

# New Jersey Science Olympiad New Coaches Handbook



*Exploring the World of Science*

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# Philosophy

## **National Science Olympiad:**

The Science Olympiad is an international nonprofit organization devoted to improving the quality of science education, increasing student interest in science and providing recognition for outstanding achievement in science education by both students and teachers. These goals are accomplished through classroom activities, research, training workshops and the encouragement of intramural, district, regional, state and national tournaments. The Science Olympiad tournaments are rigorous academic interscholastic competitions that consist of a series of individual and team events which students prepare for during the year. The competitions follow the format of popular board games, TV shows and athletic games. These challenging and motivational events are well balanced between the various science disciplines of biology, earth science, chemistry, physics, computers and technology. There is also a balance between events requiring knowledge of science facts, concepts, processes, skills and science applications. In addition, during the day there are open house activities which consist of science and mathematics demonstrations, activities and career counseling sessions conducted by professors and scientists at the host institution occurring concurrently with the events.

## **New Jersey Science Olympiad:**

New Jersey Science Olympiad has been on the leading edge of educational innovations since 1993. These innovations include high academic standards; demonstration of skills through performance testing; learning through hands-on, minds-on activities; cooperative learning through events that require teamwork; improved self-concept through success in achieving high standards and making applications and connections to the real world.

New Jersey Science Olympiad events are closely aligned with New Jersey Science Education Standards and include strong components for problem solving, critical thinking and use of technology. Science Olympiad also portrays the close relationship between teaching and assessment. Assessment tasks are developmentally appropriate for young children, and include recognition of students' physical skills and cognitive abilities.

The members of the New Jersey Science Olympiad Committee invite you and your district to participate in Science Olympiad, the foremost academic competition in New Jersey.

## History of Science Olympiad

Science Olympiad is an international, non-profit organization devoted to improving quality of science ed., creating a passion for learning science and providing recognition for outstanding achievement in science education by students and teachers.

1983	First S.O. tournament was between states of Michigan and Delaware.
1984	Program about S.O. presented at NSTA in Boston
1985	First national tournament sponsored by Army at Michigan State with 17 states. Presently: 14,000 schools from 50 states and Canada participate.
1993	First New Jersey S.O. tournament.
2004	Regional tournaments added to enable more schools to participate. Now have three middle/high school regionals and 4 elementary regionals
2005	Community MS took FIRST in the nation out of 60 teams at U. of Illinois
2007	Community MS is FIRST in the nation again. West Windsor-Plainsboro HS was 6 <sup>th</sup> !

## **How to Participate**

**Division A** – Elementary (Grades 4-6) Elementary competitions are designed for local school based and regional competitions.

**Division B** – Middle School (Grades 6-9)

**Division C** – High School (Grades 9-12)

Division B and Division C competitions are conducted at the regional, state and national levels.

**Three basic levels of competition in the Science Olympiad organization:** Each team will compete at a regional tournament. The top teams will move on to the state competition.

- Information about tournaments can be found on our website at **[www.njscienceolympiad.org](http://www.njscienceolympiad.org)**

The tournaments last for about 6 hours, with an awards ceremony at the end of the competition. Ribbons and medals are awarded to students who place in each event. In addition, teams are awarded overall points based on their performance on the individual events.

At the state competition, qualifying teams vie for a spot at the National competition. The top team in each division (B and C) advances to the National competition. The state competition is intense!

**To register a team:** There is a registration fee for each team. Visit [www.njscienceolympiad.org](http://www.njscienceolympiad.org) to download the registration form. The coach completes a registration form and submits it. Once the registration form and fees have been received, an official Rules Manual will be sent.

**Rules Manual:** The same manual is used for regional, state, and national competitions. Each year the events and rules change, so **LOOK OVER THE RULES MANUAL CAREFULLY** to avoid disqualification. Often a rule change or clarification is needed. It is important to check all websites (state and national) to stay up to date on the clarifications or changes. In addition, the rules may need to be modified based on logistics and/or the level of competition. For example, an event may specify a drop height or distance traveled of 5 meters at regional, 10 meters at state and 15 meters at nationals. A host site may not have the facility to accommodate the specified heights and will need to modify the drop height.

Many of the rules in the events are complex. If rules need to be clarified, you can contact a National Science Olympiad Event Supervisor through the official clarifications page at [www.soinc.org](http://www.soinc.org).

As students prepare for an event, keep up to date on all clarifications. Visit the clarification websites frequently. At the state tournament, the judges will receive a copy of the clarifications from the national and state clarifications pages.

# The Events

There are several events in each division level. Below are some examples:

## **Division B - Middle School Events**

Amphibians and Reptiles	This event will test knowledge of amphibians, turtles, crocodiles and reptiles.
Dynamic Planet	Teams will work at stations that display a variety of earth science materials and related earth science questions. (earthquakes/volcanoes)
Elevated Bridge	Teams will design, build & test the lightest bridge to carry a maximum load.
Robo-Cross	Students will design and build a robot capable of performing certain tasks.
Science Crime Busters	Teams will identify the perpetrators of a crime or crimes by using paper chromatography and analysis of unknown solids, liquids, and plastics found at the scene of a crime.

## **Division C - High School Events**

Astronomy	Teams identify deep sky objects and solve astronomy problems.
Experimental Design	Given a set of unknown objects, teams will design, conduct, analyze and write-up an experiment.
It's About Time	Using a pre-constructed non-electronic device, students will measure time in intervals.
Picture This	Draw representations of a set of scientific terms or concepts and guess the term being drawn.
Trajectory	Teams will design, construct, calibrate and operate a device capable of launching a projectile into a target using energy provided by nonmetallic elastic solids.
Write It, Do It	A technical writing exercise where students write a description of a contraption and other students will attempt to recreate it using only the written description.

## Regional and State Competition Rules

1. **Team structure:** Each registered team submits the *NJSO Official Team* list of up to 18 team members and alternates to the state director prior to the start of the state event. The list must include signatures from the coach and school principal.
2. **Device Impound:** Only regular team members and registered alternates may impound a device. The team member(s) does NOT need to be the student participating in the individual event. Parents, teachers, and others with the team are not allowed to impound.
3. **Scoring Procedures:** Scoring at the state tournament will follow the same scoring plan at the national competition. Raw scores received from the event supervisor will be converted into a simple number corresponding to their place in that event. (1 = first place; 2 = second place...15 = fifteenth place). These simple scores will be tallied for all events. The team with lowest total score will receive first place for the state competition.
  - a. If a team makes an honest effort but fails to compete because of outside factors (mechanical failure, etc.), they will receive a simple score equal to N, where N = the total number of teams competing in the tournament.
  - b. Teams that choose not to participate in an event, will receive a score of N+1 for that event.
  - c. Teams that are disqualified from an event (improperly following rules, unsafe practices, severe poor sportsmanship, etc.) will receive a score of N+2.
  - d. There will be no ties; they must be settled through tie breakers at specific events.
4. **Posting Scores:** Scores will be posted on the [www.njsciencolympiad](http://www.njsciencolympiad) website. Scores do not become official for 5 days.
5. **Arbitration:** An arbitration committee will be available throughout the day to assist with issues that may arise. Individual event appeal forms will be available from the event supervisors. A team coach must complete the form and submit it to the event supervisor; it will then go to the arbitration committee.

## Setting up a team

1. Teams consist of 18 students per team, with a coach (teacher or other adult) in charge. **A maximum of 7 seniors are permitted on the Division C team. A maximum of 5 freshmen are allowed on the Division B team.** A school is considered to be a separate school if it has a separate administrator. Students must be from the membership school. Recruiting from neighborhood schools is not permitted. However, middle schools may invite **five of the last year's eighth grade students** to be part of the team. These students are not allowed to be part of the middle school AND the high school team at the same time.
2. Extra students can be designated as alternate participants and may compete in the trial events.
3. For the events, a team may enter no more than **one set of competitors** in any one event.
4. All teams must pre-register to compete in the competition. Please refer to the NJSO website ([www.njscienceolympiad.org](http://www.njscienceolympiad.org)) for details on how to register. It is not necessary to name the students who will compete in each event as these names can be changed and listed up to the day of the event.
5. Olympiad events are designed to use a variety of intellectual and practical skills. Some events require a quick recall of specific facts, while others require concept development, a process skill, or an application of a specific concept. Some events require general knowledge while others require a specific skill. Others may require a student to build an apparatus.
6. Check the schedule carefully. Do not over commit any one student. In some schools a coach chooses the makeup of the team and this is permissible. Some schools have the science department chooses the team members. In other schools, an intramural competition is used to select certain team members.
7. Schools can use the rules of the Olympiad to run practice activities or mini-competitions if there are multiple students that want to compete in specific events. Consider having several preliminary heats culminating in an assembly format for the entire school to arrive at the best students for the event. These preliminary rounds build interest and suspense for the actual Olympiad.
8. Last minute problems such as bad weather for any event scheduled outside may make it necessary for the coach to move the students into a different event. Be sure to coach students so they can be flexible enough and adventuresome enough to accept the challenge of a last minute substitutions.

## Conduct of Participants

The goal of Science Olympiad is to build character, teamwork, increase the interest of students in science and promote an overall good attitude. Unsportsmanlike conduct will not be tolerated on the part of students, parents, coaches, or guests.

## Role of Parents

One of the most important goals of Science Olympiad is that students must be part of team to engage in science and science learning. While it is encouraged that parents and adults help students with their projects and preparation of their events, it is important to stress that parents do not do it all! They should merely be a guide on the side. Having parents construct a structure such as Bridge Building will expose and embarrass the student when they are not capable of answering questions asked of them by the judge. Further, even if the student were to successfully compete, the emphasis of Science Olympiad is NOT to have the student win a medal, but rather to get them involved in the process of science.

## Scheduling Tips

With many events and only 18 team members, scheduling a team to cover every competition can be a difficult task. There are several things to keep in mind when scheduling, which may make your job a little easier.

1. Students with a wider background in a variety of science areas are easier to schedule.
2. The first effort is to schedule a student into his/her “strong” event if this is possible.
3. Note the times and places of events so students will not be covering too much physical ground. If the events are in the same building and back-to-back, the same team members can probably participate.
4. Schedule “back-up” team members to be present in case an event was late in starting or ending and an originally scheduled team member(s) can’t make it. This is not always possible but the coach can ask team members who are “free” to check events during that “free” time to make sure they are covered. This contingency plan is often used.

A student should be encouraged to seek additional sources of information from libraries, college professors or community resource personnel. However, **adults doing the actual physical work involved (i.e., building a trajectory device, rocket, etc.) are strictly forbidden. Commercially finished or purchased products, unless otherwise permitted in the rules, and those completed by adults will be disqualified.**

# Hints and Suggestions for New Coaches

## 1. Goals and Objectives:

- a. Science is Fun
- b. Develop Teamwork
- c. Prepare all team members for each event

## 2. Recruiting Coaches:

- a. Hold a parent meeting
- b. Suggest events to parents based upon parent background
- c. Provide school facilities/supplies
- d. Seek help from all staff members, not just teachers
- e. Recruit former team members
- f. Recruit professionals from the community
- g. Check to see if your district requires a Criminal Record Screening for volunteers.

## 3. Communicating:

- a. Message Board
- b. E-mail
- c. Memos
- d. Submit articles to each edition of the school newspaper
- e. Submit articles to local newspapers with all teams and coaches names along with photos showing training /competition activities

## 4. Organizing Team:

- a. Accept all who apply for the team or create a tryout.
- b. Identify 15 competing members and alternates as the competition approaches
- c. Provide and enforce written team rules

## 5. Equipping:

- a. Review materials offered by National Science Olympiad.
- b. Provide materials, safety equipment and supplies needed for each event
- c. Provide resource manuals as field guides where needed

## **6. Training:**

- a. Coordinate schedules
- b. Make food an element of most sessions
- c. Get coaches to all offer training sessions and have enough coaches to cover all sessions.
- d. Take advantage of internet resources
- e. Take advantage of resources made available by national ([www.soinc.org](http://www.soinc.org)), state ([www.njscienceolympiad.org](http://www.njscienceolympiad.org))
- f. Combine younger team members with upperclassmen when training for an event
- g. Practice, practice, and more practice is the key. If students are constructing a bridge or a tower, they should actually test it at school, determine what works and what doesn't, and then reconstruct after they have analyzed the results. If students are competing in a lab based event, they should be familiar with all the concepts and should have spent a great deal of time in the lab conducting the experiment. Although many events do not give a specific lab to complete, the rules will specify the general topics that will be tested.
- h. Again, to avoid disqualification make sure students follow the rules carefully and have all safety equipment on the day of the competition.

## **7. Competing:**

- a. Enter all events
- b. Remind students to thank the event supervisors and volunteers for each event
- c. Bring parent/staff volunteers to supervise/encourage/comfort students
- d. Have adults/event coaches take students to events
- e. Carry every student who trains to the competition. Enter them in trial events, use them as a cheering section, have them observe other events and keep records/comments
- f. Debrief students about each event as soon as possible and keep records for the future
- g. Bring extra trash bags to clean up areas used for building, eating and recreation.
- h. Don't forget extra supplies for last minute fix-ups: Glue guns, tape, paper, extra goggles.

## **8. Financing:**

- a. Have administration set up an account for the team
- b. Estimate between \$500 - \$1000 for the year
- c. Seek donations from parents and companies/organizations in the community
- d. Encourage donations of equipment and supplies such as team attire, equipment, tools and supplies, parts for construction events, protective glasses/goggles, resource videos or manuals, calculators, food/snacks

## Post-Competition Overview

On the first day back to school after the competition, gather all the students that competed and discuss how they felt they did. Have them record information on the events, the way they were run, and what they could have done differently. Have them discuss their preparations for the events, and how they could have changed their planning to do better. Keep in mind that the goal of Science Olympiad is not solely to win the events. It is to engage in the process of science and become proficient in the methodologies of science. However, the evaluation of performance is an essential part of learning. Students must focus on what they did, why they did it and how they can improve it.

Here are some things to consider as the students evaluate their performance.

- What events did I do?
- Was I prepared for it?
- Did I have the proper resource if they were allowed?
- Did I spend enough time preparing for it?
- Did I work smart, not just hard?
- If there was a problem, did I communicate it clearly with the judges?
- Did I work well with my team member?
- Did I clearly understand the rules and follow them?
- Were there any rules that were unclear that need to be changed or clarified?
- Was it easy to find the location?
- Did I plan my day well?
- What did I do well and succeed in?
- What positive things occurred during the day?

There are some issues that are beyond the control of the students. As the team discusses the successes during the day, please record any problems that may have existed that can be forwarded to the Tournament and State Directors.

## Science Olympiad Web Site and Other Related Resources on the Internet

Many resources sites are available on the Internet. A list of resources is available in this section of the manual. Many of these sites will contain links to several other sites.

### *Science Olympiad Web sites*

The Official Science Olympiad Web Site with connections to Science Olympiad web sites for many states.

[www.soinc.org](http://www.soinc.org)

[www.njscienceolympiad.org](http://www.njscienceolympiad.org)

### **General Resources (Sites covering multiple topics)**

California State University, Northridge — Web Sites & Resources for Teachers

<http://www.sitesforteachers.com>

Chicago Museum of Science & Industry

<http://msichicago.org>

Columbia University-Lesson Plan Gold mine

<http://www.eskimo.com/~billb/amateur/coolsci.html>

Discover Magazine Guide

<http://www.discover.com/>

Discovery Channel Resources

<http://www.discovery.com>

Eisenhower Clearinghouse (ENC)

<http://www.enc.org>

EnviroLink

<http://www.envirolink.org>

Environmental Protection Agency (EPA)

<http://www.epa.gov>

Exploratorium Index

<http://www.exploratorium.edu/>

Frank Potter's Science Gems, Science and Mathematics Resources

<http://www.martindalecenter.com/>

Hands-on Science Centers Worldwide

<http://www.cs.cmu.edu/afs/cs/ustr/mwm/www/sci.html>

Mad Scientist Network —Washington University of Medicine

<http://www.madsci.org/>

Inquiry Institute – Professional Development and Science Olympiad Training

<http://www.inquiryinstitute.org>

NASA K-12 Internet Interactive at Spacelink

<http://spacelink.nasa.gov>

National Science Foundation

<http://www.nsf.gov>

National Science Teachers Association (NSTA)

<http://www.nsta.org/>

Oakridge National Laboratory

<http://www.ornl.gov/>

Pacific Bell-Blue Web'n Lesson Plans

<http://www.kn.pacbell.com/>

Science Learning Network

<http://www.sln.org>

Science Resources Search Engine

<http://www.learner.org>

Teacher Net Lesson Bank

<http://www.teachers.net/lessons/posts/posts.html>

The Global Schoolhouse

<http://www.gsh.org>

US Department of Education

<http://www.ed.gov>

Univ. of Tenn. Computing & Academic Service

<http://oit.utk.edu/>

Yahoo Science-links to each scientific discipline

<http://www.yahoo.com/science>

### **Biology Resources**

Access Excellence by Gentect, Inc.

<http://www.gene.com>

Bio-Sciences On-Line

<http://mcb.harvard.edu/BioLinks.html>

Cell & Molecular Biology Online

<http://cellbio.com>

CELLS Alive!

<http://www.cellsalive.net/>

Center for Disease Control

<http://www.cdc.gov/excite/>

Cytogenetics Gallery

<http://www.pathology.washington.edu/>

Human Anatomy Outline

<http://www.meddean.luc.edu/>

Human Genome

<http://www.nhgri.nih.gov/>

National Association of Biology Teachers (NABT)

<http://www.nabt.org>

USGS Biological Resources

<http://biology.usgs.gov/>

### **Chemistry Resources**

About Temperature

<http://www.unidata.ucar.edu/staff/blynds/tmp.html>

Catalyst — links to HS chem resources

<http://www.thecatalyst.org/>

Chemfinder

<http://chemfinder.camsoft.com/>

Exploring ChemCom

<http://www.whfreeman.com/chemcom/>

Interactive Guide to Chemistry

<http://library.thinkquest.org/3659/>

Mad Scientist Network

<http://www.madsci.org/>

Microworlds

<http://www.lbl.gov/MicroWorlds/>

MSDS -Material Safety Data Sheets & Univ. of Kentucky Resources

<http://www.chem.uky.edu/resources>

Periodic Table Information

<http://www.cs.ubc.ca/cgi-bin/nph-pertab>

Water Quality

<http://www.wqa.org>

Water Science for Schools

<http://www.ga.usgs.gov/edu/helptopics.html>

### **Physics & Physical Science Resources**

American Association of Physics Teachers

<http://www.aapt.org/>

Physics Around

<http://www.physics.mcgill.ca/>

Physics Classroom

<http://www.physicsclassroom.com>

Physics Web

<http://physicsweb.org/>

## **Earth and Space Science Resources**

Comet Website

<http://www.comet.ucar.edu/>

EE Link (Environmental Resources Link)

<http://eelink.net>

Finding Your Way

<http://mapping.usgs.gov>

Geophysics

<http://denali.gsfc.nasa.gov>

NASA

<http://www.nasa.gov/>

NSCSS Soil Science Links

<http://www.ncss.org/soil.html>

Project Atmosphere

[http://www.ametsoc.org/amsedu/project\\_atmosphere.html](http://www.ametsoc.org/amsedu/project_atmosphere.html)

U.S. Geological Survey — The Learning Web

<http://www.usgs.gov/education>

Volcanoes Page (Michigan Technological University)

<http://www.geo.mtu.edu/volcanoes/>

Water Resources & other science resources

<http://www.ncsu.edu/sciencejunction>

WeatherPlus University

<http://www.weatherplus.com>

Weather Prediction

<http://www.weather.gov>

Weather Net

<http://cirrus.sprl.umich.edu/wxnet/>

Weather Underground

<http://www.wunderground.com/>

Weather World 2010 Project

[http://ww2010.atmos.uiuc.edu/\(Gh\)/home.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/home.rxml)

### **Additional Resources**

Science Olympiad has a wide array of materials available to assist with these events. For more information or help on specific events, video tapes, and books go to the national Science Olympiad website at [www.soinc.org](http://www.soinc.org).