

# The Ohio Academy of Science

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## SCIENCE DAY PROGRAM UPDATE 2022-2023

September 1, 2022

To all State Science Day Officials, District Councils, Teachers, Mentors, Judges and Students,

The Ohio Academy of Science and Junior Academy Council continue to seek ways to provide the Science Day Program for students amid lingering COVID-19 restrictions and uncertainty. To that end, a dramatic new program will be implemented this year which will provide students with expanded research project guidance and resources significantly greater than anything done in the past. (See *ProjectBoard information provided in a separate document and at <https://projectboard.world/oas>*) The enclosed *Science Day Standards* apply to the 2023 State, District and Local Science Days. Please review them carefully.

**Plans for 2023 include: State Science Day** – due to continuing COVID-19 restrictions, the OAS has been unable to secure a venue large enough for an in-person judging event. The 2023 SSD will be held as an on-line virtually judged competition in early April. However, Superior-rated projects as well as other nominated projects will be invited to present their projects (in-person symposium style) at a State Science Day Celebration, held in mid-May at The Ohio State University. A number of additional select awards will be presented, along with keynote speakers, activities, campus department lab tours and food.

**District Science Days** – plans include a return to 17 separate in-person only DSDs. District Science Days will be required to use ProjectBoard for event registrations. Project registration requirements will be detailed in the ProjectBoard information provided and must be complete to participate. If a District is unable to provide an in-person District Science Day, students from that District may participate in a separate virtually judged District Science Day administered by the OAS office, to be known as “District 18”.

**Judging Scorecards:** The single judge scorecard (rubric) used in 2021 and 2022 will be updated/modified and shall be used at State Science Day and all District Science Days. It is advisable that District Councils also distribute the judge scorecard to all local and county science day administrators within their respective District to provide the best continuity of judging possible state-wide.

As a reminder, an **Engineering Design** project is any project where a prototype is designed, built, and tested. Not all Engineering projects are considered Engineering Design, and not all Engineering Design projects fall under an Engineering topic category. Regardless of the topic category, Engineering Design projects should be identified by students under the Statement of Purpose included in their Research Plan and Final Project Report. Likewise, **Meta-analyses** projects need to be identified by the student. It is important that these projects be identified correctly so that judges assess each project accordingly. Definitions for both are included in the Science Day Standards.

**Topic Categories:** 2023 topic categories and sub-categories will follow ISEF list found here: <https://www.societyforscience.org/isef/categories-and-subcategories/all-categories/>

Sincerely,



Michael Woytek, CEO

# THE OHIO ACADEMY OF SCIENCE 2022-2023

## SCIENCE DAY STANDARDS

### TABLE OF CONTENTS

- I. [Introduction](#)
- II. [Scientific Inquiry, Meta-analyses Research and Engineering Design Projects](#)
- III. [General Information](#)
  - a) [Grade Levels](#)
  - b) [Adherence to the Standards by Teachers](#)
  - c) [Project Duration](#)
  - d) [Sampling and the Use of Statistical Analysis](#)
  - e) [Policy Statements: Preventing, Detecting and Penalizing Plagiarism in Science Projects](#)
  - f) [Team Project Policies](#)
  - g) [Expectations of Display: Present Results](#)
  - h) [Safe Project Displays](#)
  - i) [Items ALLOWED at Project with the Restrictions Indicated](#)
  - j) [Items NOT ALLOWED at Project Display](#)
  - k) [Eligibility for District Science Day](#)
  - l) [Eligibility for District Science Day Under Extraordinary Circumstances](#)
  - m) [Policy for District Procedures for Registering Students for State Science Day](#)
  - n) [Eligibility for State Science Day](#)
  - o) [Preparation for State Science Day](#)
- IV. [Required Material](#)
  - a) [Abstract](#)
  - b) [Research Report](#)
  - c) [Research Plan](#)
  - d) [Additional Student Research Plan for Special Protocols or Adult Supervision](#)
  - e) [ISEF and Consent Forms](#)
- V. [Judging Information](#)
  - a) [Instructions to Judges](#)
  - b) [Judging- The Process](#)
  - c) [Judging Criteria for Individual and Team Projects](#)
  - d) [The Criteria Interpreted](#)
  - e) [Ranking vs Criteria](#)
  - f) [Re-judging Criteria to be used at Local, District and State Science Days](#)
  - g) [Provisional Judging Policy](#)
  - h) [Judging Ethics](#)
- VI. [Additional Policies & Procedures](#)
  - a) [General Harassment](#)
  - b) [Sexual Harassment](#)
  - c) [Accommodation of Students with Disabilities](#)

## I. Introduction to Student Participants

Participation in a Science Day should be a rewarding experience. It offers an opportunity: 1) to learn and practice the principles of scientific research, 2) to meet others interested in scientific study, and 3) to earn recognition for academic excellence. Thus, those involved should not be limited to a particular type of student as the accurate prediction of a student's potential is impossible until he or she has attempted a project several times. Most will not achieve perfection on the first attempt, but proficiency will come to those who are persistent.

When issues arise that are not covered in these standards, the student or teacher should seek guidance from the latest edition of the Rules for the International Science and Engineering Fair. (See <http://student.societyforscience.org/international-rules-pre-college-science-research>).

Teachers, other professionals, scientific organizations, industries, and parents can and will give much valuable aid if the request is made in the proper way. Reasonable response time, courtesy, and consideration coupled with sincere expressions of appreciation will eliminate many of the rough spots for a young scientist. Remember, others may advise and give aid, but they must not do any work for the participant.

## II. Scientific Inquiry, Meta-analyses Research and Engineering Design Projects

Not all **scientific inquiry projects** require a physical experiment be completed by the student researcher. **Meta-Analysis Research Projects**, or more precisely, "Statistical Meta-analyses", are projects which collect, process, or produce statistical data from multiple publicly available scientific studies or data reports, combining and/or using the information to explore a relationship that had not previously been explored, or to evaluate the combined data in a broader scope.

Meta-analysis projects require a well-documented lab journal with background and research notes; source data and graphs; and a research report including relevant background, research question and hypothesis and how it relates to the background; discussion of experimental design and procedures used by source researchers; data analysis and interpretation, conclusion, and bibliography. Meta-analysis projects do NOT require the researcher to perform first-hand physical experiments.

Just as **scientific inquiry projects** require: 1) the identification of a problem or question and 2) a proposed hypothesis that might offer a solution to the problem or answer the question, so too, **engineering and technological design projects** require: 1) a problem or needs statement and 2) a design statement that identifies such limiting factors and criteria for success or meeting the design as cost or affordability, reliability (mean time between failure MTBF), material limits (strength, weight, resistance to corrosion, color, surface texture, ease of manufacture or reproducibility), operating environment or conditions (temperature, humidity, barometric pressure, caustic condition), ergonomics (human factors), health and safety and general ease of use or operation.

In a manner like the development of methods used to test a hypothesis, engineering and technological design projects must test the "design statement" to see how close the prototype, for example, comes to meeting the design criteria. A prototype developed for an engineering or technological design project must achieve stated design objectives and satisfy specified constraints. Generally, the results of an engineering or technological design project will describe the extent to which the prototype met the design criteria. An inquiry project shall state the extent to which the results derived from

experimentation validate or invalidate a hypothesis. Thus, a *hypothesis* is to *inquiry* as *design* is to *engineering* and *technology*. In all cases, the students must present the results of repeated trials. Use the figure below to determine whether your project is testing a hypothesis or a design/engineering.

### Scientific inquiry vs. technological or engineering design projects

The Scientific Method	The Technological or Engineering Design Process
State a question or problem	Define a problem or need
Gather background information	Gather background information
Formulate hypothesis; identify variables	Establish design statement or criteria for success
Design experiment; establish procedure(s)	Prepare preliminary designs
Test hypothesis multiple times by an experiment	Build a prototype and test multiple times
Analyze results & draw conclusions	Analyze results; verify, test & redesign as necessary
Present results.	Present results

## III. General Information

### a) Grade Levels

Participants in local science days may be in any grade level. Each Junior Academy Council District Science Day has the option of accepting participants in grades 5-12 or 7-12. For 2023 there will be no requirement for a local fair “Superior” rating to qualify for a District Science Day. Projects should be reviewed by a teacher or mentor prior to registration. District SRC should also review. Any project completed and approved will be eligible.

### b) Adherence to the Standards by Teachers

Teachers promoting local student research projects and conducting local science days leading to District and State Science Days, are expected to have their students follow the official Science Day Standards outlined here. Included in these Standards are the Judging Criteria for both Individual and team projects that teachers should use locally and that must be used at all District Science Days. **The Ohio Academy of Science discourages the assignment or use of special points or a scoring rubric unique to local science days and does not permit their use by District or State Science Days.**

### c) Project Duration

A student research project shall be used for only one year. It must not be repeated nor given to another person to represent his or her work. Each student may enter only one project which covers research done over a maximum of 12 continuous months between January of the year before the Science Day and May of the year of the State Science Day. A project may continue only if it involves new or revised objectives, hypotheses, or methods, and presents substantially new or different results each succeeding year.

### d) Sampling and the Use of Statistical Analysis

Projects must provide adequate sampling and analyze results using statistics. This may require a great deal of time and many trials. Due to the nature of projects, it is not possible to state minimum sample sizes. Science or mathematics teachers, mentors, or advisors should be consulted to determine an adequate number.

Almost all scientific research involves statistics. A scientist should not draw a conclusion based on a single measurement or observation. Scientists usually repeat the same measurement three or more times and use statistics to express its reproducibility or significance. If the term “significant” is used, then the actual statistical test of significance must be stated. Other scientists may repeat the research to see if they can replicate the stated results. Sampling of subjects is of utmost importance. Students doing behavioral studies using vertebrates should learn what is the minimum number of subjects needed for adequate sampling. In project abstracts and reports always state the number of trials or the population samples as (N = number).

#### **e) Policy Statements: Preventing, Detecting and Penalizing Plagiarism in Science Projects**

- Any claim of plagiarism in a project made prior to, during or within one week after State Science Day shall be judged as usual, but all scores, ratings, and awards shall be retained until a review of the project is completed by the Academy office and/or its delegated inspectors. If the project is found to be plagiarized, the registration fees for State Science Day as well as awards and ratings will be forfeited. The district and school from which the project originated will be contacted. The student(s) future project(s) will be required to pass a review prior to presentation in any Academy Science Days.
- Scientific fraud and misconduct are not condoned at any level of research or competition. Such practices include plagiarism, forgery, use or presentation of other researcher’s work as one’s own, and fabrication of data. Fraudulent projects will fail to qualify for competition in affiliated fairs or the ISEF.

#### **f) Team Project Policies**

- A team shall consist of a maximum of three students. A District Science Day may only allow a maximum of two students per team due to local space limitations. Teams may not have more than three members at a local science day and then eliminate members to qualify for District or State Science Day. In a subsequent academic year, a continuing team project may be converted to an individual project or vice versa.
- Team projects shall be accepted at all District Science Days. Individual and team projects shall be considered equally when District science day directors select projects to fill quotas to attend State Science Day.
- All currently active team members must be present to receive an official recorded score. Team projects with a missing participant at an in-person judged event will be evaluated with comments but a final score will not be given. Such projects will not be eligible for sponsored awards. Also, all team members must contribute to the presentation in a virtually judged competition for the project to be scored and/or awards given. This will be in effect at District and State Science Day.
- Each team shall appoint a team leader to coordinate the work and act as the primary spokesperson. However, each member of the team should be able to serve as spokesperson, be fully involved with the project, and be familiar with all aspects of the project.
- The final work should reflect the coordinated efforts of all team members.
- Full names of all team members must appear on the abstract and registration forms. At in-person events, the Judges will be instructed to ask each team member for a one or two sentence description of what they consider to be their most important contribution.

## g) Expectations of Display: Present Results

**NEW IN 2023: There will be several options for displays at in-person District Science Days. Each District Council may determine which option or options may be used in their respective District.**

1. Traditional tabletop Tri-Fold poster. Table-top display dimensions shall not exceed 36 inches (91 cm) wide by 30 inches (76 cm) deep. The top of the display shall not be more than 85 inches (216 cm) above floor level or 55 inches (140 cm) above a 30-inch-high table. There shall not be any lettering or display materials extend more than 1 cm from the vertical front surface of a display board.
2. Printed QuadBoard (aka QuadChart). May be attached to a tri-fold poster or flat poster with braces to hold upright. The top of the display shall not be more than 85 inches (216 cm) above floor level or 55 inches (140 cm) above a 30-inch-high table. There shall not be any lettering or display materials extend more than 1 cm from the vertical front surface of a display board.
3. Tabletop Laptop presentation of digital QuadBoard and/or slide presentation from ProjectBoard, simulation, modeling, animation, or data display integral and essential to the project results.
4. Screen projected presentation of digital QuadBoard and/or slide presentation from ProjectBoard, simulation, modeling, animation, or data display integral and essential to the project results.

Students are expected to **present the results** of their original research and experimentation/design plan. They **are not expected** to perform, demonstrate, or repeat an experiment for judges or visitors. Students should have already completed an experiment or conducted many research trials, and thus have adequate results in the form of charts, graphs, data tables, and a required research notebook (printed or digital in ProjectBoard) — all recorded with dates — which should be with project display. ***Equipment used in research is not required for a presentation but is permitted if needed to explain a procedure to judges.*** Use photographs or drawings of equipment on the poster boards, in the technical report and in the research notebook or in ProjectBoard, to document and explain the equipment used. Items on the display backdrop/poster board, or in ProjectBoard should be used as visual cues to keep the students' oral presentation to the judges on track or to refer to when responding to questions. The whole project, in simple form, should be visible on the poster board or in ProjectBoard. Abstracts, a research notebook, technical reports, and additional data should be in folders (paper or digital) for immediate reference. At in-person events with physical displays, **“the score of the student’s project may be impacted by the violation(s) if either the physical dimensions or physical items rules are not followed.”**

**Displays for virtually judged Science Days** (District 18 and State Science Days) are provided via ProjectBoard, including the Abstract, the Final Report and a video which may include a power point (or similar software program) presentation of the same visual information required of poster presentations and an oral presentation as would have been provided to judges at an in-person Science Day.

## h) Safe Project Displays

Project displays at in-person events shall not involve materials or elements that might be dangerous to exhibitors, judges, or onlookers. However, it is understood that some hazardous materials or devices may be necessary in a research project. The experimenter should always exercise the greatest care and conduct these phases of the work under qualified supervision and follow all protocols as required and listed by the Rules of the International Science and Engineering Fair. **These materials or elements cannot be on the display poster, on the display table, or under the table at an in-person Science Day.**

## **i) Items ALLOWED at Project with the Restrictions Indicated**

For in-person Science Days, physical posters should display an abstract and data tables, diagrams, charts, photographs, and graphs that summarize results. The same items should be included if using digital presentation from ProjectBoard. Research notebooks, Final Research Reports, research plans and documentation of research protocols are expected, and may be in physical notebooks or folders on the table, or digitally provided in ProjectBoard for use by science day officials and judges. Information such as postal, web and e-mail addresses, telephone and fax numbers is allowed only for the exhibitor. The only photographs or visual depictions of identifiable or recognizable people allowed are photographs of the exhibitor, photographs taken by the exhibitor (with displayed individuals documented permission), or photographs/graphics for which credit is displayed (such as from magazines, newspapers, journals, websites, or other electronic media). Battery powered computers may be used only for project slide presentation or visualization of digital QuadBoard on ProjectBoard, simulation, modeling, animation, or data display integral and essential to the project results.

### **List of Items Permitted at Project Display at In-Person Science Day**

Equipment or materials used, or developed, as part of this project may be displayed if:

- It fits within the display dimensions described in Section III, part g. (Free-standing floor exhibits not permitted, must fit on table); and
- It is not listed in Section III, parts h and j “items NOT ALLOWED at Project Display”; and
- It meets Safety Regulations found in Section III, part j, that is deemed safe by the Display and Safety Committee upon inspection.

Permitted items may include Engineering Design prototypes and equipment designed and built to complete scientific research and to collect data for a project, assuming it meets the criteria above. (Note: All items included in project display must fit within the display dimensions described in these Science Day Standards, Section III. General Information, part g) “Expectations of Display”.)

## **j) Items NOT ALLOWED at Project Display**

- Living organisms, including plants
- Soil, sand, rock, cement and/or waste samples
- Taxidermy specimens or parts
- Preserved vertebrate or invertebrate animals
- Human or animal food as part of the exhibitor demonstration of the project.
- Human/animal parts or body fluids (for example, blood, urine) NO exceptions for teeth, hair, nails, dried animal bones, histological dry mount sections, and completely sealed wet mount tissue slides.
- Petri dishes or culture tubes with living or dead cultures
- Plant materials (living, dead, or preserved) that are in their raw, unprocessed, or non-manufactured state (Exception: manufactured construction materials used in building the project or display)
- All chemicals including water (exception: sealed bottled water for human consumption)
- All hazardous substances or devices (Example: poisons, drugs, firearms, weapons, ammunition, reloading devices)
- Large vacuum tubes or dangerous ray-generation devices (exceptions: computer monitors on battery-operated notebook computers when used for computer modeling projects)

- Items that may have contained or been in contact with hazardous chemicals (Exception: Item may be permitted if professionally cleaned and document for such cleaning is available)
- 3-D Printers
- Dry ice or other sublimating solids
- Sharp items (for example, syringes, needles, pipettes, knives)
- Flames or highly flammable materials (including magnified light sources). A Fresnel Lens cannot be used in conjunction with a light source - it becomes an open flame.
- Any apparatus producing heat above room temperature (e.g., heat lamp, hotplates, Bunsen burner)
- Batteries with open-top cells or wet cells
- Glass, or glass objects, (including mirrors in hologram or laser apparatus), unless deemed by the Display and Safety Committee to be an integral and necessary part of the project (for example, glass that is an integral part of a commercial product such as a computer screen)
- Any apparatus deemed unsafe by the Scientific Review Committee, or the Display and Safety Committee (Example: empty tanks that previously contained combustible liquids or gases, pressurized tanks, etc.)
- The Display and Safety Committee reserve the right to remove any project for safety reasons or to protect the integrity of the State Science Day and its rules and regulations.
- Awards, medals, flags, etc. (Exceptions: Academy membership or State Science Day lapel pins)
- Organizational/school/mentor/grant provider/etc. logos or reference statements.

#### **Other Display Safety Regulations (at in-person events)**

- Any inadequately insulated apparatus producing extreme temperatures that may cause physical burns is not allowed
- Any apparatus with unshielded belts, pulleys, chains, or moving parts with tension or pinch points must be for display only
- Project sounds, lights, odors, or any other display items must not be distracting. Exceptions to this rule may be permitted for judging demonstrations. Approval must be given prior to judging. Exhibitors must endeavor to limit the distraction to be as brief as possible. Extended distraction(s) may cause the exception to be revoked by the Safety and Display Committee.

#### **Electrical Regulations at State Science Day (at in-person event)**

- No AC electrical power will be provided or shall be used.
- Battery powered devices must be protectively enclosed. Any enclosure must be non-combustible. All external non-current carrying metal parts must be grounded.
- Energized wiring, switches, and metal parts must have adequate insulation and over-current safety devices (such as fuses) and must be inaccessible to anyone other than the student(s) for the project.

#### **Laser Requirements (at in-person events)**

Any Class 1 or Class 2 lasers, along with only Class 3A or 3R lasers, are allowed to be used provided a finalist avoids indiscriminate exposure to other finalists, judges, or visitors (except if passed through magnifying optics such as microscopes and telescopes, in which case they may not be used). No other lasers may be used or displayed.

- Any laser must be labeled by the manufacturer so that power output can be inspected. Lasers without labels will NOT be "cleared."
- LED's that consume over 1 watt, unless they are in a commercial light bulb/fixture or otherwise shielded, will not be allowed.

- Lasers will be confiscated with no warning if not used in a safe manner. Serious offenses may result in failure to qualify.

Due to unavailability of electrical power supply at State Science Day, use of lasers is limited to battery-powered equipment (Laser classifications defined: <https://www.rli.com/resources/articles/classification.aspx>)

### **k) Eligibility for District Science Day**

Students shall be admitted to only one District Science Day per year. District Science Days shall not accept duplicate projects from the same school.

For 2023 there will be no requirement for a local fair “Superior” rating to qualify for a District Science Day. Projects should be reviewed by a teacher or mentor prior to registration. District SRC should also review. Any project completed and approved will be eligible.

A local or county science day is expected to use the same forms, follow the same rules and criteria on safety and judging as the District and State Science Days.

Each District is expected to accept only students who live in the boundaries of that District, except for existing agreements between districts.

Under unusual circumstances, the director of the home district may request the director of the temporary district for permission for one or more students of the home district to participate in the temporary district for one year only. The director of the home district must contact the director of the temporary district directly to request to be made and permission be granted. Specifically, the director of the temporary district will NOT accept requests for transfer by any representative other than the director of the home district.

If permission is granted, the home district will send to the temporary district one (1) accommodating judge for every three (3) accommodated students sent, with a minimum of one (1) accommodating judge. If permission is granted, the accommodated student will: 1) pay their fees to the temporary district, 2) be eligible for prizes from the temporary district, at the discretion of the temporary district director, and 3) be counted in the State Science Day quota for the temporary district, at the discretion of both district directors if they are eligible to go to State Science Day. The only exception is they will not be eligible to participate in the Regional Science and Engineering Fair (RSEF) at the home district if not permitted by the affiliation agreement of the RSEF with ISEF.

In lieu of the above policies & procedures, any student unable to participate in their respective District Science Day may instead register for the OAS administered virtually judged “District 18 Science Day”. Those students may not be eligible for any District level awards; however, a Superior rating will make the project eligible for State Science Day.

### **l) Eligibility for District Science Day Under Extraordinary Circumstances**

Does not apply. Requirement for a Local or County Science Day Superior is waived for 2023.

### **m) Policy for District Procedures for Registering Students for State Science Day**

**Students selected to enter State Science Day following an in-person District Science Day are expected to be present for the announcement of their eligibility for State Science Day.** If a student anticipates that he or she will not be present for announcement and receipt of registration

instructions and materials, he or she must designate in advance of the event and in writing an adult to be responsible for obtaining the registration materials, and promptly delivering the materials to the absent student. **Absence from the announcement does not relieve the student of the responsibility to meet the registration deadline.** The District Science Day Director shall have final authority for selection of State Science Day registrants who are certified as eligible to the executive office of the Ohio Academy of Science by noon on the first Monday after the district science day. **Students selected to enter State Science Day following a virtually judged District Science Day will be notified via email. This notice will include registration instructions and deadlines.**

**n) Eligibility for State Science Day**

All Superior rated projects from a District Science Day may register to be judged at the State Science Day competition. District quotas do not apply for 2023.

**o) Preparation for State Science Day**

District Science Day Directors may meet with all eligible students, parents and teachers or mentors in advance of State Science Day **judging to coach and prepare students for participation in State Science Day.**

## **IV. Required Material**

**a) Abstract *\*REQUIRED for all Student Participants\****

All students at Local, District, and State Science Days shall have an abstract and written research report, which documents that the student has researched relevant literature, stated a question and/or tested a hypothesis or technological design statement, collected and analyzed data, and drawn conclusions.

Abstracts of 250 or fewer words are required and must be submitted with applications for both District and State Science Days. The abstract must contain a heading that includes a project title and name(s) of the author(s). The heading does not contribute to the word count. The purpose of an abstract is to provide a summary of the project that will inform interested individuals of the contents. The wording must be written in a manner that any scientifically minded individual, who may not be familiar with the topic, can quickly understand the project's important points. Keep the wording brief and concise and use complete sentences.

Summarize in a few sentences:

- Background information necessary to understand the project and its importance
- The problem that was investigated and the hypothesis or technological design statement
- Outline the materials and methods used in the actual experimentation
- Summary of the results obtained from experimentation
- The conclusions drawn from results
- The importance or potential applications that the research offers

**b) Final Research Report *\*REQUIRED for all Student Participants\****

**\*Scientific fraud and misconduct are not condoned at any level of research or competition. Such practices include plagiarism, forgery, use or presentation of other researcher's work as one's own, and fabrication of data. Fraudulent projects will fail to qualify for competition in affiliated fairs or the ISEF.**

- **All written reports and logbooks (paper or digital) must disclose and cite where appropriate the specific source(s) of the idea for the project. Citations must be fully documented with references such as author(s), date, publication, and URL, if website.**
- The Ohio Journal of Science follows the citation and reference plan of the 8<sup>th</sup> Edition of Scientific Style and Format: The CSE (Council of Science Editors) Manual for Authors, Editors and Publishers.
- Research Report must follow an accepted form of technical writing such as: MLA, APA, and others.

### **Required Final Research Report**

Each project must include a research report covering in detail all the work, references consulted, and acknowledgement of assistance received. The experimental data, statistics, notes, and computations should be recorded in a research notebook. The report should include a description of the work, the results, and the conclusions. This report should follow an accepted form of technical reporting and be checked for correct punctuation, spelling, and grammar preferably by an English teacher. If possible, the report should contain illustrations in the form of photographs, sketches, graphs, data tables or chart that contribute to the effectiveness of the material presented. The Ohio Academy of Science recommends the following format for sections of the research report:

- Title Page including the date and name of student
- Table of Contents (optional for reports fewer than 10 pages)
- Abstract
- Background Information
- Problem and hypothesis or problem and design statement
- Methods and Materials used to study the problem
- Results, including an analysis of collected data with graphs, tables, photographs, and diagrams to illustrate investigation
- Conclusions and Implications for further research
- References or Literature Cited

### **c) Research Plan *\*REQUIRED for all Student Participants\****

All students who participate in District and State Science Days shall complete a research plan **prior to beginning their experimentation or research trials**. Modifications in the plans are permitted during the process of research. The modifications must be prepared and dated as a research plan. If the modifications involve new protocols that must be approved before experimentation, it must be approved before the student resumes experimentation. The initial research plan must be kept if any data obtained before the modification will be used in the final project.

A student research plan shall include: 1) The name and address of each student involved in the research, 2) The teacher's name or name of research supervisor, 3) Whether the project is a continuation of work or a new project, 4) Where the work will be done (home, school, research institution, industry, or in the field), 5) The project title, 6) The research question (s) or problem, 7) The hypothesis or technological design statement, 8) The experimental methods or procedures, and 9) At least five major references specifically applicable to the proposed research; e.g., science journal articles, books, or internet sites. For internet sites, research plans must cite the complete URL, a title of the report, the name of the author if known, and the date of the publication or update of the site.

If the proposed research involves vertebrate animals, then the research plan must also: 1) provide a detailed justification for their use, 2) briefly discuss non-vertebrate alternatives and 3) give an additional animal care reference for the species being used.

#### **d) Additional Student Research Plan for Special Protocols or Adult Supervision**

##### **\*REQUIRED\***

These projects include those associated with:

- Human subjects
- Nonhuman vertebrate animals including observation projects
- Potentially hazardous biological agents including microorganism, recombinant DNA technologies, or human or animal fresh tissues, blood or body fluids
- Controlled substances and alcohol and tobacco
- Hazardous substances or devices including certain chemicals, equipment, firearms, radioactive substances, and radiation

#### **e) ISEF and Consent Forms *\*REQUIRED for all Student Participants\****

An on-line Consent and Release Form must be read and marked as agreed to by all students and parents to register in District and State Science Days.

##### **The International Science and Engineering Fair Forms**

The documents for the ISEF are available at <https://www.societyforscience.org/isef/>. Procedures of a particular year must be used by all students who participate in District and State Science Days of the same year. These rules require adherence to special student research protocols and supervision, including **prior approval of student research projects** by local scientific review committees (SRC) or, in the case of human subjects, institutional review boards (IRB). **Local schools or counties must appoint and manage these committees.** Depending upon the project(s), committee members must have sufficient professional expertise by way of education and experience to review both human subjects and non-human vertebrate projects.

## **V. Judging Information**

### **a) Instructions to Judges**

**The attitude and conduct of the judges determine the success of any Science Day Activity. Therefore, it is vital that each judge understands thoroughly his or her duties and obligations. All judges need to have a genuine interest in young people combined with a desire to offer encouragement and guidance in their efforts to pursue learning in the various fields of science.**

For in-person and virtually judged Science Days, students shall have an opportunity to present their project to two judges (in-person or online video presentation respectively), one of whom (where possible) should be a K-12 teacher. This may be achieved as a team of judges or separately, with the scores averaged. Although judges should discuss the performance of the student, each judge shall score independently of the other judge and shall not reveal the scores to the other judge(s) or to the student. Only Science Day officials may inform the student of the scores or ratings after judging.

For in-person Science Days:

- Judges should have full knowledge of all The Ohio Academy of Science's requirements and expectations for Science Day participants.

- Judges should introduce themselves upon approaching a student and attempt to establish a friendly rapport to help reduce the participant's tension. Judges are expected to be exceptionally courteous to all students.
- The student should first be asked to give her/his oral presentation of the project while judges listen carefully to the complete presentation. Secondly, Students are expected to answer questions about her/his work on the specific problem. It is also proper for Judges to ask questions within the discipline or subject matter involved at the student's level of learning.
- Judges should feel free to question the participant on the materials and tools used, the methods of construction, terms used, the sources of information, and the amount and type of assistance enlisted in the preparation of the project.
- Judges should take an active part in the evaluation; silence may be interpreted as disinterest or boredom, which can have a very discouraging effect on the participant.
- Judges are required to check through the abstract, the research plan, and research report to determine their quality. A check of the references will assist in making fair determination of the scope and depth of the literature search. The quality and quantity of the references should be considered to evaluate the student's research methodology.
- Judges should determine the span of sustained interest in the particular field of science, as well as the approximate amount of time spent in developing the project being evaluated. Some premium should be granted for considerable extended interest and effort to encourage this quality of persistence.
- Judges are to review the Project Data Book/notebook/logbook for the project. Note the number of entries, the dates, as well as the number of subjects or specimens used. Is the number adequate to generalize to the larger group what the sample is intended to represent?
- Judges are expected to write statements to the student/s in a professional manner on the back of each score card. The scorecard will be returned to the student thus the comments should reflect reasons for the rating, as well as suggestions for improvement.
- Judges are expected to discuss the final scoring of the project a considerable distance from the participant, since disclosure of scores is delayed until judging is completed.

For online virtually judged Science Days (District 18 and State Science Days):

- Judges will review each project Abstracts, Final Report, and video presentation independently through the online platform.
- Judges are expected to write statements to the student/s in a professional manner in the space provided through the online platform. The scores and comments will be provided to the student, thus the comments should reflect reasons for the rating, as well as constructive suggestions for improvement of the project and its presentation.

## **b) Judging – The Process**

The score received by a project is the average of the scores of the two judges. Fractional scores should be rounded up.

### **Minimum number of points for each rating:**

**Individual and Team Projects:** Superior 36, Excellent 24, Good 12, Satisfactory 4 (Satisfactory not given at State Science Day).

**All students at local, District or State Science Days shall have an abstract and a written Final Report, which documents that the student has searched relevant literature, state a question and/or tested a hypothesis or technological design statement, collected and analyzed data, and**

**drawn conclusions.** For a superior rating, an individual student shall receive a minimum of 36 points, or 45 points for a team, based on the criteria of: 1) Depth of Understanding, 2) Experimental or Engineering Design, 3) Oral, Written & Visual Communication, 4) Originality and Creativity.

### c) Judging Criteria for Individual and Team Projects

<b>Individual and Team Projects will be judged on the following criteria:</b>	<b>Max. Points</b>
• Depth of Understanding (considering student's age and grade level)	10
• Experimental or Engineering Design	15
• Oral, Written & Visual Communication	10
• Originality and Creativity	05

Each criterion is rated with cumulative of 40 points being the maximum

- Superior range is 36-40 points
- Excellent range is 24-35 points
- Good range is 0-23 points

### d) The Criteria Interpreted

The following explanations interpret the various criteria on which the student's project or exhibit will be judged. The bullets do not have pre-determined numerical value.

#### ***Depth of Understanding (considering the student's age and grade level)***

- Adequate age-appropriate background research (journals, textbooks, websites, etc.) relevant to the project which provides basis for hypothesis and age-appropriate use of terms and principles.
- Supplements answers with relevant information reflecting knowledge gained during the project.
- Describes how project applies to the student, the community, and the natural world (i.e., the "why" would this project be important for people to know).
- Age-appropriate exploration of science in subject, depth of investigation, and/or sophistication of project.

#### ***Experimental Design***

- Project addresses a clear, focused problem or question with hypothesis that is testable using scientific methods. If Meta-Analysis project, then hypothesis is testable using data from multiple peer-reviewed research papers. If Engineering Design project, addresses a clear, focused engineering design problem or need; criteria for success are identified; preliminary designs prepared; prototype is created and tested with results clearly communicated.
- Project plan and data collection methodology identifies variables and controls and is not a summary of already known science. If Engineering Design project, student identifies and applies established engineering principles in their design.
- Reproducible and sufficient data are collected, or if Meta-Analysis project, enough scientific data is synthesized from other sources to address question/problem. Data used were collected using appropriate and safe scientific protocols. If Engineering Design project, student used materials and processes effectively to correctly build prototype or model.
- Data are properly analyzed. Appropriate graphs and/or tables illustrate the data. Statistics appropriate to the age of student are correctly used. If Engineering Design project, sufficient testing of prototype or model is completed; data is properly measured, presented, and analyzed.

- Includes discussion of results and forms valid conclusions reached from the data obtained with sources of error identified. If Engineering Design, prototype successfully meets criteria that were established for the project.

### ***Oral, Written & Visual Communication***

- Written: Final Research Report (includes relevant background information, research question and testable hypothesis, experimental design and procedures, data acquisition techniques, data analysis, conclusion and works cited). For Engineering Design projects, include an engineering design statement, design plan and discussion of prototype development and testing.
- Oral: Correct and concise explanation of project, design, and analysis. Responses reflect accurate understanding of experimental results and limitations of, expansions of, and/or impact of project.
- Visual: Logical organization of material, neatly displayed, graphics and legends appropriate to project, easy to read and understand. Photos and graphics cited.

### ***Originality and Creativity***

Project displays originality in concept, relative to grade level (i.e., not "cookbook", not classroom lab, not a simple extension of "found" idea). The project is a new idea, concept, principle, insight, or non-obvious approach. There is novel association or relationship of previous knowledge and particularly rigorous analyses that reveals previously unknown relations, etc.

## **e) Ranking vs Criteria**

Except to fill quotas for participation in District and State Science Days, The Ohio Academy of Science does not rank students at local, District, or State Science Days. Rather, Judges for the Academy compare students against the judging criteria described above.

## **f) Re-judging Criteria to be used at Local, District and State Science Days**

Teachers promoting local student research projects and conducting local science fairs or science days leading to District Science Days and to State Science Day are expected to have their students follow the official Science Day Standards outlined herein. Included in these Standards are the following Re-judging Criteria for both individual and team projects that teachers should use locally and that must be used at all District and State Science Days.

- Two judges will judge each project for the Ohio Academy of Science ratings.
- If each judge grants a total score within anyone rating category (Superior, Excellent, or Good), that specific rating (Superior, Excellent, or Good) will be granted to the student and no re-judging is permitted.
- Re-judging is automatic *if all three* of the following conditions apply:
  - The judges' final ratings are in different categories,
  - The average of the judges' scores is in the lower category, and
  - If the judges differ in their total points by more than five points.

No project will be re-judged at State Science Day based solely on rating. Individual districts, however, may choose to re-judge based on rating provided a consistent policy is developed and consistently applied within the individual district.

*Under exceptional circumstances*, a project may be re-judged at a District Science Day with the approval of the District Science Day Director or designee.

*Under exceptional circumstances*, a project may be re-judged at State Science Day with the approval of the CEO of The Ohio Academy of Science, or the Director of the Junior Academy Council, or designee.

### **g) Provisional Judging Policy**

No longer applies.

### **h) Judging Ethics**

#### **Judges shall:**

- Return judging cards immediately to Science Day officials if (1) you know the student, (2) the project is out of your area of expertise, or (3) there are language issues that may impair communication
- Keep in mind that the Mission of the Ohio Junior Academy of Science is to discover and foster interest in science, technology, engineering, and mathematics among students in grades 5-12
- Have no prior involvement with the participant or project
- Adhere to all Ohio Academy of Science Guidelines
- Judge students against CRITERIA not against other students
- Listen carefully to student's complete presentation
- Be always attentive and courteous to students
- Evaluate theoretical and applied projects without bias toward either
- Provide written, constructive criticism and suggestions for improvement
- Seek written permission from students to photograph them
- Not photograph students or projects during judging
- Avoid discussion of ratings with others prior to public release

## **V. Additional Policies & Procedures**

### **a) Harassment Generally – Policy (In-person or Online Communications)**

This policy prohibits harassment of any kind against any student, volunteer, or employee by an adult, another student, volunteer, Science Day committee member or employee, or third party for any reason including, but not limited to: age, national origin, race, color, religion, gender, gender identity, sexual orientation, marital status, disability, ancestry and/or veteran status. Harassment includes but is not limited to slurs, epithets, threats, derogatory comments, unwelcome jokes, and teasing.

Any student or other person who feels that he or she is a victim of such harassment at an Ohio Science Day program should promptly report the matter to a member of the Event Staff or a Committee member (of the respective State or District Science Day Committee) or other adult authority who must immediately present it to the proper Science Day authority. If a Science Day employee or adult volunteer becomes aware of such a situation, he or she is under the responsibility to report it to the proper Science Day event authority (Ohio Academy of Science-CEO or Junior Academy Council Director for State Science Day, or District Council Chair or designated council member for each respective District Science Day). Upon receipt of an allegation(s), the appropriate representative of the Host Institution will be contacted and an investigation will be initiated following the established policy & procedure of the Host Institution. All such reports will be handled as confidentially as possible. The Science Day event authority or the Host Institution, or

both organizations, may take appropriate disciplinary action against any person found to have violated the harassment policy. This includes contacting appropriate law enforcement agencies if deemed necessary.

No adverse action or retaliation will be allowed to be taken against a person who reports a violation or who participates in an investigation of this policy in good faith. Knowingly false accusations are prohibited and will be treated by disciplinary action comparable to that which would be applied to actual misconduct.

#### **b) Sexual Harassment – Policy (In-person or Online Communications)**

Sexual harassment of or by any person in attendance at any Science Day event (State or District level) is prohibited. Sexual harassment includes but is not limited to unwelcome sexual advances, requests for sexual favors, and/or verbal or physical conduct of a sexual nature including, but not limited to, drawings, pictures, jokes, teasing, or uninvited touching.

In accordance with this policy, unwelcome sexual advances, requests for sexual favors, sexual demands, or other verbal or physical conduct of a sexual nature will constitute sexual harassment when:

- The conduct has the purpose or effect of unreasonably interfering with an affected person's performance, or creating an intimidating, hostile, or offensive environment; or in third party situations, one or more individuals are reasonably offended by the sexual interaction, conduct, or communications between others.
- The conduct has the effect of creating actual, perceived, or potential conflicts of interest, favoritism, disruption, or lack of objectivity.

Any student or other person who feels that he or she is a victim of sexual harassment at an Ohio Science Day program should promptly report the matter to a member of the Event Staff or a Committee member (of the respective State or District Science Day Committee) or other adult authority who must immediately present it to the proper Science Day authority. If a Science Day employee or Adult volunteer becomes aware of such a situation, he or she is under the responsibility to report it to the proper Science Day event authority (Ohio Academy of Science-CEO or Junior Academy Council Director for State Science Day, or District Council Chair or designated council member for each respective District Science Day) Upon receipt of an allegation(s), the appropriate representative of the Host Institution will be contacted and an investigation will be initiated following the established policy & procedure of the Host Institution. All such reports will be handled as confidentially as possible. The Science Day event authority or the Host Institution, or both organizations, may take appropriate disciplinary action against any person found to have violated the harassment policy. This includes contacting appropriate law enforcement agencies if deemed necessary.

No adverse action or retaliation will be allowed to be taken against a person who reports a violation or who participates in an investigation of this policy in good faith. Knowingly false accusations are prohibited and will be treated by disciplinary action comparable to that which would be applied to actual misconduct.

#### **c) Accommodation of Students with Disabilities at Science Day – Policy**

When teacher, parent, or student gives advance notice of a disability which would affect the student's ability to attend or remain all day at a Science Day, without some accommodation regarding access or schedule, the event administrators should determine the exact needs of the

student and identify solutions which would allow the student to present their project as best they can. This may include access to facilities for project presentation, seating if not in a wheelchair, restroom access, early judging and to be excused from staying for awards if needed. Student would still need to meet established judging criteria and earn a Superior rating to move on.

If no advance notice is given, event committee should consider options on a case-by-case basis, with goal to accommodate the student's needs if possible. If unable to accommodate needs, give involved parties an explanation why and provide them the opportunity to suggest other ideas or options not considered by event committee (student may have been in similar situations in the past).