MSEF

Massachusetts Science + Engineering Fair

MIDDLE SCHOOL MANUAL 2024-2025

The Massachusetts Science & Engineering Fair program gives students the chance to engage in science and engineering discovery through hands-on experience. Through the Fair process, students learn about emerging fields of science and engineering, while developing important academic and life skills - from reading, writing and math to communication, teamwork and design. Engaging in an independent research project via the Fair program provides a solid foundation to support development of scientific thinking while providing context and practice to the skills and standards students explore in the classroom.

Science & Engineering Fairs have rules, suggested procedures, and expectations to support student learning, keep participants safe, and provide consistency across schools and programs. Familiarizing yourself with this manual is the first step in your Science & Engineering Fair participation.

Updates for 2025

- New **MAMS.zfairs.com site for all project approval**, page 8 - Link here
- New **paperwork packet** for project details, research plan, and approvals, page 6 - Link here
- New **Research Plan template** that can be used by interested teachers, page 3 - Link here
- New requirements for **participation and eligibility**, page 4 and 9 - Link here
- Allowance for **Continuation Projects**, page 9
- Acknowledgement of **Mentors**, page 9

Tutorials

- zFairs Account creation video (9 mins)
- Paperwork Package video (9 mins)
- Slideshow

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The Science & Engineering Process

The most critical aspect of a project is the way the student explores and manages the project. A simple project can offer a great experimental challenge to the imaginative student. The role of the teacher, mentor or parent should be one of guidance, encouragement and, as needed, constructive criticism. In some cases, supervising a safety-related component of the project will be required.
Visit the scifair.com/science-fair-ready/ page for more information and resources for both teachers and students.

OBSERVE: Choosing a Project

Student projects should be of an experimental nature –either investigating a research question or solving a design challenge. The main areas for evaluation are the scientific or engineering design approach, the thought processes used in completing the project and the student's mastery of the topic and concepts. The strongest projects are often driven by student interest and what is personally meaningful to them. These can help in choosing:

- Brainstorm ideas by generating questions after experiencing a phenomenon, reading an article or watching a video.
- Have students think about local or global issues that matter to them and what they could research or design that can help their community.
- Have students identify careers in STEM that interest them and explore possible connections.

PLAN: Research and Design

The next key step to planning a project is determining the 'testable question' or the 'problem to solve.. It needs to be something that can be observed and measured. Something that can be answered or solved in the time available through experimentation or design and testing.

Once students know what they want to address with their question or problem, they need to determine how they want to address it. This is the research or design plan where they identify what is feasible in the timeframe, what materials they need, and the process they need to follow.
The RESEARCH PLAN is Form 1B of the Middle School Paperwork Packet. Options for your classroom:

- Use copies of Form 1B in the paperwork packet to draft their plan.
- Adapt this google form as a RESEARCH PLAN planning template. https://forms.gle/63RpBntyp4GpvTaS8
- Adapt the ISEF High School research plan templates by project type.

EXPLORE: Experimentation and Investigation

Students will need to experiment and investigate according to the plan they devised in the previous step. This may involve creating their prototype, testing, and revising and conducting multiple trials with different conditions and variables. Data collection and recording observations is critical in this step and we encourage students to do recording by hand in a *project notebook*. This simulates the experience of scientists in a lab and reinforces a student's processing and understanding.
In this phase it is important for students to know how to ask for help and learn from the unexpected. Contact student@scifair.com for support.

EXPLAIN: Communication and Presentation

Once data and observations are collected, students must analyze and interpret their findings. They should represent their findings and tell the story of their project in a few different ways. Students will need to create graphs & tables, written reports, as well as poster presentations that summarize the key pieces of their project and discovery.

Students also will need to present their work through oral communication with a practiced presentation as well as prepare for Q&A with judges and volunteers. See the Project Components Guide for more guidance.

The Science & Engineering Project: Participation Steps & FAQs

WHO may participate

All students grades 6-8 who attend school in Massachusetts are eligible to participate.

- Projects are individual with 1 student or a team made up of 2 or 3 students.
  - For team projects, one student is the lead
  - Students on teams can be from different schools, or even different regions.
    - Students will participate in the region according to the team lead
    - Students may only compete in one regional fair
  - Registration goes through the 'lead' student's school.
- Homeschool and Virtual School students are eligible according to their home address.
- Students who do not have the support of their school should contact middleschool@scifair.com BEFORE starting a project. Some non-profit or municipal organizations may be eligible to support projects.

ROLES of ADULTS:

Teacher: The person who provides permission to participate and signs off in zFairs and communicates with the regional and state fair organizers. Provides oversight for the academic integrity & ethics of your project.

"Adult Sponsor": The person helping most closely with the project. Provides oversight to the scientific integrity & ethics of your project. Signs off on the forms. This is often the teacher.

Parent/Guardian: Provides permission for participation. May provide oversight for any work conducted at home.

"Designated Supervisors": The adult who is responsible with any project work that requires supervision (if you need Form D). Can be teacher, a qualified parent, or another adult.

WHAT makes a Science Fair project?

Projects should show evidence of scientific research, engineering design, computer science, or mathematics. Projects that are informational projects research or literature reviews, explanation models or kit building are not appropriate for competition.

Find project categories at www.scifair.com/fairs/middle-school

Project ideas can support curriculum themes of:

STRUCTURE AND FUNCTION SYSTEMS AND CYCLES CAUSE AND EFFECT

While teachers may suggest general project topics or themes, projects MUST be the student's own design and work.

- Consult the MSEF Ethics Statement for policies on independent work and artificial intelligence
- Adults should provide support and encouragement but the work should be led and facilitated by the student(s).
- Students should explain any work done by others in their research plan and with judges.

See below for restrictions and limitations on project materials, safety requirements, and ethics.

Science Fair projects are reviewed for thoroughness, problem solving, independence, and understanding of the topic. Students and teachers should review the scoring rubric (Updated for 2025: available Sept 1) to understand what judges look for in projects at the fairs. At the Fairs, projects receive awards and prizes based on overall score and/or topic category and ideas.

Fair projects include:

Research Plan, Project Notebook, Project Report, Project Display, Oral Presentation

HOW to participate

Step 1: Planning

- Log on to **MAMS.zfairs.com** (6-8th).
- Review deadlines, rules, system tutorial, and download the paperwork package that includes all the required forms bundled together.
- Teachers must create an account first.
- Schools with more than 20 student projects , email MSEF for alternative paperwork approval options.

RULES:

- All projects need adult permission before experimentation. Follow directions on the forms packet found at MAMS.zfairs.com .
- Projects in restricted areas need approval from the Middle School Scientific Review Committee before experimentation. Submit early. See the information below for more information. Restricted areas include:
    - **HUMAN SUBJECTS**
    - **VERTEBRATE ANIMALS - observation only, no manipulation allowed**
    - **HAZARDOUS SUBSTANCES or DEVICES**
    - **BIOLOGICAL AGENTS**

It is the student and teacher's responsibility to follow the rules, contact middleschool@scifair.com for support or clarification. With notice, MSEF can pre-review projects for compliance to avoid disqualification.

Middle School projects are intended to focus on the development of core skills and build experiences that students can use in more advanced research in High School and beyond. To that end, Middle School projects have the following restrictions that are specific to 6th-8th grade projects. See section 3 below for more details and exemptions.

MIDDLE SCHOOL PROJECTS CAN NOT INVOLVE THE FOLLOWING MATERIALS:

Biological Agents - anything that involves the potential for unknown pathogens or microbes

- Blood products, fresh tissue, teeth and bodily fluids
- Pathogenic agents or disease causing, or potential disease-causing organisms such as bacteria, viruses, viroids, prions, rickettsia, fungi, mold, and others.
    - Organisms collected, isolated and/or cultured from any environment (e.g., air, soil, water) considered potentially pathogenic and experiments using these procedures.
    - All plant projects must use sterile, bagged potting soil.
    - Raw or partially processed human/animal waste is considered to contain potentially pathogenic agents.
    - Composting or microbial fuel cells
    - Recombinant DNA
- Ingestion, inhalation, or application of any substance by or to a human subject

Hazardous Chemicals or Devices - anything that needs a high level of supervision and/or equipment for safety

- Controlled substances, including DEA-classed substances, prescription drugs, alcohol and tobacco
- Carcinogenic, mutagenic, explosive and toxic chemicals
- Radioactive materials
- Compressed gas (exception: helium, air, CO_2,)
- Hazardous substances or devices (including, but not limited to BB guns, potato cannons, paint ball guns)
- High voltage equipment
- Lasers (any strength)
- Ionizing radiation
- X-rays or nuclear energy

Vertebrate Animals - Massachusetts State Law has strict restrictions for vertebrate animal research for K-12.

- Non-human vertebrate animals or their parts, except eggs & observation-only, no manipulation

Step 2: Submission

Fill out the **Science Fair Ready Paperwork Package** from MAMS.zfairs.com with student information and step-by-step project plan and safety requirements. This includes the Research Plan.

- ☐ **Form 1A: Project Info and Permissions** - student info and approvals (1 per student)
- ☐ **Form 1B: Research Plan -** include step by step details of your project (1 per project)
- ☐ **Form C: Informed Consent Form -** ONLY needed for HUMAN SUBJECT projects. This includes asking people to take surveys or test products or designs. Submit for SRC approval BEFORE experimentation.
- ☐ **Form D: Designated Supervisor -** ONLY for projects that require additional supervision according to Middle School rules. Submit for SRC approval BEFORE experimentation.

- **Submit** forms to MAMS.zfairs.com for review. Teachers must create an account first. Rolling submissions with final deadline for all projects as posted.
- All projects must be approved before REGIONAL FAIR deadlines for State Fair participation.
- MSEF Review Committee will approve for participation or request follow-up for rule compliance.
- Students should be using their **project notebook** to track all their work - including background research and planning. We encourage paper notebooks, but digital are allowed.

Step 3: Project Work

DO THE WORK on your project and prepare for showcasing your work. Follow guidance on required project components. Any updates to project plan need to be communicated to middleschool@scifair.com

- ☐ Consult deadlines and dates for your region at MAMS.zfairs.com and plan accordingly.
- ☐ Plan ahead: Students and teachers should set a goal deadline to submit paperwork for approval and any necessary changes. **Final deadline for all projects is 1 month before the fair.**
- ☐ MSEF provides sample timelines for participation. Make sure you allow for time for project approval between submission and experimentation. Go to www.scifair.com/resources for 'timelines'.
- ☐ Work on your project components. The project report (3), project display (4), and oral presentation (5) have a lot of the same elements required. Use this GUIDE to plan out each item.
- ☐ Hit a roadblock or feel stuck? Scientists and engineers deal with this all the time. Remember there are resources and people who can help like your teachers, mentors, or MSEF. Reach out and ask questions!

Step 4: Fair Specific Details and Preparation

Approximately a month before regional and/or state fairs, follow instructions for deadlines, permissions, and site specific requirements. More details can be found at MAMS.zfairs.com - including event specific details.

Regional Science Fairs are held across six regions determined by the location of the student's school/site.

- Students with the top projects from each region may participate in the MSEF State Science & Engineering Fair.
- In addition, each middle school may send a set number of projects to the State Fair regardless of participation and/or placement at the regional fair.

Follow fair specific requirements such as registration, permission forms, or safety restrictions for your display. Email middleschool@scifair.com if you need help connecting to your regional fair.

- **Regional fairs** occur from early March to early May, depending on region.
- The **Middle School State Fair** is in mid-May.
- The top 10% of projects at each fair are eligible for the national **Thermo-Fisher Junior Innovators Challenge**

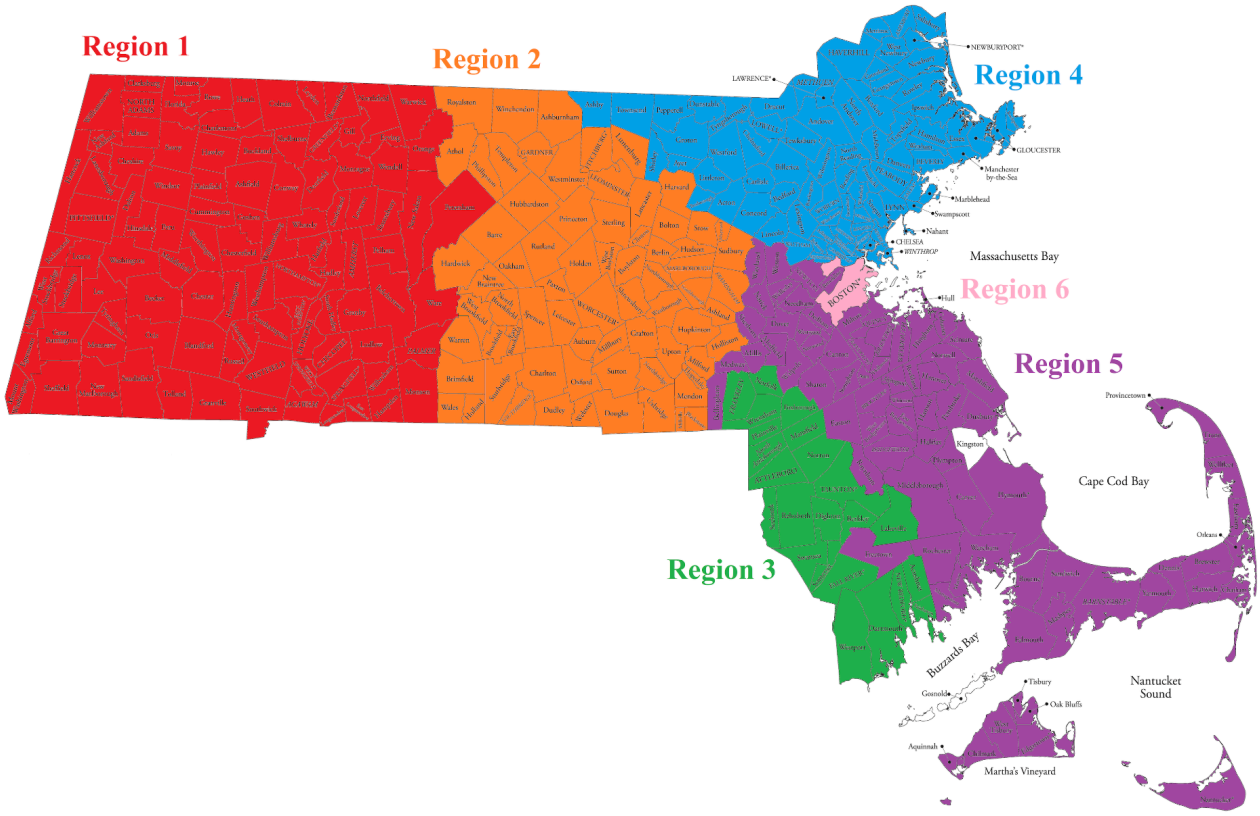
How do students who placed at the Regional fair get entered into the State fair? The top projects from the regional fair will automatically be promoted as a State Fair participant via the zFair platform; information will be

sent about the details of the State Fair. Each school can additionally send one direct entry to the state fair. Please inform your regional chair about a direct entry so they can promote you to the state fair.

For regional event information look here or use the map at www.scifair.com/fairs.

Communication about the Regional Fair events should go to the regional coordinators.

- Region 1 - https://msreg1.zfairs.com/
- Region 2 - https://msreg2.zfairs.com/
- Region 3 - https://mareg3.zfairs.com/
- Region 4 - https://msreg4.zfairs.com/
- Region 5 - https://msreg5.zfairs.com/
- Region 6 - https://mareg6.zfairs.com/



Sample Timeline

All regional fairs are on their own timeline from early March to early May. Please consult deadlines and dates for your region and plan accordingly. The Middle School State Fair is in mid May. *Suggested timeline for project creation below*- adapt to fit your own schedule. More timeline examples can be found at www.scifair.com/resources.

Steps	Suggested Pacing	Resources and Instructions
Pre-work to inspire creativity and question generation		Check out guidance in the Project Ideation Activities guide
Decide topic/Possible problem to solve	Week 1	Teacher account creation in zFairs.
In notebook: Students complete background research and turn in list of 5-10 sources in APA format. They should generate a list of questions for teachers, other sources.	Week 2	easybib.com citationmachine.com Guidance for notebook here.
Final Research Question/Engineering Problem	Week 3	Consider feasibility with time and materials available.
Hypothesis/Possible solutions	Week 4	For example, "If"... "then"... statement
Experiment or Engineering Design (material/procedure) -create an account and upload paperwork -include project summary	Week 5	With a completed plan, create a student zFairs account and upload paperwork for approval.
Waiting for approval - gather materials, continue research, lesson on data analysis, practicing mock presentations.	Week 6	Reviewer may ask for more information before approval is granted. Watch for emails from reviewers
Experimentation and testing: Initial Results - Table	Week 7	Try your procedure once and report your first set of result
Final Results – Table/graph	Week 8	Redo all the steps at least 3-5 times and report your results in table and graph
Data analysis	Week 9	Explore this guide from 826 Boston
First draft of project report	Week 10	
Final Draft of project report with corrections	Week 11	
Final poster board, notebook complete	Week 13	Poster board suggestions
Practice presentation with peers, family and/or mentors.	Week 14	Presentation Prep guidance
Date of local science fair	3-4 weeks before regional fair	Can be a showcase or a competitive fair. Schools can typically send 10 projects to the regional fair
Submit student/project list to regional fair for participation	Approximately 3 weeks before fair.	
Regional Fair	varies	Consult your regional zFairs site
State Fair participation based on performance at Regional Fair, plus direct entry per school	Mid May	Students can use time between fairs for additional practice and improving materials but not changing experiment.

The Science & Engineering Project: Requirements and Systems

zFairs: Online Platform

NEW: All Middle School students regardless of region will use the statewide zFairs site for paperwork review - https://MAMS.zfairs.com .

- Follow the instructions in the video and/or slide tutorials for help.
- Attention Large Programs: Schools with a large number of projects (20+) should contact MSEF to streamline the process and review deadlines.
- Email middleschool@scifair.com if you need further assistance. We are happy to help!

Each Region has their own zFairs site for event information Regional zFairs websites are listed at the Statewide Zfairs site as well as www.scifair.com/fairs. See page 7 for links.

- ☐ **Teachers need to register first and then students can set up their own account to register, linked to the teacher account.**
- ☐ **The forms in the Paperwork Package will need to be downloaded (available in several locations), filled out and signed, and then uploaded for approval through zFairs.**
  - ☐ **Students should draft their paperwork and receive teacher and parent approval before creating an account.**
  - ☐ Permissions form: students, parents, and supporting adults will need to sign off on having reviewed the following statements. Review them here.
    - Ethics Statement
    - Hold Harmless and Media Release
- ☐ **Once uploaded, teachers check student projects with the 'Mark Ready' box in zFairs dashboard.**

Deadlines

- ☐ After students create their account all paperwork must be uploaded to the 'paperwork' tab at the top of their mams.zfairs.com home page. Teachers can assist with these uploads or ask MSEF for help.
  - Complete the account with complete paperwork within two weeks of creating the account.
  - The Middle School Scientific Review Committee (SRC) will use this information to review projects to provide feedback, request revisions, and/or approve accordingly.
- ☐ Follow Deadlines
  - Plan ahead and follow directions carefully. Students should work with their Adult Sponsor/Teacher to create a goal deadline for their specific project.
  - Paperwork can be submitted on a rolling basis for review and approval. Submit when you are ready and before experimentation.
    - ☐ **If your project requires Forms C or D your paperwork must be submitted before you begin experimentation.** Determine a personal deadline that allows for review and experimentation.
    - ☐ **Final deadline for ALL projects to be approved for regional or state fair participation is ONE MONTH before your Regional Fair.** Paperwork submitted close to this deadline will take longer to review so submit early. Paperwork that is submitted at the deadline and/or is incomplete may not be approved in time for experimentation.
- ☐ Teachers must **'MARK READY'** in the zFairs platform (Paperwork > Review) to signal that project paperwork is ready for review. Once uploaded, ask your teacher to 'Mark Ready' in their zFairs dashboard. Projects will not be reviewed until this box is checked. Incomplete projects will not be reviewed.

Additional Eligibility Requirements and Disclosures

In Massachusetts, the Science & Engineering Fair programs operate in collaboration with schools for a number of reasons. It is first and foremost an educational program *and* students represent their schools through their participation. The default expectation is that teachers serve as the 'adult sponsor' for student work. However, in cases where the student is working with outside support it is the role for a teacher (or representative of the school) to provide permission for the student to participate and oversight of the academic integrity of the project- but leaves the project work management to an 'adult sponsor.'

NEW: STUDENT ELIGIBILITY POLICY can be found here: https://scifair.com/student-eligibility-policy/

- Communication through zFairs goes through the teacher.
- If students can not secure the support of the school for permission they can work with a **non-profit** or **municipal** organization for sponsorship. Reach out to middleschool@scifair.com for more information.

Projects can only include experimentation or testing done in the current school year to be eligible for participation at the Middle School level.

NEW: CONTINUATION PROJECTS If projects are built on any knowledge or experience from a previous year's work, students should explain this on the research plan and should only present a current year's work to judges. A continuation project is only allowed if students use a new procedure or answer new questions.

Individual projects must be entirely the work of the individual student/student team. While involved adults (parents, teachers, other mentors) should be supportive of student work they should not interfere or guide excessively. Students and the adults who are supporting them must agree to the rules of the MSEF Ethics Statement as well as any school ethics rules.

NEW: MENTOR ACKNOWLEDGEMENT If students work with adults beyond the support of their teacher, they must explain this on their research plan. They should explain the role of the student vs the parent or professional who supported them. It is okay to have help from others, but the project needs to remain the students' own work and design.

NOTE: In the Research Plan (form 1B) this question is written in the past tense. Please write what you expect for support and modify before the fair to post on your display board.

What can I do if my school does not have a Fair program? You can still participate if your teacher will review and sign all the necessary forms for you to register for your Regional and State fairs. Remember you will be responsible for understanding all the safety rules, deadlines and for making sure all required forms are submitted on time. You and your teacher will still need to set up accounts in zFairs.

Project Components

There are 5 required components for a Science Fair project. Each of these components have pieces of another, so it is not 5 distinct works but an opportunity to build understanding while practicing communication and presentation skills. Find more guidance for each of these components, as well as exemplars and templates at www.scifair.com/resources.

Research Plan, Project Notebook, Project Report, Project Display, Oral Presentation

1. **Research Plan** Instead of working on a topic that students can solve with an online search, make sure that their project is based on a question they want to answer or a problem they want to solve!
   - Fill out the research plan like writing a recipe. Someone should know exactly what the student did by reading the procedure.
   - A well-constructed research plan can be used when they write their project report and make their project display later.
   - They will use this research plan to get approved through MSEF. Use the paperwork packet and watch the video tutorials to learn more.

2. **Project Notebook** Use a project notebook to record each step of the process. Start this at the beginning of your project. While digital notebooks are allowed, handwritten notebooks are preferred for educational reasons. This can be a composition book or a blue book.

3. **Project Report** This is the written report of the project where students describe their process, research, and analysis. They'll also want to list your research sources and include an abstract (brief summary of your project).
   - The short summary should also be upload their zFairs portal at the end of the project. This should include 2-3 sentences that describe their question and methods briefly. Include vocabulary (keywords) that will help describe your project.

4. **Project Display** Students competing at the Fair(s) will need a physical display of their presentation. This is usually a tri-fold board but can be a poster board with stand. It should be free-standing.

5. **Oral Presentation** The oral presentation of the project should be approximately 5 minutes plus Q&A from the judges. The presentation should cover the main points of their work and allow the judges to 'dig deeper' into questions. Students should consult the "Judge Rubric" to see what judges will be looking for.

Forms Overview and Approval Process

The Paperwork Packet includes all forms, but not all projects need every form. See more information below and detailed restrictions in section 3.

- ☐ **ALL PROJECTS:** Prior to beginning a project for a regional or state science fair, each student is required to complete a Research Plan. Once approved by the adult sponsor/teacher, upload forms to zFairs for approval.
    - **Form 1A** includes information about the student, their project title, permission signatures from the teacher, adult sponsor and guardian. There are three copies of this form in the packet to allow for teams up to 3. Leave blank if not needed.
    - **Form 1B** includes fields for the students to submit their research plan for review. Students can upload an attachment with additional details if needed. The best way to do this is to scan or merge additional pages to their PDF packet.
        - Students should include information about any risks in their project and related safety precautions. Depending on the level of risk, Form D may also be required. *See below.*

SOME PROJECTS may require additional forms:

- ☐ **Form C** is required if the project involves **HUMAN SUBJECTS.** This is for behavioral studies projects and/or if humans are testing devices or materials.
    - *Designated Supervisor (who may also be the teacher) should approve Form C. Upload the completed & signed form for approval from the Region before experimentation.*
    - *Print form (multiple copies as needed) and collect signatures of participants on the bottom of form for proof of consent. Bring completed forms to the Fair.*
- ☐ **Form D** is required if a project requires supervision due to **potentially hazardous materials or activities**.
    - *All projects with **non-pathogenic microorganisms** must have a Designated Supervisor Form (Form D) completed and submitted in zFairs approval BEFORE experimentation.*
    - ***Special Safety Concerns:** Other situations such as use of power tools, chemicals, etc. require adult supervision of the student's project and need to be documented on Form D, Designated Supervisor.*
- Forms can be found at the link above, on the zFairs portal, and in the Resources section of scifair.com. They will need to be downloaded to complete - either digitally filled out or handwritten and signed.
- Once completed and signed, required forms are uploaded to the Regional zFairs portal for approval. Teachers MUST check "mark ready" to request a review.
- Team projects require submission of a shared packet with individual permissions forms from each student.

Common Sense to Avoid Risk: Thinking about risk goes beyond using hazardous materials and tools. You should consider the materials used and the methods that are used in collecting data to ensure student and community safety.

What is a Risk Assessment?: Students should include information about any risks in their project and related safety precautions. This includes activities like cooking, exercise, tool use, or collecting materials in nature. Depending on the level of risk, Form D may also be required. *Students should be prepared in the case that they may be asked for more details or forms before approval is granted.*

Approval:

- ☐ Students participating in the science fair process must get **approval** from the Middle School Scientific Review Committee (SRC) by submitting forms to zFairs at MAMS.zfairs.com.
    - ☐ Projects should be submitted for approval when paperwork is ready. See information on deadlines above.
    - ☐ Teachers should contact MSEF at middleschool@scifair.com for clarification on rules and instructions to avoid disqualification.
    - ☐ Projects with forms C and D require approval BEFORE experimentation

- ☐ Teachers are invited to participate in a one-hour MSEF Safety orientation to help approve student projects for experimentation. Paperwork still needs to be submitted by deadlines posted. Email middleschool@scifair.com for details.
- ☐ Attention Large Programs: Schools with a large number of projects (20+) should contact MSEF to streamline the process.
- ☐ Students will be notified via zFairs about approval status within 10 days. Teachers can check on the status of approval in their 'Dashboard' in zFairs.
- ☐ All projects participating in a regional or state level fair must be approved in zFairs to be eligible to compete at the Regional or State Level.

Contact your region or MSEF at any time when completing the forms to ask for clarification on rules or process before submitting.

All Forms and PDFS must be uploaded to zFairs prior to regional and state deadlines as posted.
If you won at a regional fair, you will automatically be promoted to the state fair. Please remember to check email as all correspondence is done via email to teacher, student and parent.

How do I know if a student's project has been approved?
Teachers and students will receive an email once the region has approved the project. Students and teachers can also log into zFairs to check on status.

Middle School Research Regulations

Paperwork Package linked HERE or found at MAMS.zfairs.com

FORMS 1A & 1B are required for all projects.

- Form 1A: Student details and permission from guardian, teacher and 'adult sponsor' (may be teacher). Students and adults must review ethics statement and parents must give permission on required release. Both documents can be found at MAMS.zfairs.com and in the paperwork packet.
- Form 1B: Research Plan - Student(s) will fill out the following details:
    - Question they are addressing or Problem they will solve
    - Hypothesis or Statement of Goals
    - Materials and Diagram of their setup
    - Methods or Procedure
    - Risk Assessment
    - If the project is a continuation from a previous year
    - If they worked with adults other than their teacher

FORM C: All HUMAN RESEARCH projects must have an Informed Consent Form (Form C) submitted.

This includes any project where humans (other than the students leading the project) are testing products, devices, filling out surveys, or involved in activities. Human Research projects are only allowed with minimal risk and anonymous data collection and if it is one of the following:

- 👍 Research involving normal educational practices
- 👍 Research on individual or group behavior or characteristics of individuals where the researcher does not manipulate the subjects' behavior and the study does not involve more than minimal risk.
- 👍 Surveys and questionnaires that involve perception, cognition, or game theory
- 🚫 Surveys and questionnaires can NOT involve gathering personal information, invasion of privacy or potential for emotional distress such as sensitive personal history, physical or mental health.
- 👍 Studies involving physical activity where the probability of harm is not greater than those ordinarily encountered in DAILY LIFE or during performance of routine physical activities. For example, activity conducted in Physical Education class would be allowed.

🚫 NOT ALLOWED at the Middle School Level:

- Ingestion, inhalation, or application of any substance by or to a human subject

⚠️ All human research projects-- including surveys, professional tests, questionnaires, and studies in which the human subject used is also the researcher -- require Scientific Review Committee approval.

- Copies of standardized and/or student prepared tests, surveys, etc. to be used must also be uploaded to zFairs for approval.
- Forms should be uploaded with the teacher signature to be reviewed.
- The individual subject signatures at the bottom of the form will be filled out after the approval is granted. The individual forms signed by participants do not need to be uploaded but should be brought to the fair for proof of consent.

⚠️ After approval, Informed Consent Form (C) must be printed out and signed by all subjects involved in human research projects prior to the experimentation. If a participant/human subject is under 18 years old, the parent/guardian signature is required.

FORM D: All projects with HAZARDOUS SUBSTANCES, DEVICES, BIOLOGICAL AGENTS, OR ANIMALS requires the Designated Supervisor Form (Form D) submitted.

This form is needed for projects that include risk and require additional adult supervision. Students and adults should conduct a thorough risk assessment by asking "What are the possible risks for you or for the participants in your project?"

- What is a risk assessment: Students will be asked to make a note of mitigated risk on their research plan (Form 1B). For minor risk, this may be all that is required for approval. However students should be prepared for a request for Form D if more details are needed. If the project involves components described below they should submit a Form D unless otherwise noted.
- Note: A parent can be the Designated Supervisor if they have the expertise to do so.

This includes:

1. **Experiments with non-pathogenic microorganisms**
   - ⚠️All projects with non-pathogenic microorganism must have a Designated Supervisor Form (Form D) completed and submitted for approval before experimentation. All projects with any non-pathogenic organisms may only be conducted in a laboratory setting (not in the home):
     - The laboratory work is to be supervised by an individual with general training in microbiology.
     - Standard practices for sterile technique must be observed.
     - Work is to be done on an open bench or fume hood.
   - ⚠️Purchased microorganisms must be identified and certified as non-pathogenic from the supply house with full name of microorganism, source of purchase and catalog number. E. coli K-12 is a great example that can be purchased through Carolina Biological.
   - ⚠️Lab coats must be worn.
   - ⚠️Culture plates/tubes of bacteria must be sealed and not opened in the laboratory after culturing and growth.
   - 🚫Sub-culturing is not allowed.
   - ⚠️Decontamination must be achieved by either chemical disinfectants or steam autoclaving.
   - 👍 **Baker's and Brewer's yeast do not need Form D**. *The only two exceptions.

🚫 NOT ALLOWED at the Middle School Level:

Biological Agents - anything that involves the potential for unknown pathogens or microbes

- Blood products, fresh tissue, teeth and bodily fluids
- Pathogenic agents or disease causing, or potential disease-causing organisms such as bacteria, viruses, viroids, prions, rickettsia, fungi, mold, and others.
  - Organisms collected, isolated and/or cultured from any environment (e.g., air, soil, water) considered potentially pathogenic and experiments using these procedures.
  - All plant projects must use sterile, bagged potting soil.
  - Raw or partially processed human/animal waste is considered to contain potentially pathogenic agents.
  - Composting or microbial fuel cells
  - Recombinant DNA
  - Ingestion, inhalation, or application of any substance by or to a human subject

2. **Hazardous Activities, Devices and Chemicals:**

   MSEF defines hazardous chemicals and devices as: Any chemical or device that involves more than normal risk. These include substances and devices that are controlled by local, state, federal, and/or international laws and regulations. Examples include illegal and prescription drugs, corrosive chemicals, toxic, highly reactive, flammable, or carcinogenic chemicals, alcohol, tobacco, firearms, explosives, radioactive materials, high vacuum devices, etc. **See full list below for what is not allowed.**

- ⚠️Other situations such as use of power tools, chemicals, etc. **will require** adult supervision of the middle school student's project and need to be documented on Form D, Designated Supervisor. Consider both human and environmental impacts like eye safety, fumes, chemical reactions, and disposal.
- ⚠️Some everyday hazardous activities such as using a stove at home, collecting environmental samples near a road or wild area, or using hand tools, **may** require Form D. This risk assessment can be denoted on Form 1B and the regional review may request additional documentation if they feel additional safety and supervision are necessary.

Regional Reviewers will use the Globally Harmonized System for Classifying Hazardous Chemicals and will review the risk assessment accordingly. We recommend consulting this document (American Chemical Society Guidelines for Chemical Laboratory Safety in Secondary Schools) as well as familiarizing yourself with the safety data sheets for any products used. Consideration should be given to use, PPE, spills, fumes, and disposal.

🚫 NOT ALLOWED at the Middle School Level:

Hazardous Chemicals or Devices - anything that needs a high level of supervision and/or equipment for safety

- Controlled substances, including DEA-classed substances, prescription drugs, alcohol and tobacco
- Carcinogenic, mutagenic, explosive and toxic chemicals
- Radioactive materials
- Compressed gas (exception: helium, air, CO_2,)
- Hazardous substances or devices (including, but not limited to BB guns, potato cannons, paint ball guns)
- High voltage equipment
- Lasers (any strength)
- Ionizing radiation
- X-rays or nuclear energy

Vertebrate Animals - Massachusetts State Law has strict restrictions for vertebrate animal research for K-12.

- Non-human vertebrate animals or their parts, except eggs & observation-only, no manipulation

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Vertebrate Animal Remote Observation Projects

Manipulation of an environment or interaction with animals in any way, requires a rigorous review process with animal care professionals in addition to pre-approval from regional committees and completion of special forms. MSEF does not allow the completion of projects with this scale of research at the Middle School level in Massachusetts.

Animal safety and unintended interference is our top priority, so we have set parameters for potential animal science projects with the intent to allow exploration safely and ethically to support student engagement.

What can be considered:

- 👍 Zoocams or Naturecams from regulated organizations such as Audubon, State Conservation Departments, National Parks, etc.
- 👍 Observation in AZA Accredited animal care facilities (zoos, aquariums, wildlife parks). Observation in a pet store requires details on where and how they will collect observations.
- 👍Data mining/analysis of animal data from research institutions.
- 👍Data mining/analysis from authorized citizen science projects (see iNaturalist, Zooniverse, Scistarter for ideas).

- 👍Observation only projects where there are NO manipulations or interactions with animals such as apps that record sounds (i.e. Merlin app from Cornell, FrogWatch USA). Students must include details of where and how they will collect observations.
- 👍The study meets all federal and state agriculture, fish, game and wildlife laws and regulations.
- ⚠️ The student's research plan should clearly state why they are taking this approach, alternatives they considered, and a description of procedures and safeguards to ensure no interaction or interference with the animal**.**

🚫 NOT ALLOWED at the Middle School Level:

- There can be no interaction with the animals being observed.
  - This includes touching and verbal interaction.
  - This includes any in-home observation of domestic pets
- There can be no manipulation of the animal's environment in any way
  - This includes changing food sources, limiting movement with gates, introducing sounds or smells.
  - This includes any obtrusive recording equipment that include lights, sounds, or a change to the physical space.
- There can be no interaction with any animal parts, fluids or excrement.

Projects with Forms C and Ds MUST be approved by the Middle School SRC before beginning any experiment.

Middle School Project Safety and Materials FAQs

PROJECT SAFETY and MATERIALS:

Where are the safety rules for project work? Look in this manual, page 14 to 16

Are "human consent" forms necessary even if the student is just observing people for the experiment? Yes, the people you are observing need to give their permission to be observed, even if they might not be aware that you are doing it. If you observe people under 18, you need to have their parent/guardian sign the Human Consent Form.

Can I use any rating level of video game, movie/video clip/music in my experiment? No. The ratings must be appropriate for middle school student experimenters and their subjects. The following ratings are the only ones that can be used:

- Video/clip – C, E, or E+
- Movie – G or PG
- Music – The title, lyrics and artist must be submitted for approval prior to beginning the experiment.

Can we use compost in an experiment? No. There is a possibility that the experimenter may unknowingly cultivate harmful microorganisms that could cause disease or allergic reactions.

Can I observe food spoiling under different conditions? No. There is a possibility that the experimenter may unknowingly cultivate harmful microorganisms that could cause disease or allergic reactions.

Can I do an experiment to find out if there are bacteria on doorknobs, countertops and bathroom surfaces? No. It is not safe to grow bacteria from either an inside or outside environment. The reason for this safety rule is that the bacterial or other microbial species is unknown and could be disease causing, thereby posing a health risk for the experimenter.

Is it OK under the safety rules to do experiments about chewing gum since gum is not swallowed? No, any experiment that involves putting anything in the mouth, on the tongue or teeth is not allowed.

What soil can I use for planting projects? Because of the potential of pathogenic agents, only bagged, sterile potting soil may be used. Not all potting soil is sterilized so make sure you look for that on the label.

My student is very familiar with using power tools (or other restricted items). Do they still need supervision? Are there still restrictions? Yes. They should still fill out the information of how they are keeping themselves and their environment safe, and have the necessary adult supervision in place according to the rules. If the object is forbidden in the rules it is still not allowed.

For Further Information

Massachusetts State Middle School Science & Engineering Fair
middleschool@scifair.com
617-491-1500
www.scifair.com

DAY OF FAIR: Guidelines and Expectations

GENERAL REQUIREMENTS

- Students must remain with their projects during judging and exhibition times.
- Parents, advisors, mentors, teachers and guests must wait outside the project area until public display begins.
- Cell phone use is not allowed during the judging period. Students should be ready to engage with the judges and guests in a professional manner. Feel free to bring a book or non-electronic, quiet activity.
- When a student is accepted for the State Fair, the student, teacher, and parent will receive additional fair information via zFairs.

PROJECT DISPLAY GUIDELINES

The purpose of the science fair is to explain the research, through the safe use of materials, through photographs, videotapes, charts, diagrams and other simulations. It is not to demonstrate the experiment to the judge.

Students must adhere to all display guidelines provided in this Manual. If the State Scientific Review Committee considers the presence or operation of any equipment or material to be dangerous or unsafe, it has the right to prohibit the presence or operation of such equipment or material.

All Science Fair participants must adhere to the safety aspects of their projects as follows:

- Projects must fit on a 40” x 26” table space. Wall space for posters is not available. Students must design their exhibits so that all posters, charts and displays are free standing.
- Due to the popularity of projects needing electricity, these projects will get less than 40” depending on amount of projects. Electricity is NOT available for charging phones.
- No aisle space for project displays is allowed.
- No laser pointers allowed.
- Glass is prohibited from display area but may item(s) be either encased in a break-resistant container or replaced by a break-resistant container. The exception is glass light bulbs. Mercury thermometers are prohibited.
- Water and saline may be displayed in a sealed plastic container but no other liquids can be displayed.
- Knives and other sharp objects may not be displayed.
- Microorganisms may not be displayed.
- Drugs, over-the-counter medications, antibiotics, and vitamins may not be displayed.
- Access to electrical outlets is limited, so please bring a heavy-duty/three-pronged extension cord.
- The power supply cord for electrical apparatus must terminate in a three-prong grounded outlet.
- If applicable, printed and signed Form Cs (Human Consent Form) should be in a separate notebook, not displayed on the table, should the safety judge ask to see it.

Do I get less space if I need electricity? Yes. This is due to the limited number of outlets and the layout of the exhibit hall. We suggest charging computer laptops or phones before you arrive, if that is the only reason you need to have electricity access.

Why are there two sets of safety guidelines? One set of safety guidelines refers to the time during which you are doing your experiment. The other set of safety guidelines refers to what you can bring the day of the science fair as part of your project display. Some of the guidelines overlap, but there are differences, so be sure to look at both sets. On the day of the science fair, there will be safety checks of all projects before the judging takes place.

What to Expect from Judging

The judging process will focus on **what the student has learned about his or her chosen project and the process used in completing the project**. In addition, the project will be judged based on the student's ability to discuss the overall scope and significant results of his or her work. Judging criteria for team and individual projects are identical. Look for an updated rubric at www.scifair.com/fairs/middle-school

To be UPDATED by September 1st, 2024 with Judge Rubric categories and criteria

Science Fair projects are reviewed for

- thoroughness
- problem solving
- independence
- understanding of the topic

Projects receive awards and prizes based on overall score and/or topic category and ideas.