

## The Ohio Academy of Science

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### SCIENCE DAY PROGRAM UPDATE 2024-2025

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

The Ohio Academy of Science (OAS) and Junior Academy Council (JAC) continue seeking ways to provide students with the Science Day Program. The program ProjectBoard will be implemented this year, providing students with expanded research project guidance and resources. The enclosed *Science Day Standards* apply to the 2025 State, Regional, and Local Science Days. Please review them carefully.

#### **Plans for 2025 include:**

**State Science Day** – The 2025 SSD will be held as an online, virtually-judged competition in early April. However, Superior-rated projects and other nominated projects will be invited to present their projects (in-person symposium style) at a State Science Day Celebration held in May at The Ohio State University. Additional select awards will be presented, along with keynote speakers, activities, campus department lab tours, and food.

**Regional Science Days** – Ten Regional Science Days will be in-person, with one being held virtually. Regional 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 Region cannot provide an in-person Regional Science Day, students from that Region may participate in a separate virtually-judged Regional Science Day administered by the OAS office, known as Virtual Regional Science Day.

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

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 in their Final Project Report. Likewise, **Meta-analysis** projects need to be identified by the student. It is essential 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:** 2025 topic categories and sub-categories will follow the ISEF list found here:

<https://www.societyforscience.org/isef/categories-and-subcategories/all-categories/>

Sincerely,



Michael Woytek, CEO

# THE OHIO ACADEMY OF SCIENCE 2024-2025

## SCIENCE DAY STANDARDS

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## 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 they have 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 not covered in these standards arise, 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 valuable aid if the request is made properly. Reasonable response time, courtesy, consideration, and sincere expressions of appreciation will eliminate many rough spots for a young scientist. Remember, others may advise and give aid, but they must not do any work for the participant.

## II. Hypothesis-based Research, Meta-analysis Research and Engineering Design Projects

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

Meta-analysis projects require a well-documented Project Data Book 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 **hypothesis-based 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.

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, meets the design criteria. A prototype of 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. A hypothesis-based research project shall state the extent to which the results derived from

experimentation validate or invalidate a hypothesis. In all cases, the students must present the results of repeated trials. Use the figure below to determine whether your project tests 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

Each Junior Academy Council Regional Science Day accepts participants in grades 5-12. There is no requirement for a local fair “Superior” rating to qualify for a Regional Science Day. A teacher or mentor should review projects before registration. The Region’s Scientific Review Committee (SRC) should also review any project that has been completed and approved and will be eligible.

### b) Adherence to the Standards by Teachers

Teachers promoting local student research projects and preparing students for Regional and State Science Days are expected to have their students follow the official Science Day Standards outlined here. These Standards include the Judging Criteria for all projects that teachers should use locally and must be used at all Regional Science Days. **The Ohio Academy of Science discourages assigning or using special points or a scoring rubric unique to local science days. It does not permit their use by Regional 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 their work. Each student may enter only one project that covers research done over a maximum of twelve (12) continuous months between January of the year before Science Day and May of the year of 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 the projects, it is impossible 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 the minimum number of subjects needed for adequate sampling. Project abstracts and reports always state the number of trials or the population samples as (N = number).

#### **e) Team Projects**

- A team shall consist of a maximum of three students. Those students cannot be separated by more than a single grade level in grades 5-8. Students from any combination of grade levels in grades 9-12 can constitute a team. Teams may not have more than three members at a Local Science Day and then eliminate members to qualify for Regional 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 Science Days.
- 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 awards given. This will be in effect at Regional and State Science Days.
- Each team shall appoint a leader to coordinate the work and act as the primary spokesperson. However, each team member should be able to serve as a 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.
- The 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.

#### **f) Expectations of Display: Present Results**

There will be several options for displays at in-person Science Days. Each Regional Council may determine which option or options may be used in their respective Region.

- 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 extending more than 1 cm from the vertical front surface of a display board.
- Printed Quad Chart. It may be attached to a tri-fold poster or flat poster with braces to hold it 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 extending more than 1 cm from the vertical front surface of a display board.
- Tabletop Laptop presentation of digital Quad Chart and/or slide presentation from ProjectBoard, simulation, modeling, animation, or data display is integral to the project results.
- Screen projected presentation of digital Quad Chart and/or slide presentation from ProjectBoard, simulation, modeling, animation, or data display integral and essential to the project results.

Students are expected to **present their original research and experimentation/design plan results**. 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 Project Data Book (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, 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 Project Data Book, 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 are provided via ProjectBoard, including the Abstract, the Final Report, Quad Chart, and a video that may include a PowerPoint (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.

### **g) 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, 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, the display table, or under the table at an in-person Science Day.**

### **h) 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 a digital presentation from ProjectBoard. Project Data Books, 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, as well as 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 Quad Chart 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 are not permitted and must fit on a table), and
- it is not listed in Section III, Parts h and j; and
- it meets Safety Regulations found in Section III, Part j, and 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 collect data for a project, assuming it meets the criteria above. (Note: All items in the project display must fit within the dimensions described in these Science Day Standards, Section III. General Information, part g) “Expectations of Display”.)

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

- Living organisms, including plants
- Soil, sand, rock, cement, and 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 (Except 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 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 reserves 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 before 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 events)***

- 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."
- LEDs 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 safely. Serious offenses may result in failure to qualify.

Due to the unavailability of an electrical power supply at State Science Day, the use of lasers is limited to battery-powered equipment (Laser classifications defined:

<https://www.rli.com/resources/articles/classification.aspx>)

## **j) Eligibility for Regional Science Days**

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

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

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



other than the Director of the home region. If permission is granted, the accommodated student will 1) pay their fees to the temporary region and 2) be eligible for prizes from the temporary region at the discretion of the temporary region's Director.

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

#### **k) Regional Procedures for Registering Students for State Science Day**

**Students selected to enter State Science Day following an in-person Regional Science Day are expected to be present for the announcement of their eligibility for State Science Day.** If a student anticipates that they will not be present for the announcement and receipt of registration instructions and materials, they 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 Regional Science Day Director shall have final authority for the 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 Regional Science Day. **Students selected to enter State Science Day following a virtually-judged Regional Science Day will be notified via email. This notice will include registration instructions and deadlines.**

#### **l) Eligibility for State Science Day**

All Superior-rated projects from a Regional Science Day may register to be judged at the State Science Day competition.

#### **m) Preparation for State Science Day**

Science Day Directors may meet with all eligible students, parents, teachers, or mentors before the 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 Regional 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 tested a hypothesis or technological design statement, collected and analyzed data, and drawn conclusions.

Abstracts of 250 or fewer words must be submitted with applications for Regional and State Science Days. The abstract must contain a heading with a project title and the 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 so that any scientifically minded individual who may not be familiar with the topic can quickly understand the project's essential 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 the results
- the importance or potential applications that the research offers

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

Each project must include a research report covering in detail all the work, references consulted, and acknowledgment of assistance received. The experimental data, statistics, notes, and computations should be recorded in a research notebook. The report should describe 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, and data tables or charts 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 the student(s)
- Table of Contents (optional for reports fewer than ten 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 the investigation
- Conclusions and Implications for further research
- References or Literature Cited, following an accepted form of technical writing such as MLA, APA, or others

**c) Visual Presentation \*REQUIRED for all Student Participants\***

Display options for Regional Science Days include a Tri-Fold Board, Quad Chart Poster, Digital Quad Chart, and slide show (e.g., PowerPoint, Google Slides, etc.). Check the Regional Science Day Map for your requirements. Refer to section III, subsections f-i for display rules.

**d) Video**

This brief presentation should completely summarize the project. The quality and quantity of knowledge attained by the student will be evaluated by this Oral Presentation. Students should not memorize a formal speech. An outline (notecards) that lists the variables, procedures, data collection, results, conclusions, references, and implications of the entire project may assist the student during the presentation. The video shall not exceed 15 minutes.

What to include in your video:

- Introduce Yourself. State your full name and current grade. Rather than reciting your project title, consider explaining your project in a single sentence.
- Explain Your Project. Summarize your research into main points. What did you do? What did you find? What conclusions did you draw?

## e) Quad Chart

A “quad chart” is a single page divided into four quadrants providing a high-level project summary. It is intended to be more visual than detailed to quickly introduce your judges to what is important about your project.

- Quad Chart Title: Line one is the title of your project. Line two is your name(s) and grade(s). Do not include the names of schools or other organizations.
- Quadrant 1: Research Question/Engineering Objectives
  - State the research question or engineering problem being addressed. A leading core graphic or visual is encouraged but not required.
- Quadrant 2: Methodology/Project Design
  - Provide a succinct, bulleted summary of the methodology/project design.
- Quadrant 3: Data Analysis & Results
  - It is advised that this quadrant should primarily be a graphic representation of relevant data and results. The text should be kept to a minimum.
- Quadrant 4: Interpretation & Conclusions
  - In this quadrant, you will reject or accept your hypothesis. You will then list the evidence that supports your conclusion statement. Finally, please list the real-world applicable reasons your project is important to the STEM community.

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

An online Consent and Release Form must be read and marked as agreed to by all students and parents to register for Regional and State Science Days.

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

The documents for the ISEF are available at <https://www.societyforscience.org/isef/forms/>. All students participating in Regional and State Science Days of the same year must follow the procedures for a particular 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 through education and experience to review human subjects and non-human vertebrate projects. **For a detailed explanation of each ISEF form, please refer to the [ISEF Forms Help document](#).**

## V. Judging Information

### a) Instructions to Judges

The attitude and conduct of the judges determine the success of any Science Day Activity. Therefore, each judge must understand thoroughly their 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 student's performance, each judge shall score independently of the other judge and shall not reveal the scores to the other judge(s)

or the student. Only Science Day officials may inform the student of the scores or ratings after judging.

For in-person Science Days:

- Judges should know all The Ohio Academy of Science's requirements and expectations for Science Day participants.
- Judges should introduce themselves when 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 their oral presentation of the project while judges listen carefully to the complete presentation. Secondly, Students are expected to answer questions about their 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, the terms used, the sources of information, and the amount and type of assistance enlisted in the preparation of the project.
- Judges should actively participate 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 the research report to determine their quality. A check of the references will assist in making a fair determination of the scope and depth of the literature search. The quality and quantity of the references should be considered when evaluating the student's research methodology.
- Judges should determine the span of sustained interest in the particular field of science and the approximate amount of time spent 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 for the project. Note the number of entries, the dates, and the number of subjects or specimens used. Is the number adequate to generalize to the larger group the sample intends to represent?
- Judges are expected to write statements to the student(s) in a professional manner on the back of each scorecard. The scorecard will be returned to the student; thus, the comments should reflect reasons for the rating and suggestions for improvement.
- Judges are expected to discuss the final scoring of the project a considerable distance from the participant(s) since disclosure of scores is delayed until judging is completed.

For online virtually-judged Science Days:

- Judges will independently review each project's Abstract, Final Report, and video presentation 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 and constructive suggestions for improvement of the project and its presentation.

## **b) The Judging Process**

The score received by a project is the average of the scores of two judges. Fractional scores should be rounded up. If each judge grants a total score within any 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. All projects at Regional and State Science Days shall be judged on the criteria

of 1) Depth of Understanding, 2) Experimental or Engineering Design, 3) Oral, Written & Visual Communication, and 4) Originality and Creativity.

### c) Judging Criteria

<b>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 a 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 for judging the student's project or exhibit. The bullets do not have pre-determined numerical values.

#### ***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 a basis for the hypothesis and age-appropriate use of terms and principles.
- Supplements answers with relevant information reflecting knowledge gained during the project.
- Describes how the 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 project sophistication.

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

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

then sufficient testing of the prototype or model is completed, and data are properly measured, presented, and analyzed.

- Discussion of results is included, and valid conclusions are formed from the data obtained with sources of error identified. If Engineering Design, then the prototype successfully meets the criteria 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 an accurate understanding of experimental results and limitations, expansions of, and impact of the project.
- Visual: Logical organization of material, neatly displayed, graphics and legends appropriate to the project, easy to read and understand. Photos and graphics cited.

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

The 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 a novel association or relationship with previous knowledge, and particularly rigorous analyses reveal previously unknown relations, etc.

#### **e) Ranking vs. Criteria**

The Ohio Academy of Science does not rank students at Regional or State Science Days. Instead, Judges for the Academy compare students against the judging criteria described above.

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

At all Regional and State Science Days, a project shall automatically be re-judged 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 Regions, however, may choose to re-judge based on rating provided a consistent policy is developed and consistently applied within the particular Region.

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

## **g) 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 the student's complete presentation
- be constantly 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 before public release

## **V. Code of Conduct and Ethics Policies**

### **a) Scientific Fraud & Misconduct**

Scientific fraud and misconduct are not condoned at any level of research or competition. This includes plagiarism, forgery, use or presentation of other researchers' work as one's own and data fabrication. Fraudulent projects will fail to qualify for competition. The Ohio Academy of Science and The Junior Academy Council reserves the right to revoke recognition of a project subsequently found to have been fraudulent.

Any claim of plagiarism in a project made before, 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 and awards and ratings will be forfeited. The school from which the project originated will be contacted. The student(s) future project(s) will be required to pass a review before presentation in any Academy Science Days.

### **b) Generative AI**

The project should reflect independent research done by the student(s) and presented in their own words with proper citation, particularly if artificial intelligence is used. The project must not include fraudulent data, plagiarism, or inappropriate use of generative AI in presenting work that is not their own. Examples of inappropriate use include authorship by generative AI of a research paper, use of generative AI to fabricate data with the intention of giving a false impression, manipulating images (except when used to improve readability), removing outliers, and changing, adding, or omitting data points. Any use of generative AI must be properly explained and cited.

### **c) General Harassment (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 they are 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 Regional 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, they are 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 Regional Council Chair or designated council member for each respective Regional 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 and procedure of the Host Institution. All such reports will be handled as confidentially as possible. The Science Day event authority, the Host Institution, or both organizations may take appropriate disciplinary action against anyone who violates the harassment policy. This includes contacting appropriate law enforcement agencies if deemed necessary.

No adverse action or retaliation will be allowed against a person who reports a violation or 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.

### **d) Sexual Harassment (In-person or Online Communications)**

Sexual harassment of or by any person attending any Science Day event (State or Regional 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 they are 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 Regional 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, they are 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 Regional Council Chair or designated council member for each respective Regional 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, the Host Institution, or both organizations may take appropriate disciplinary action against anyone who violates the harassment policy. This includes contacting appropriate law enforcement agencies if deemed necessary.

No adverse action or retaliation will be allowed against a person who reports a violation or 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.

#### **e) Accommodation of Students with Disabilities at Science Days**

When a teacher, parent, or student gives advance notice of a disability that 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 presentations, seating if not in a wheelchair, restroom access, early judging, and being excused from staying for awards if needed. Students would still need to meet established judging criteria and earn a Superior rating to move on.

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