.g., 'a' can map to x, y, z, b, c, or d).
 - iv. Vigenère Cipher: Decryption given the key.
 - v. PigPen Cipher (Masonic Cipher): No mapping table given.
 - vi. Tap Code Cipher: Decryption using coordinate pairs from a 5x5 table (c/k share a cell; table not provided).
 - vii. Dancing Men Cipher: Decryption using symbols from "The Adventure of the Dancing Men".
- c. Competition Rules:
 - i. Participants may answer questions in any order.
 - ii. No resources or reference materials are permitted.
 - iii. All work must be completed within the specified time
 - iv. Answers must be written legibly on the provided answer sheet.

3. SCORING:

- a. High score wins.
- b. Exam Score: Each question is assigned a point value based on difficulty. Points for each question are added to determine the exam score.
- c. Scoring Individual Questions: Unless specified otherwise, the final score for a question is based on accuracy in decoding the plaintext:
 - i. Two or fewer errors: Full credit.
 - ii. Each additional error: Deduct 100 points up to the value of the question; final score for a question cannot be less than zero. (e.g.: a 400-point question with 7 errors = 0 points, not -100.)
- d. Ties will be broken by predetermined selected questions as indicated on the exam.

Mystery Architecture

A TEAM OF UP TO: 2

DESCRIPTION: This event is designed to test the student's ability to think on their feet. They will be given a bag of materials and instructions for designing and building a Structure that can be tested.

1. EVENT PARAMETERS:

- a. Each participant may bring a writing utensil, linear measuring device (i.e. ruler), and a pair of scissors to the event to aid in their build. These items may not be used as part of their Structure.
- b. Event supervisors will provide all other materials.

2. THE COMPETITION:

- a. Instructions given at competition will list a Structural Goal with a Primary and Secondary Metric.
 - i. Some examples of Structural Goals and Primary Metrics are: The tallest tower to hold a baseball at the top, the longest bridge to hold a small milk carton full of sand in the center, the longest cantilever to hold a chalkboard eraser at the end, or the shortest boat/barge to float holding a baseball without sinking.
 - ii. Some examples of Secondary Metrics: the smallest width of the tower, the smallest base or the width of the bridge or cantilever, the heaviest boat.
 - iii. Structures are not limited to these examples. The participants will not know the assignment until they begin the competition.
- b. Teams will have 25 minutes to construct a Structure using the provided materials to accomplish the stated Structural Goal. All teams will receive exactly the same materials. Examples of materials include: cups, drinking straws, paperclips, string, tape, paper, and popsicle sticks. Materials are not limited to this list; the actual materials provided may be entirely different. Only the materials provided may be used to build the Structure. No other materials may be part of the finished Structure.
- c. If the Structure must support a load, a separate load of the same size and weight as used for testing will be provided to each team so they can incorporate it into their building plans. Event Supervisors may use one "official" load for testing all Structures. When finished building, participants must remove the load from their Structure until immediately prior to the testing by the judges. When the Event Supervisors are ready to test the Structure, the participants will place the load in/on it.
- d. Participants will have a maximum of 25 minutes to construct the specified Structure. If participants are finished prior to the 25 minutes, they should inform the Event Supervisors to start testing their Structure.

3. SCORING:

- a. The Primary and Secondary Metrics specified in the instructions will be measured and recorded as accurately as possible by the Event Supervisors prior to placing the load (if required) on the Structure.
- b. Structures that are required to support a load will be placed in one of two groups depending on whether or not they support the load for the specified time. Structures that support the load will be ranked higher than all Structures that do not.
- c. Structures within each group will be ranked by their Primary Metric.
- d. The Secondary Metric, and then build time will be used to break any ties.

The Penne Express

A TEAM OF UP TO: 2

DESCRIPTION: Before the tournament, teams design, build, and test a vehicle constructed primarily from pasta, intended to traverse a ramp and lane in a specified amount of time and distance. The device is tested for both structural integrity and distance traveled.

1. EVENT PARAMETERS:

- a. Teams must bring one vehicle, constructed before the competition, which meets the device requirements below.
- b. Participants must bring and wear their own impact-resistant safety glasses or goggles.
- c. On the morning of the Tournament, all teams will impound their vehicle prior to the first competition timeblock.

2. THE COMPETITION:

- a. Device Build:
 - i. The vehicle must be built using any supermarket variety of fresh (soft) or dry pasta, uncooked and unaltered. Pasta pieces may be shaped by dry machining (filing, sanding), but no wet or chemical treatment is allowed.
 - ii. Commercially available glues are permitted, but the use of glue must be minimal and for attachment purposes only —no sculpting, joint, or gap-filling is allowed.
 - iii. No other materials beyond pasta and glue are allowed on the vehicle.
 - iv. The vehicle in ready-to-run configuration must fit entirely within a closed box with dimensions 30 cm × 20 cm × 15 cm (in at least 1 chosen orientation)
 - v. No mass restrictions apply.
 - vi. The device must rest on at least three points (wheels, axles, or functional feet); simple shapes such as spheres or plain cylinders as the sole support will not be accepted.
 - vii. The vehicle must be a discrete, free-rolling structure capable of maintaining basic integrity during its run.
 - viii. The vehicle must make and maintain contact with the test surface at three or more points at all times during the run.
- b. Competition Set Up:
 - i. Vehicles will be released at the top of a ramp provided by the Event Supervisor, with the rearmost part in contact with a starting barrier.
 - ii. No external force (helper pushes, nudges) may be applied; the device must be released cleanly by the contestant.
 - iii. The ramp is a curved surface with a maximum height of 1 m, and the entire ramp fits within 1 m (height) × 1 m (length) × 0.5 m (width).
 - iv. The target travel lane is 1.5 m wide, extending from the ramp's base.
- c. Competition Procedure:
 - i. Devices will be inspected for build compliance before launch. Event Supervisors will verify dimensional and integrity requirements before the run. This will not count toward the 6 minutes, but the time used by the team to adjust the device will.
 - ii. Each team has 6 minutes to set up and perform two launches of their vehicle. Time will be paused while distance measurements are made and until the participants collect their vehicle from the track.

- iii. Upon release, the vehicle will travel down the ramp under the force of gravity alone.
- iv. If participants choose and time permits, they may elect a second run of their vehicle using the largest intact part of their vehicle. The vehicle must still meet all device requirements listed in Section 2.a.

3. SCORING:

- a. The distance traveled within the 1.5 m lane is measured from the ramp base to the furthest point reached by the bulk of the vehicle.
- b. If the device breaks during the run, the distance is measured to the largest surviving structural fragment.
- c. If the device crosses the lane boundary, the distance will be measured at the point where the device exited the lane.
- d. The vehicle with the highest distance traveled down the track wins.
- e. Ties are broken by which vehicle remains the most intact, as quantified by the number of pieces that fell off the main vehicle.
- f. Devices not meeting the device build requirements will be ranked below all those with no violations.

Sherlock Foams

A TEAM OF UP TO: 2

DESCRIPTION: Each team will test mystery powders, match fingerprints, and use chromatography to identify items found at a crime scene and solve the crime.

1. EVENT PARAMETERS:

- a. The Event Supervisor will provide a written test and materials for each team.
- b. Teams must bring writing utensils. They are also allowed to bring two 8.5" x 11" sheets of paper that may contain information on both sides in any form from any source. They may also bring up to two 4-function calculators.
- c. Participants must bring and wear their own chemical splash-proof goggles and a lab apron or coat.

2. THE COMPETITION:

- a. **Unknown Powders:** Teams will be given up to seven unknown powders from the following list: salt, sugar, Plaster of Paris, flour, cornstarch, baking soda, limestone, and sand. Teams may be given up to two additional containers with mixtures of two of these substances.
 - i. The following materials will be provided to aid in the identification of the powders: water, vinegar, iodine solution, a magnifying glass, and plastic cups. All teams will receive the same set of unknowns, and the event scenario will note which vials are mixtures.
 - ii. Touching, tasting, or feeling of the substances with fingers is not allowed.
- b. **Fingerprint Analysis:** Teams will receive fingerprints from several suspects and those found at the scene. They must identify and match the patterns, knowing the differences between whorls, loops, and arches.
- c. **Paper Chromatography:** Teams will make chromatograms using supplied pens and analyze the results to help identify a forged check or criminal. Chromatograms must be labeled and turned in with the answer sheet. Teams may be required to calculate Rf values based on provided evidence.
- d. **Evidence Integration & Analysis:** After collecting and analyzing evidence (powder IDs, fingerprints, chromatograms), students should determine which suspect(s) committed the crime and must justify their conclusions in writing, including reasoning for excluding other suspects.
- e. **Safety & Clean-up:** Participants must follow all safety guidelines and dispose of waste as directed. Unsafe handling may result in penalties or disqualification.

3. SCORING:

- a. The team with the highest total score wins. Scores are based on:
 - i. Powder Identification: 50%
 - ii. Chromatography: 15%
 - iii. Fingerprint Analysis: 10%
 - iv. Identification of the Criminal & Written Analysis: 25%
- b. Tiebreakers: Scores from the analysis section, then powder identification, then fingerprinting, will be used as tiebreakers.
- c. Penalties of up to 10% may be assessed for improper equipment, attire, or failure to clean the area.

Watt's Up

A TEAM OF UP TO: 2

DESCRIPTION: Participants will complete tasks and answer questions related to simple direct-current (DC) electric circuits, including identification, construction, and understanding of open, closed, series, and parallel circuits.

1. EVENT PARAMETERS:

- a. The Event Supervisor will provide a written test for each team.
- b. Teams must bring writing utensils. They are also allowed to bring up to two 8.5" x 11" sheets of paper that may contain information on both sides in any form from any source.

2. THE COMPETITION:

- a. Part I: Written Test
 - i. The written test will assess the team's knowledge of direct current (DC) electric circuits and their components.
 - ii. Unless otherwise specified, answers must use appropriate scientific units and terminology.
 - iii. The test will include at least one question from each of the following areas:
 - iv. Definitions and properties of conductors, insulators, open and closed circuits, and short circuits
 - v. Distinguishing series, parallel, and series-parallel circuit characteristics
 - vi. Function and identification of schematic diagram symbols for: battery (one cell), light bulb (lamp), wires, conductors, crossed conductors, normally open and closed switches
 - vii. Circuit logic (e.g., predicting function when a switch is opened/closed, determining if a lamp will light)
- b. Part II: Hands-On Tasks
 - i. Teams will construct a continuity tester using a battery, lamp, and wires provided by the supervisor.
 - ii. Using their continuity tester, teams will evaluate a set of circuit cards, testboxes, or grids (with points labeled A, B, C, etc.) to identify which points are electrically connected internally.
 - iii. Teams will be presented with a tray of common household items and will classify each item as a conductor or an insulator.
 - iv. Accurate completion and data recording for these tasks will be scored.

3. SCORING:

- a. High score wins.
- b. Points will be awarded for correct answers, accurate identification, construction quality, solution of hands-on tasks, and proper use of scientific reasoning.
- c. The written test will account for 50-75% of each team's score; hands-on tasks will form the remaining 25-50%.
- d. Selected questions or specific circuit tasks will be used as tie-breakers.

Team Work

A TEAM OF UP TO: **Entire Team of 8**, minimum 2

DESCRIPTION: Physical skills are interspersed with science questions in a relay-style race

1. THE COMPETITION:

- a. This event involves the entire team. Appropriate athletic attire is advised (running shoes, pants instead of skirts, etc.).
- b. Four different Physical Activities (PA) will be interspersed with four different Science Tests (ST). The PA must be completed correctly before proceeding to the ST station
- c. If the team has fewer than 8 participants, a participant may do more than 1 activity, but each PA should have 2 students.
- d. Examples of the PA may include (but is not limited to): three-legged race, wheelbarrow race, blindfolded guidance, balloon volleyball, or other cooperative games requiring Teamwork.
- e. Both students who completed the preceding PA should cooperate to do the ST. Each ST will consist of 5 general science questions on these subjects:
 - i. Physics: classical mechanics, Newton's Laws, energy and power, and waves
 - ii. Chemistry: elements, physical/chemical changes, acids/bases
 - iii. Biology: parts of cells, food chains/webs, evolution/adaptations
 - iv. Math: calculations, angles, systems of units, and estimation
- f. After the ST is completed, a second pair of students should perform the second round of PA & ST, then a third pair of students should perform the third round of PA & ST, and finally the fourth pair of students should perform the third round of PA & ST.

2. SCORING:

- a. The total team time to complete the event will be kept by timekeepers. Total time will be added together and will be calculated as the Time Score (lowest time = highest number of points).
- b. The number of correct answers on the ST will be added together for the Test Score.
- c. Total Score = Time Score + Test Score. Highest total score wins