

## WHY SHOULD I ENTER THE FAIR?

There are many reasons for doing a science fair project. You'll have a chance to increase your knowledge, confidence, and self-esteem and find out what science is really all about by doing a project of your choosing from start to finish. Not only will you increase your own awareness and understanding of some aspects of science or engineering, but you will also be able to inform others about your findings and possibly win awards and prizes. With increasingly limited enrollments and scholarships available at select schools, science fair participation will help your chances for acceptance and awards. Also, good science students will get a great start in preparing themselves for potential jobs in the high-demand, high-salaried science and engineering career fields. The reasons are numerous and the possibilities almost unlimited.

The Metropolitan Science and Engineering Fair serves as the regional qualifier for the Nebraska Junior Academy of Sciences. MSEF/NJAS is open to students in grades 6-12 attending school in Douglas, Sarpy and Washington Counties or home schooled within these

counties. Projects will be judged on Thursday morning, March 5, 2020 at Omaha's Henry Doorly Zoo and Aquarium with an awards program on Saturday, March 21, at Lauritzen Gardens. The MSEF/NJAS Fair will give students a chance to display and describe their project to area instructors and practicing professionals in the project's field. The overall top six projects from the MSEF/NJAS Junior Division and the overall top six projects from the MSEF/NJAS Senior Division will compete in the Nebraska Junior Academy of Sciences in April 2020. Senior Division awardees selected at NJAS are invited to present their research as the American Junior Academy of Sciences in February 2021 in Phoenix, Arizona.

MSEF consists entirely of volunteers from area schools and colleges, businesses, and government agencies. MSEF/NJAS Rules and Regulations, Registration, Research Plan, and Approval Forms and Abstract Forms, and are available at our web site:

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

## SCIENCE AND ENGINEERING FAIR PROJECT PREPARATION

### I. Getting Started on Your Project.

Doing a project means designing an investigation and performing it yourself, gaining recognition for having done it, and possibly preparing you for a scientific career. The first step is coming up with an idea. Some suggestions:

1. Look at what interests you and what you are curious about. Find a broad subject in science, mathematics, or engineering, then start asking yourself questions. Since questions that start with "why" are often broad and difficult to test, narrow your questions to a limited area of study that may be thoroughly investigated. Try out some ideas as preliminary investigations to determine what other aspects you notice and wonder about, taking notes as you do so.

2. Go to your science teacher and to the library and look through some of the many books, websites and pamphlets on science fair projects. Consider the lab skills that you have already learned, as well as equipment available for you to use. In addition, consider safety and ethical issues that may require your study to receive approval from a review committee. Other good sources include lists of previously done science fair projects, scientific papers or newspapers, science books and magazines, scientists or summer institutes, science or mathematics/computer science teachers, or your own curiosity.

3. Employ scientific or engineering practices. Using your observation and questioning skills, identify an area of inquiry. Then begin to plan your project and refine your tentative hypothesis to reflect the area that you want to study. Projects need only be a simple

investigation of a scientific statement, idea or process. In addition to experimentation, projects may also represent analysis of large data sets, theoretical explanations or engineering designs.

4. Find out as much as you can about your subject and related subjects. Search the literature in your school, public, and college libraries. Remember to keep an accurate list of your sources. For books, include author, title, edition, publication place, publisher, date, and pages used. Magazine/journal article references should list author, article title, magazine name and volume number, date, and pages. For publications found on the Internet, include the web address, author, page title, and date accessed. Writing style guides will help you format your paper. Feel free to use any writing style guide, but use it consistently throughout your paper. Don't forget to ask others for information or assistance. Classmates, teachers, professional scientists, engineers, and technicians may be helpful. Before asking professionals if they have time to answer your questions, be sure you are familiar with background research, have a set of prepared questions to ask. Credit all sources that you use, including drawings and ideas used.

**5. Complete a Research Plan/Project Summary, Student Checklist (Form 1A), and Approval Form (Form 1B) and turn it in to your supervising teacher for approval.** Interactive ISEF forms are at <https://student.societyforscience.org/isef-forms>

All projects require Form 1, Form 1A, a Research Plan/Project Summary, and Form 1B. Research plans involving humans, vertebrates, and potentially

hazardous biological agents **MUST** receive Safety Review Committee (SRC) approval **BEFORE** actual experimental RESEARCH BEGINS! The link for the MSEF, SRC is [MSEFSRC@omahazoo.com](mailto:MSEFSRC@omahazoo.com).

## II. Working On Your Project.

Science projects may be displays or models, but the best projects are generally laboratory or field projects. Some comments on these:

1. Make sure that the experiment is designed to obtain information to help answer the inquiry. Consider how to identify and isolate variables, which may influence your work, select appropriate equipment, and keep time requirements in mind.

2. Start collecting data. Keep an accurate record of your experiment's purpose, all research done, data, problems, measurements and other results in a bound project notebook. Include charts, photographs, notes on materials, apparatus, and experimental factors and conditions, graphs, preliminary conclusions reached, and data generalizations.

3. Continue your library research and discussions with others as you encounter unexpected results, new questions, or data that supports your tentative hypothesis. Experiment and research as completely as you can, but remember to isolate variables and stick to the inquiry you are researching. Use controls, which have the same conditions as the experimental except for the factor being investigated, and repeat the experiment to confirm that your results are valid. Record all results in your project notebook.

## III. Project Completion and Display.

Adequate presentation of your project to the judges and others is essential for you to get the recognition that you deserve for your work!

1. Write a report of your project. Include a title, introduction, problem statement or question and hypothesis, experimental procedure used in detail, analysis of data using descriptive statistics, a discussion of results, conclusions reached, and suggestions for further research. Writing style guides will help you format your paper. Feel free to use any

writing style guide, but use it consistently throughout your paper. Remember to include summary data tables, diagrams, drawings and photographs, and credits for all sources used (bibliography) and help received.

2. Type a shortened version of your report, known as an abstract, of 250 words or less. You will be asked to copy this into the MSEF Digital Registration by Thursday, January 28.

3. Prepare your exhibit as a display version of your report. Construct a display, watching size restrictions and other requirements in the attached rules, making it eye-catching and attractive. Keep safety in mind. Be aware of what facilities will be available in the display area. Common displays include presentation of your question or problem statement, hypothesis, data and results, and conclusions on separate panels of the display with other items placed in front on the table. Organize your exhibit into an interesting, logical and neat display, including appropriate graphs, photographs, and essential apparatus and other materials. Major lettering should be large enough to be viewed from a distance. Don't forget your notebook and a hard copy of your abstract, but avoid overcrowding.

4. Prepare a four to five-minute verbal presentation of your project, telling in your own words what you did. Be ready for the judge to visit you by practicing your presentation before friends, parents, or your teacher, anticipating possible questions. Remember to bring everything with you on Fair day!

## Science Project Websites:

<http://www.nsta.org/docs/201109BookBeatResearchDesign.pdf>

[www.gnsef.org/resources](http://www.gnsef.org/resources)

[www.super-science-fair-projects.com](http://www.super-science-fair-projects.com)

<https://student.societyforscience.org/science-project-resources?mode=blog&context=4472>

[www.ipl.org/div/projectguide](http://www.ipl.org/div/projectguide)

[www.all-science-fair-projects.com/](http://www.all-science-fair-projects.com/)

[www.sciencepage.org/scifair.htm](http://www.sciencepage.org/scifair.htm)

[www.sciencebuddies.org/science-fair-projects/project-ideas](http://www.sciencebuddies.org/science-fair-projects/project-ideas)

[www.education.com/science-fair/](http://www.education.com/science-fair/)

[www.sciencefaircentral.com/](http://www.sciencefaircentral.com/)

[cssf.usc.edu/Resources/Good\\_Project.html](http://cssf.usc.edu/Resources/Good_Project.html)

## SUGGESTED STUDENT SCHEDULE

**Before December:** Find idea for project, complete Research Plan, other required forms (1A & 1B)

**After research plan finished:** Research plans involving humans, vertebrates, and potentially hazardous biological agents MUST receive Safety Review Committee (SRC) approval **BEFORE** actual experimental RESEARCH BEGINS! The link for the MSEF, SRC is [MSEFSRC@omahazoo.com](mailto:MSEFSRC@omahazoo.com).

Work on project, recording important data and details

**January:** Prepare report; finish abstract and other entry requirement

**January 28:** Deadline to enter MSEF with all required forms, including Research Plan and Abstract

**February:** Complete display board and practice your oral presentation

***BEFORE EXPERIMENTAL RESEARCH BEGINS, Complete Research Plan/Project Summary and Approval Forms (Form 1A and Form 1B).***

## IMPORTANT DATES

### **Saturday, December 14, 2020:**

Deadline for sponsor to submit an “Intent to Participate” form to MSEF noting number of students and types of projects anticipated to participate at 2020 MSEF.

### **Thursday, January 28, 2020:**

Deadline to submit completed MSEF Digital Registration Form, and mail in Form 1, Research Plan (Form 1A + attachment) and Approval Form (Form 1B). If additional forms were required for your research, they must be submitted to MSEF at this time, too.

### **Wednesday, March 4, 2020:**

4:00 p.m and 6:30 p.m. Projects must be set up at Henry Doorly Zoo and Aquarium Omaha. A member of the Rules Committee will verify that your display meets the size and safety requirements. Allow up to 30 minutes to complete check in, set up, and obtain Rules Committee approval for your display.

### **Thursday, March 5, 2020:**

7:15 a.m. – 7:45 a.m. MSEF Senior Division Student Check-in at Henry Doorly Zoo and Aquarium

7:45 a.m. – 8:25 a.m. MSEF Junior Division Student Check-in at Henry Doorly Zoo and Aquarium

8:00 a.m. (Senior Division), 8:30 a.m. (Junior Division) MSEF/NJAS Project Judging begins (no sponsors or parents permitted in display area until 12:00 p.m.)

11:50 a.m. (approximate) Lunch is provided for MSEF participants

12:00 p.m. (approximate) Public viewing begins (Judging resumes after lunch)

1:30 p.m. Judging and Public viewing ends. Participants move display boards to holding area for dismissal.

### **Monday, March 9, 2020:**

Invitations to Awards Ceremony sent to award recipients and sponsors

### **Friday, March 13, 2020:**

RSVP due for Awards Ceremony

### **Saturday, March 21, 2020**

9:00 a.m. – 9:30 a.m. MSEF Awards and Public Display set up at Lauritzen Gardens

9:30 a.m. – 10:00 a.m. Public viewing begins

10:00 a.m. Keynote

10:25 a.m. – 11:30 a.m. Awards Ceremony

11:55 a.m. Public viewing ends

## PRIZES

- MSEF Certificates for all participants
- NJAS Award Medals (Top 6, each division)
- Cash prizes for category and grand prize winners
- Special gifts for all participants
- Trophies (top six in each division)
- Plaques (top projects in each category)
- Special awards by donors and outside groups

## RULES AND REGULATIONS

1. Any 6th through 12th grade student who has not attained the age of 21 in a public, private or parochial school in Douglas, Sarpy or Washington Counties may enter a project in the Metropolitan Science and Engineering Fair (MSEF). MSEF is the only means for students in the Eastern Region to qualify for the Nebraska Junior Academy of Sciences (NJAS).

2. MSEF accepts projects from either individuals or teams of two. An individual or team may enter only one project and it must be the personal work of that individual or the members of the team. Refer to MSEF Rule 6 for additional rules and regulations relating to team projects.

3. All MSEF/NJAS project entries are expected to comply with entry rules of the International Science and Engineering Fair (ISEF). This includes a Research Plan/Project Summary (Form 1A) and Approval Form (Form 1B). Forms 1A and 1B, a Research Plan and projects requiring Safety Review Committee (SRC) MUST have forms completed BEFORE experimental research begins! Research plans involving humans, vertebrates, and potentially hazardous biological agents MUST receive Safety Review Committee (SRC) approval BEFORE actual experimental RESEARCH BEGINS! The contact information for the MSEF SRC is [MSEFSRC@omahazoo.com](mailto:MSEFSRC@omahazoo.com). For rules questions, start with ISEF Rules Wizard: <https://ruleswizard.societyforscience.org/>

4. Any projects involving live vertebrate animals or human subjects must comply with ISEF Life Research Rules. Projects involving DNA, tissue, pathogenic agents or controlled substances require additional forms, which may be downloaded from the ISEF rules website <https://student.societyforscience.org/intel-isef-forms>

### 5. Individual project submissions due by Thursday, January 28:

Electronic submissions:

- MSEF Digital Registration Form (includes student's name, title, and abstract)

Keep copy, mail hard copies of these:

- Form 1 (Checklist for Adult Sponsor)
- Research Plan/Summary
- Form 1A (Student Checklist)
- Form 1B (Approval Form)
- other required forms as determined by ISEF Rules Wizard
- \$10 entry fee (payable to MSEF)

6. Team Projects consist of two members. A team project cannot be converted to an individual project without authorization. A new member may not be added to a continuing Team Project.

Both members 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 both team members and will be evaluated using the same rules and judging criteria as individual projects.

### Team project submissions requirements due by Thursday, January 28:

Electronic submission:

- one MSEF Digital Registration Form (includes both partners' names, title, and abstract)

Keep copy, mail hard copies of these:

- Form 1B (Approval Form) for Partner #1
- Form 1B (Approval Form) for Partner #2
- Form 1 (Checklist for Adult Sponsor)
- Research Plan/Summary. Include in the outline each person's tasks
- Form 1A (Student Checklist)

- other required forms as determined by ISEF Rules Wizard
- \$20 entry fee (payable to *MSEF*)

7. Forms and a non-refundable registration fee of \$10.00 per student **MUST be received by Thursday, January 28, 2020**. Applications received after this date will not be accepted unless the MSEF Rules Chair is contacted before then. Correspondence, forms, and fees must be sent to:

MSEF  
2001 South 6th St.  
Omaha, NE 68108

Forms or additional information may be obtained by contacting the MSEF Rules Chair, Dave Dow, at [DowChemistry@gmail.com](mailto:DowChemistry@gmail.com), or visiting MSEF website at <http://www.msefomaha.com>

8. Categories of Projects: Participants' projects must be classified into one of the following categories on the registration form:

1. Animal Sciences (ANIM)
2. Behavioral and Social Sciences (BEHA)
3. Biochemistry (BCHM)
4. Biomedical and Health Sciences (BMED)
5. Biomedical Engineering (ENBM)
6. Cellular and Molecular Biology (CELL)
7. Chemistry (CHEM)
8. Computational Biology and Bioinformatics (CBIO)
9. Earth and Environmental Sciences (EAEV)
10. Embedded Systems (EBED)
11. Energy: Chemical (EGCH)
12. Energy: Physical (EGPH)
13. Engineering Mechanics (ENMC)
14. Environmental Engineering (ENEV)
15. Materials Science (MATS)
16. Mathematics (MATH)
17. Microbiology (MCRO)
18. Physics and Astronomy (PHYS)
19. Plant Sciences (PLNT)
20. Robotics and Intelligent Machines (ROBO)
21. Systems Software (SOFT)
22. Translational Medical Science (TMED)

Category selection is the responsibility of the student and teacher. To help decide, see <https://student.societyforscience.org/category-sub-category-selection> ISEF category descriptions:

<https://student.societyforscience.org/intel-isef-categories-and-subcategories> The judging chair or MSEF President may change category designation to allow similar types of projects to be judged together. On the day of the fair, if the judges feel that a particular project is misclassified, it may be transferred to a more appropriate category with the approval of the judging teams involved or the fair director.

9. Judging will be done within the specific procedures announced to the entrants. **Entrants MUST be present for judging to be eligible for awards.**

10. Projects will be rated according to the following criteria:

- I. Research question: 10 points
- II. Design and methodology: 15 points
- III. Execution: Science-Data collection, analysis, interpretation OR Engineering-Construction and Testing: 20 points
- IV. Creativity: 20 points
- V. Presentation (Poster 10, Interview 25); 35 points

**11. SNOW DATE: Friday, March 6**

In the event of hazardous weather on March 5, MSEF will adhere to the school cancellation declarations of the Omaha Public Schools and Omaha Area Catholic Schools. Local media will be provided information. Additional details will be posted on the MSEFOmaha.com web site and Twitter @MSEFOmaha.

12. A keynote session and awards presentation will take place on Saturday, March 21 at Lauritzen Gardens. The keynote session and awards presentation are free to MSEF participants, their sponsor and a limited number of family members.

13. All participants will receive a certificate. Superior projects will be awarded a plaque, trophy or other honor for the participant.

14. Other specific rules:

**A. Project Display Rules**

(1) Project exhibit size is limited to 76 centimeters deep (front to back), 122 centimeters wide (side to side), and 274 centimeters high (floor to top).

(2). Student name, school name, and cooperating institution are only permitted on the back of the display for organizational purposes. When set up, the student name, school name and cooperating institution should not be visible.

**B. Technical Rules**

(1) **NO** plants, chemicals (including water unless supplied by MSEF/NJAS), live animals, flames, flammable materials, or other potentially hazardous or unsafe materials are permitted at the fair. See checklist on next page.

(2) Except for certain basic supplies (e.g. tables, 110 volt power supply link-up, etc.), all materials should be supplied and set up by the participant. The participant is responsible for the cost of such materials and supplies and their protection and care. The MSEF/NJAS assumes no responsibility for loss of or damage to projects. Secure or remove valuable items.

(3) All technical rules of the current International Science and Engineering Fair (ISEF) will be followed whenever applicable, except as noted in the preceding rules.

## PROJECT/DISPLAY CHECKLIST REQUIREMENTS

This is a copy of the form used by the Rules and Regulations Committee to check that all forms have been completed and that the display complies with all rules. Rules will be strictly enforced!

### I. DOCUMENTATION/CERTIFICATION

#### ALL PROJECTS:

- \_\_\_\_\_ MSEF Digital Registration Form
- \_\_\_\_\_ Abstract (This is included in the MSEF Digital Registration for dissemination to the judges, also bring at least one copy for display on the day of the fair)
- \_\_\_\_\_ ISEF Form 1 (Checklist for Adult Sponsor)
- \_\_\_\_\_ ISEF Form 1A (Student Checklist) and Research Plan/Project Summary (#10)
- \_\_\_\_\_ \$10.00 per student registration fee (payable to *MSEF*)
- \_\_\_\_\_ ISEF Form 1B (Approval Form)

#### IF APPLICABLE:

- \_\_\_\_\_ ISEF Form 1C (Regulated Research Institutional/Industrial Setting Form)
- \_\_\_\_\_ ISEF Form 2 (Qualified Scientist Form)
- \_\_\_\_\_ ISEF Form 3 (Risk Assessment Form)
- \_\_\_\_\_ ISEF Form 4 (Human Participants Form)
- \_\_\_\_\_ ISEF Form 5A or 5B (Vertebrate Animal Form)
- \_\_\_\_\_ ISEF Form 6A (Potentially Hazardous Biological Agents Risk Assessment Form)
- \_\_\_\_\_ ISEF Form 6B (Human and Vertebrate Animal Tissue Form)
- \_\_\_\_\_ ISEF Form 7 (Continuation/Research Progression Project Form)

Download forms from ISEF website at <https://student.societyforscience.org/isef-forms>

### II. DISPLAY/SAFETY (See ISEF)

On-line registration and fee, Forms 1, 1A, 1B, research plan, abstract are required for all projects, other applicable forms for some projects. Forms 1C and 7 (only, if applicable) must be displayed at project.

- \_\_\_\_\_ Maximum Size (76 cm deep X 122 cm wide X 274 cm high-floor to top).
- \_\_\_\_\_ No student name, reference to school or cooperating institution on front of display or at any place in the written report.
- \_\_\_\_\_ No actual names of human test subjects displayed
- \_\_\_\_\_ No living organisms (animals or plants).
- \_\_\_\_\_ No preserved animals, animal parts (except sealed insects) or plants.
- \_\_\_\_\_ No unapproved, inappropriate, un-credited photographs/diagrams.
- \_\_\_\_\_ No human/animal parts or body fluids (except teeth, hair, slides).
- \_\_\_\_\_ No soil, sand, rock, waste samples (even if permanently encased).
- \_\_\_\_\_ No chemicals (including water unless supplied by MSEF/NJAS).
- \_\_\_\_\_ No human or animal food, dry ice.
- \_\_\_\_\_ No syringes or other sharp items, glass or glass objects.
- \_\_\_\_\_ No flames or flammable materials.
- \_\_\_\_\_ No hazardous/dangerous substances or devices.
- \_\_\_\_\_ No lasers more powerful than Class 3A/3R.
- \_\_\_\_\_ Adequate insulation for temperatures over 100 degrees C.
- \_\_\_\_\_ No open top dry or wet cell batteries, 3-D printers.
- \_\_\_\_\_ Shield with ground box on high voltage--out of reach.
- \_\_\_\_\_ Shield apparatus with belts, pulleys, chains, moving parts.
- \_\_\_\_\_ Electric circuits/cords: approved capacity/insulated.