MSEF

Massachusetts Science + Engineering Fair

Middle School Manual

STUDENT Guide

NEW FOR 2026-27 | Updated Rules & System Processes

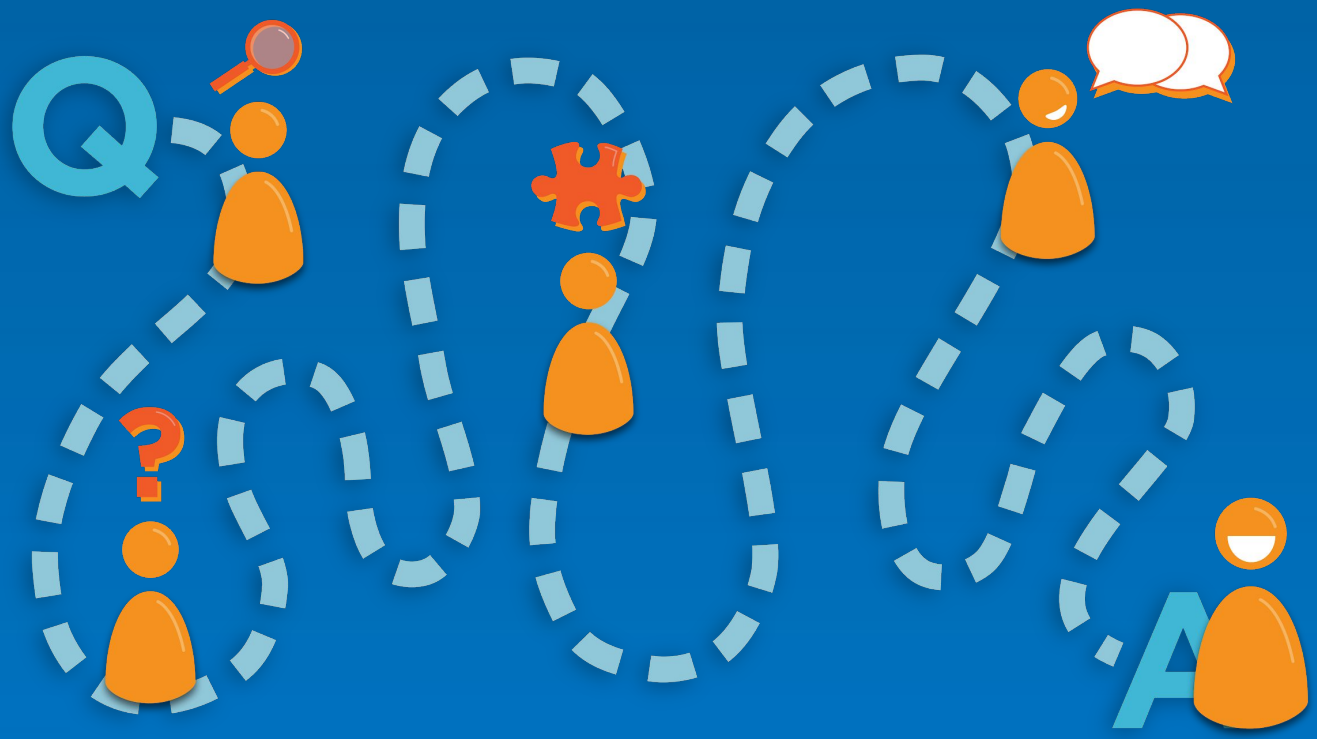


Table of Contents

Frequently Used Acronyms

MSEF - Massachusetts Science & Engineering Fair

SEF - Science & Engineering Fair

SRC - Safety Review Committee

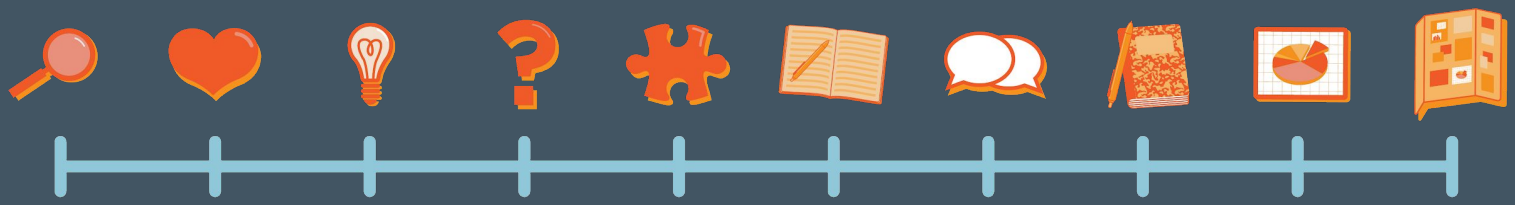
MSEF GLOSSARY

zFairs

The items in the Table of Contents are links to their respective pages. Additionally, each page within the manual contains a home button on the bottom to bring you back to the Table of Contents for ease of navigation.

Section 1

Overview of Science & Engineering Fair



Overview
What is SEF?

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Welcome to Science & Engineering Fair!

Have you ever wondered why something works the way it does – or thought “someone should fix that”? That is exactly where Science & Engineering Fair projects begin. You get to pick a question or a problem that interests you, investigate it using real scientific and/or engineering methods, and then present your discoveries to professional scientists and engineers. Not a quiz. Not a worksheet. *Authentic research.*

MSEF is a statewide competitive STEM program open to you if you're a middle school (6-8) or high school (9-12) student in Massachusetts. You'll design and complete your own original experimental or design project, then present it at a Regional Fair (some schools and districts hold local fairs before Regional). If selected, you can advance to the State Fair and possibly even a national competition. Along the way, you'll have the opportunity to win a variety of awards, and – most importantly – you'll gain hands-on experience with independent experimentation or design, along with valuable feedback from industry professionals.

What makes a Science & Engineering Fair Project?

Projects for MSEF need to involve original experimentation, engineering design, computer science, or mathematics. Projects that are informational only, research or literature reviews, explanation models, or kit building are not acceptable projects for MSEF competition. These types of projects do not fit into the full scope of what is expected for a Science & Engineering Fair project. You may build on previous years’ work, but you can only present current year work. A continuation project is only valid if it uses a new procedure, answers new questions, or builds upon or improves a previous design.

Projects are reviewed for thoroughness, problem solving, independence, and understanding of the topic. Judges use a scoring rubric, and missing required components can cost you significant points — even if the science itself is strong. Read it early and refer back to it throughout your project. Projects receive awards and prizes based on overall score and/or topic categories, ideas, and special awards.

MSEF believes that every student deserves a chance to experience real science and engineering — regardless of your school, your resources, or your background. The playing field is about curiosity and effort, not expensive materials or a fancy lab.

Fair projects include:

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

Overview
Why SEF?

MSEF

Why Participate in Science & Engineering Fair?

In your science class, there never seems to be enough time to explore the things you're most interested in. This is a school-based activity where you have a lot of control! You pick the topic. You design the investigation or prototype. You develop problem-solving skills that will benefit you throughout your life! You are doing actual science and/or engineering, the same way professionals do!

Want to find out how different soil types affect germination? Go for it! Want to design a device that helps a loved one remember to take their medication? That's a real engineering project. There simply isn't enough time in a traditional science classroom for you to explore and investigate at the level you can with Science & Engineering Fair.

	Win Awards! You can earn financial awards and recognition that helps boost college and professional applications!
	Develop science communication skills as you communicate with Judges and other professional scientist and engineers on your project journey!
	Build growth mindset and grit through constructive feedback, project setbacks that require problem solving, and seeing a project through completion. You've got this!
	Experience what it's like to be a real scientist or engineer!
	Meet peers from across the regions and the state that have the same interests as you!

"My very first science fair was in 6th grade. Through that experience, I gained knowledge about real-world issues our generation is facing and learned important skills in research, model design, slide presentations, communication, and public speaking. The experience broadened my view of the world and helped me begin to understand who I am and what I want to do. Looking back, I can say that middle school science fair lit a fire inside me that still burns today."

Maya Sushkin, Engineering Student at Worcester Polytechnic Institute
ISEF 2023 - 4th Place in Chemistry category (9th grade)
ISEF 2023 - 2nd Place Special Award from the American Chemical Society

zFairs - The Online Platform for MSEF

MSEF zFairs is the online platform students and teachers use to manage projects for MSEF. It handles project registration, required paperwork uploads, safety reviews, and event judging. Students use the site to submit their work for regional and state competitions.

Section 4 of this manual is a full guide on registering for and using zFairs.

Overview
Stages of Project Development

MSEF

These four stages – Observe, Plan, Explore, Explain – are used throughout this manual. You will see them to organize deadlines and guide you through the Fair process. Also, the stages of project development coincide with both the scientific method and the engineering design process.

OBSERVE: Choosing a Project

This is step one – and honestly, the hardest part for a lot of students. Your project should be about something that truly interests you. What do you notice in your daily life? What bothers you that nobody has fixed yet? What have you always wanted to understand? The strongest projects start with personal curiosity and passion, not picking a topic from a list. Look around, pay attention, and ask 'why?' and 'what if?'.

OBSERVE:
CHOOSING A PROJECT

PLAN: Research & Design

Once you have your question or problem, it's time to figure out HOW you are going to tackle it. You need either a testable question or a design challenge. During the planning stage you will determine your procedures, materials, and timelines. You will also write your Research Plan during this stage.

PLAN:
RESEARCH AND DESIGN

EXPLORE: Experimentation or Design and Investigation

This is where the fun really starts and things can get very exciting! If you're running an experiment, you'll set up your tests, collect data, run multiple trials, analyze your data, and develop your conclusions. If you're developing a design, you'll create prototypes, test them, figure out what breaks and doesn't work, and improve your design. When things go wrong – and they will – that's not failure, that's science! The unexpected challenges and results can be some of the most interesting aspects of your project!

EXPLORE:
EXPERIMENTATION AND
INVESTIGATION

EXPLAIN: Communication & Presentation

After all of that work, you get to share it! You'll put together a Project Display, a written Project Report with sources cited and raw data, and your Project Notebook. On the Day of Fair, you'll present and discuss your project with professional scientists and engineers (Fair Judges, one at a time). You'll walk them through everything - what you did, what you found, what surprised you, the challenges you faced, how did you address those problems, and what you'd do differently next time. It's more like a conversation than a presentation!

EXPLAIN:
COMMUNICATION AND
PRESENTATION

Overview
Stages of Project Development

MSEF

Steps to be Science Fair Ready

	ENGINEERING	EXPERIMENTAL	MATHEMATICAL	COMPUTER SCIENCE
OBSERVE	Identify & define problem	Identify research topic	Identify need or problem	Identify & define problem
	Gather background information			
PLAN	Identify possible solutions	Develop research question & hypothesis	Identify strategies for a solution	Identify possible solutions
	Decide what success will look like and how you will measure it Consider number of tests, observations, and performance criteria			
	Create design for prototype	Create research plan	Create research plan	Write code or prototype software
EXPLORE	Test and evaluate prototype	Conduct experiment & collect data	Test algorithm or model	Test program & collect data
	Refine the design & retest	Analyze data, refine, & retest	Analyze data, Refine, & retest	Debug, refine, add & retest
EXPLAIN	Analyze results, draw conclusions, and acknowledge limitations Communicate & share			

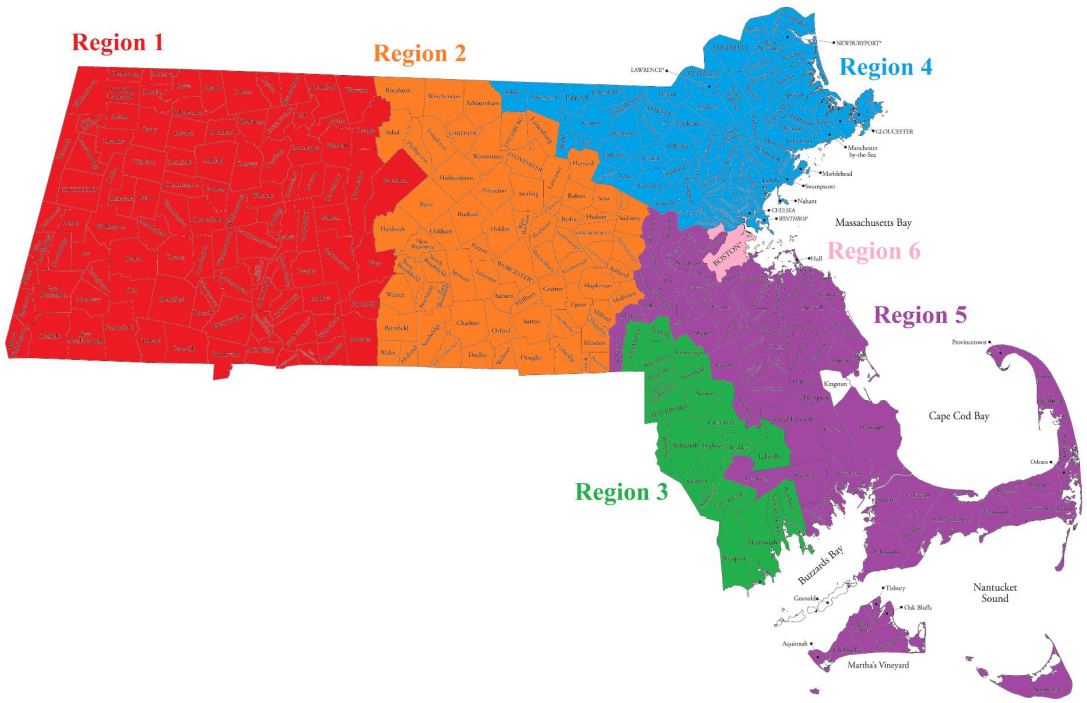
Overview
MSEF Regions

MSEF Regional Information

MSEF is geographically divided into six regions. Each Region holds their own Regional Science & Engineering Fair between March and early May. The projects that participate in the Regional Fair are determined at the school level. The top projects from the regional fairs will automatically be promoted to the State Fair.

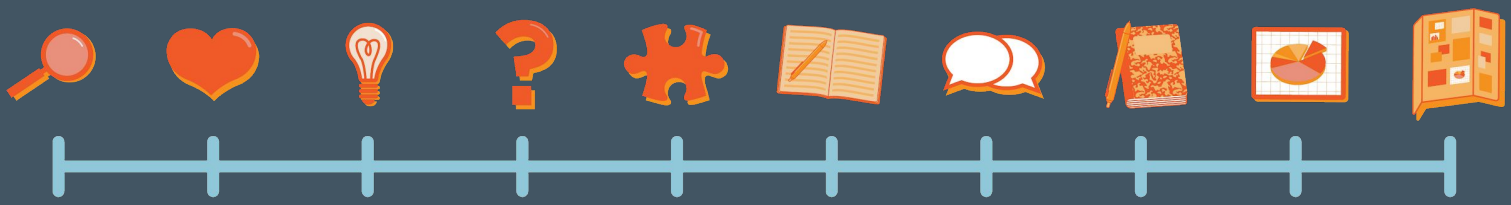
Region #	Geographic Area	Hosted at	2027 Fair Dates
1	Western MA	Mass College of Liberal Arts, North Adams	April 14
2	Central MA / Worcester Regional	Worcester Polytechnic Institute	March 30
3	Southwestern MA	Bristol Community College, Fall River	March 6
4	Northeastern MA	UMASS Lowell	Early-April TBD
5	Southeastern	Regis College, Weston	March 6
6	Boston Public Schools	Dearborn STEM Academy	March 6

The MSEF State Fair will be held on May 8, 2027, at Clark University in Worcester. The top percentage of projects at the Regional Fairs will be chosen as delegates to the State Fair. Up to 2 projects per school may also be chosen as 'Direct Entries' to the State Fair.



Section 2

Student Participation Guide



Student Participation Guide
Eligibility & Ethics

MSEF

Eligibility for Schools and Students

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

- Projects are individual (1 student) or a team made up of 2 or 3 students. No more than 3 students are allowed on a team.
- For Team projects:
  - NO more than 3 students may collaborate on one project.
  - Students from different schools and regions may work together.
  - One student is listed as the Lead and Regional participation is based on the Lead student's home school or address.
  - Students may only compete in one Regional Fair.
- Homeschool and Virtual School students are eligible to enter Regional Fairs according your home address. Contact MSEF for more information.
- If you do not have support from your home school, you should contact MSEF before starting a project as we may be able to connect you with organizations that can support your projects.

The Massachusetts Science & Engineering Fair (MSEF) works together with schools because this is, first and foremost, a learning experience — and you represent your school when you participate!

Student Ethics Summary

When you do a science or engineering project for the Massachusetts Science & Engineering Fair, you must follow rules that help make sure your work is honest, safe, and truly your own. You'll sign a form saying you agree to these rules before you start your project. **To review the full MSEF Ethics Statement go here.**

Your Project, Your Ideas

- You get to choose your own project idea. Adults like teachers or mentors can help you learn and stay safe, but they shouldn't pick your topic, do your experiment, or analyze your data for you.
- You must do the work yourself and give credit to anyone who helps you.
- Preexisting lab investigations, purchased ideas, or pre-designed experiments are not appropriate for science fair.

Be Honest

- You must fill out all forms truthfully.
- Keep a notebook with dates showing how your project developed. Include your research, steps you took, and data you collected. Digital is okay but paper notebooks are best.
- Use a bibliography to list where you got your information.
- If you use someone else's words or ideas, say who they came from.
- If someone helps you with your experiment or data, mention them in your notebook, forms, and presentation.

Student Ethics Summary, continued

Photos and Visuals

- Only use photos you took yourself unless you give credit to the person who took them.
- If you use pictures of people, you need their permission (and their parent/guardian permission if they're under 18).

No Cheating

You must not:

- Make up data or fake forms.
- Use someone else's work and say it's yours.
- Copy from the internet without saying where it came from.
- Enter the same project again with only small changes.
- If you cheat, your project can be disqualified.

Using AI (Artificial Intelligence)

Your project must still be your own work. You also must follow your school or district policies for AI use.
In agreement with your teacher you can use AI tools to help you:

- Think of ideas
- Understand hard topics
- Make outlines or fix code

But you **cannot**:

- Use AI to make up data
- Let AI write your whole report or portions of your report
- Use AI images or graphs without saying they came from AI

Student Participation Guide
Adult Support

Roles of Supporting Adults

At the forefront, MSEF is an educational program and your teacher is the default adult sponsor for your project. You may get support from a plethora of adults including teachers, parents/guardians, and mentors. MSEF has defined roles for adults and very clear restrictions to ensure that students produce independent projects.

- **Teacher or Adult Sponsor** - Most often, it is a teacher that has the role of sponsor. This is the person who provides permission to participate, signs off and coordinates with regional and state fair organizers, provides oversight, and assists students as needed.
- **Parent/Guardian** - Provides permission for their student to participate. May also provide oversight for work completed at home.
- **Project Supervisor** - Certain tools and materials must be used only with adult supervision. The Project Supervisor oversees that work and requires Form D. This may a teacher, mentor, or parent/guardian. The Project Supervisor must have expertise in the are they supervising.
- **Mentor** - Some programs benefit from professional scientists and engineers as mentors for their students through collaboration with various organizations. The role of a mentor is support students directly with insight and resources.

While teachers, mentors, parents/guardians, and other adults are essential supports for middle school students participating in Science & Engineering Fair, the following restrictions are in place:

- Projects must be of your own design from choosing a topic to performing the work.
- If anyone beyond a teacher provided support, you must describe that in your Research Plan. You must clarify what you did versus what your supporting adult did. Outside help, within reason, is acceptable, but the project must remain your own design and work.
- All adult zFairs communication goes through the teacher only.

Student Participation Guide
Adult Support

MSEF

What Adult Support Looks Like

The following table illustrates examples on what adult support is and what it is not. What is important is that you have ownership of your work, ethically and honestly. The adult(s) supporting you and your work are there to guide, advise, and coach you – not to do your project for you.

Adult support is	Adult support is not
Modeling integrity by showing honesty, transparency, and respect in all interactions	Encouraging students to omit data or hide AI use to make the hypothesis appear stronger or the work seem more independent
Helping students explore project ideas and encouraging their own curiosity	Steering the topic toward what they perceive will be scored highly by judges
Guiding students in decision making, especially in Risk Assessment	Developing question, problem, hypothesis, or procedures for the student.
Helping manage time and break down big deadlines	Taking over deadlines by finishing tasks for a student
Being available for check-ins that the student initiates	Hovering or suggesting changes unprompted
Modeling how to handle setbacks	Stepping in to fix the problem so student avoids failure
Teaching students how to use spreadsheets - enter data, create tables, charts, and graphs	Analyzing the data and making conclusions
Teaching students how to use No- and Low-Risk tools	Using all tools for a student
Assisting and guiding on setting up experiments	Performing the set up, executing experimentation
Assisting students with required paperwork and zFairs	Filling out paperwork for students

Student Participation Guide
Deadlines & Timelines

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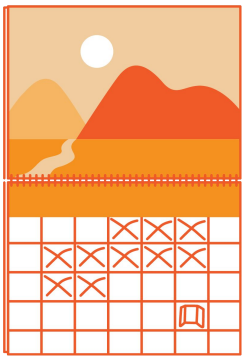
Deadlines & Timelines

Important: Changes in Deadlines - please read this section thoroughly.
In order to give you ample time to complete your projects with a thorough Safety Review process to ensure safety and adherence to newly expanded rules – initial Research Plan submissions to the SRC are due earlier than in previous years.

MSEF is introducing an ideal timeline to give you time to make necessary adjustments to your plans before experimentation or building. There is space in the ideal timeline to write in your school's deadlines – which your teacher will give you. Research Plan submissions for SRC will open in early September for all students.

Starting Fall 2026, any projects that fall into the Yellow Safety Zone (see Section 3) should submit Research Plans by December 1st to allow for adequate revision time if required by SRC Reviewers. These projects will not be accepted for approval after January 31st. The table below illustrates when you may expect to be allowed to begin experimentation and prototype building based on when your Research Plans and additional paperwork are submitted for SRC approval.

Project Approval Zone	Forms Needed	Submission Period	Students can expect to start experiments & building by
Green Zone	Form A and B maybe Form E	September 1 until January 31	Experimentation can happen with teacher approval
Yellow Zone	Form A and B maybe Form C, D, and/or E	September 1 until December 1	Before holiday break
Red Zone	not allowed, revise your project	not allowed	not allowed



Student Participation Guide Timeline

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Enter your school's time frame below.

OBSERVE: CHOOSING A PROJECT

PLAN: RESEARCH AND DESIGN

EXPLORE: EXPERIMENTATION AND INVESTIGATION

EXPLAIN: COMMUNICATION AND PRESENTATION

Time Frame	What you should be doing:
September 1st	**Submission Period Opens for All Projects**
OBSERVE	• Set up your Project Notebook • Make observations & ask questions • Begin background research • Read this Student Manual (may skip zFairs section until later)
PLAN	• Background research & Brainstorming • Develop Research Plan • Register on zFairs • Submit Research Plan on zFairs
PLAN	• Refine timeline & plans • Continue background research • Seek resources • May begin EXPLORE stage once your project is SRC approved
December 1st	**Submission Date for Yellow Safety Zone Projects**
Holiday Break	★ May work on project at home if approved
EXPLORE	• Experiment, build, collect data • Document everything
EXPLORE	• Experiment, build, collect data • Reiterate & improve as needed • Document everything
January 31st	**Submission Date for Green Safety Zone Projects**
EXPLORE	• Analyze data and make conclusions • Document everything • Begin project components
EXPLAIN	• Finish report and board • Put together all project components • Practice Oral Presentation
EXPLAIN	• Be sure all project information on zFairs is up to date (title, abstract, teammates, etc…). • Get ready for Day of Fair!

Student Participation Guide
Steps to Participate

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How to Participate in Science & Engineering Fair

This section of the manual walks you through all of the processes and stages for your project – from your first idea to getting ready for the Day of Fair. You will follow the four stages of project development – OBSERVE, PLAN, EXPLORE, and EXPLAIN – as they align with the scientific method or engineering design process.

Within each subsection are resources to help you with space for you to record your thoughts and ideas, develop your Research Plan, and stay on track through your project progress. Pages in the manual for you to record on will not have the upper blue banner for better printing, if you (or your teacher) decides to print them. You will also find buttons throughout the manual with links to resources – websites and PDFs.

The very first task you want to complete is setting up your Project Notebook.

Project Notebook:
A very important component of your project is the Project Notebook. You want to start using your Project Notebook at the very beginning – before you begin brainstorming. The next page has full instructions on how to setup and use your Project Notebook.

Student Participation Guide
Project Notebook Instructions

The Project Notebook - Importance and Guide

Why should you use a Project Notebook?

A notebook helps organize the development of your ideas and information, which are recorded chronologically as your project grows from an initial idea to your completed investigation. By taking detailed notes throughout your project, you can make sure that you are collecting all the data that you need, what you've learned, as well as documenting any challenges that you encountered. Your notebook is a place to highlight your thought process, which could include reflecting on ways to improve your experiment or design to make it more reliable. Think of your notebook like a journal where you record everything related to your project.

Setting Up and Using Your Project Notebook

Basic Requirements:

- ➔ Bound notebook is suggested (not loose pages in a binder) or digital notebook.
- ➔ Write in blue or blank ink (not pencil) using neat and legible writing, OR digital notes must be printed & pasted/stapled/taped into your notebook.
- ➔ Document any AI usage, prompts, and verification.
- ➔ Data tables, graphs, or diagrams may be written into the Project Notebook or printed & pasted/stapled/taped into your Project Notebook.
- ➔ Mistakes are not scribbled out, but only have a single line drawn through it. You can do this in digital notebooks with the 'strikethrough' feature.
- ➔ Do not tear out or delete any pages from your notebook.
- ➔ Add a date to every entry.
- ➔ Keep notes in chronological order, do not skip pages.
- ➔ Add pages numbers to one corner of each page (except for Table of Contents page).
- ➔ CONSIDER: Add your signature to the bottom corner of every page. This verifies that these are your notes. If your project is conducted with a mentor, their signature should be included.

Front Cover: List your full name (and names of partners if you worked with other students) and the title of your project (you can add this later!)

Table of Contents: Use the first page of your notebook as a Table of Contents, which organizes your project into different stages. You will add to the Table of Contents as your project moves through the phases of Observe, Plan, Explore, and Explain. Include the page numbers for each section to the right of where they are listed in the Table of Contents.

Get Original File Here!

Student Participation Guide
Stage 1 - OBSERVE

Stage 1 - OBSERVE

This is where science begins! Scientists and engineers start by asking questions and observing the world around them. Your curiosity is your most important tool right now.

What to do:

1. Read through this Student Manual carefully — pay attention to deadlines, rules, and what paperwork you'll need.

2. **Start brainstorming!** Use the buttons below for ideas on how to brainstorm. Some students know their topic right away; others take a few weeks observing the world. Both are totally fine.
   - Ask yourself: What do I wonder about? What problem could I help solve? What interests me most? Look around you — at school, at home, in your community. What could be investigated or improved?
   - When you come across a good idea or a question occurs to you, get in the habit of stopping to jot it down in your Project Notebook. You don't need to go into detail at this point. Write down EVERY idea you have! There are no bad ideas during the Brainstorming process.
   - Mind Maps (hand written or digital) are a great method for organizing your ideas.
   - When jotting down ideas in your Project Notebook, be sure to record the source of your inspiration for the Bibliography portion or your Project Report.

3. After you've performed some brainstorming activities, it's time to hone in on your specific project topic and continue background research. The following pages are activities, space for you to record your ideas and thoughts, and develop a background research plan for your project.
   - *Building Curiosity* can be used to perform a deeper dive into one (or more!) of your resources used while brainstorming.
   - Next, you can use *OBSERVE: Choosing a Project* to fully develop your project topic, the background research necessary, and record feedback from your teacher or mentor.
   - Be sure to save your sources to include in your bibliography at the end of your Project Report.
   - Once you've completed the OBSERVE stage of your project, it's time to move into the PLAN stage!

Click here to learn how to Brainstorm!

Click here to build a Mind Map!

mind meister

Guide to help you determine your question or problem!

BUILDING CURIOSITY

1. WHAT IS YOUR SOURCE OF INSPIRATION? (CHOOSE ONE)

What activity are you doing? What article are you reading? What presentation are you listening to?

2. WHAT DO YOU NOTICE?

Jot down 5 things that interest you in your activity listed above. What do you SEE and what do you WONDER?

3. WHAT QUESTIONS DO YOU HAVE?

Turn your wonderings into 2-4 questions. Focus on open-ended questions that require investigation to answer.

4. CIRCLE ONE QUESTION ABOVE TO EXPLORE AND WRITE WHY YOU CHOSE IT:

Why are you interested? What do you hope to learn? Why does this matter to your community?

5. WHAT DO YOU NEED?

What skills do you want to learn? What skills are you good at? What materials do you need?

6. WHO CAN HELP YOU?

Teacher? Parent? Friend?

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OBSERVE: Choosing a Project

Set a personal deadline for review of this stage: _____

Rough Draft for STEPS	**Student Plan**	**Mentor, Teacher, or Peer: Feedback/ Comments**
Observe: Identify Question or Problem *What's the idea you want to explore?*		
Observe: Background Research *Where will you find reliable information?*		

Observe: Questions to Consider

- ❑ How did you come up with this idea? Can you explain how you developed your question or problem based on the background information?
- ❑ What did you learn from your background research?
- ❑ Is your question and hypothesis testable or your problem solvable? Is the scope too broad or too narrow?
- ❑ Does your question and hypothesis or problem and design solution make sense based on background information?
- ❑ Has a similar question or problem already been addressed? What is new about your approach? How are you building on this similar research?
- ❑ Why are you interested understanding this question or solving a problem by designing a prototype?
- ❑ How will this experiment expand scientific knowledge? OR How is your prototype different from those already on the market?
- ❑ If this is a continuation project, how is it different from your previous project?
- ❑ What are the requirements for success?

Student Participation Guide
Stage 2: PLAN

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Stage 2 - PLAN

In the scientific method, this is where you form your hypothesis and design your procedure. In engineering design, this is where you define the problem and plan your solution. A strong plan now means a smoother project later!

What to do:

1. Learn (or review) the scientific method and engineering design process.
2. Use the following pages to help you develop a Research Plan, following the rules and regulations for Middle School in Section 3 of this manual.
3. Complete your Research Plan including:
    a. Question you are addressing or Problem you will solve
    b. Hypothesis or Possible Solution
    c. Materials - with details of amounts and product type
    d. Methods or Procedures - should include enough steps so someone could replicate your project
    e. Acknowledgement of any risks beyond day-to-day activities for the age. For human subjects projects, you should include detail of how you will recruit participants, keep them and their data safe.
4. Use the tools your teacher provides to draft your Research Plan as this makes it easier to enter into zFairs later.
5. Register on zFairs. Full zFairs instructions are in Section 4 of this manual.
6. Complete the required forms on zFairs.
7. Once your Project Forms are entered on zFairs, your teacher will flag them as “Ready for Safety Review.” You cannot start experimenting or prototyping until your project is approved.

Research Plan:
Another important component of your project is your Research Plan, sometimes referred to as the Project Plan. In addition to submitting your Research Plan on zFairs, you will also bring it for Day of Fair as one of the five required components.

Important: Safety Review Approval May Be Required Before Start of EXPLORE
Depending on the safety concerns with the materials, tools, and methods in your plan, you may need Safety Review Committee approval before you begin EXPLORE.

Student Participation Guide
PLAN → Project Safety

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Project Safety

You should consider the safety of your project elements from the very beginning of the Plan stage.
Every project uses three elements:

- ➔ **Materials** (what it's made of)
- ➔ **Methods/Procedures** (how you do the experiment or implement your design)
- ➔ **Tools** (what you use to build or test it)

Before you submit your Project Plan, your teacher needs to check it over for safety concerns and approve it. This helps keep everyone safe!

Each of these elements are sorted into one of three **Safety Zones**, based on how much risk it involves:
🟢 **Green Zone** – Low risk. Pretty safe to go ahead.
🟡 **Yellow Zone** – Medium risk. Needs a closer look before you start and adult supervision.
🔴 **Red Zone** – Higher risk and restricted. Need to revamp plan to be within the Green and Yellow zones.

Use the tables in Section 3 of this manual to figure out which zone your materials, methods, and tools fall into. That will tell you (and your teacher) what kind of approval you need before you can start experimenting or building your prototype.

Project Safety Zone	Approvals and Requirements
Green **Low to No Risk**	• Teacher approval • Parent/Guardian approval • Question 5 in Research Plan (for select projects - see rules in Section 3) • zFairs submission by January 31st
Yellow **Moderate Risk**	• Teacher approval • Parent/Guardian approval • Risk Assessment and Supervision (Form D) and/or Human Subjects (Form C) • zFairs submission by December 1st • **SRC approval (must wait for approval before EXPLORE)**
Red **High Risk**	• Student must redo Research Plan to not include processes, materials, or tools in the Red Zone.

PLAN YOUR WORK

Once you have your big idea for a project, make sure you are ready for each step of your project. Use this worksheet to set due dates and track your progress. Schedule teacher check-ins and deadlines.

PLANNING AND PREPARATION

Week	Task	Details/Notes	Due Date	Teacher Check
	Pre-work, choose a topic	Start notebook, background research		☐
	Question or Problem Formulation – ~3 draft ideas	Explore feasibility and rules		☐
	Submit statement and background research to teacher	Include variables or possible solutions		☐
	Draft Research Plan for teacher review, modify as needed	Include materials needed and risk assessment		☐
	Collect signatures and submit forms to zFairs for approval	Pre-approval required for restricted areas (see manual)		☐

STOP Wait for approval – pre-approval projects may take up to 2 weeks. Plan ahead. You can prep your research paper while you wait.

EXPERIMENT AND EXPLORE

Week	Task	Details/Notes	Due Date	Teacher Check
	Gather and prep supplies	Pay attention to delivery est.		☐
	Setup your notebook for data	What variables, data do you need?		☐
	Collect data, test, modify, adjust	Changes to protocol may need to be re-approved.		☐
	Perform initial analysis	Run tests again if possible, at least 3 times		☐

Once you have the results you need, clean up and dispose of materials as required. Reflect on what you learned and what you'd do differently next time in your notebook.

ANALYZE AND PRESENT YOUR WORK

Week	Task	Details/Notes	Due Date	Teacher Check
	Finalize your data analysis	Visualize in graphs and charts		☐
	Draft your Research Paper	Aim for approx. 5 pages		☐
	Create a mock-up of your project board	What's the MOST IMPORTANT info to include		☐
	Practice Oral Presentation	Speak slow and steady		☐

Finalize all your materials based on feedback and you're ready for the fair! Congratulations on all your hard work.

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Massachusetts Science + Engineering Fair

PLAN: Research and Design

Set a personal deadline for review of this stage: _____

Rough Draft for STEPS	**Student Plan**	**Mentor, Teacher, or Peer: Feedback/ Comments**
Plan: Identify possible solutions/ question		
Plan: Create prototype/ Research Plan/Code *What are the materials you'll need? How much time do you need?* Note: Research Plans will need to be filled out in detail for approval.		

Plan: Questions to Consider

- ❑ Is your plan ethical and safe? If not, can you make adjustments so that it is ethical and safe?
- ❑ Do you need additional approvals?
- ❑ For experiments:
  - → What are your control group, experimental group, independent and dependent variables?
  - → How are you accounting for possible errors? Are you conducting multiple trials?
- ❑ For designs:
  - → What are your design plans? What materials and tools will you use to build your prototype?
  - → How will you test your prototype for success? Have you accounted for iteration in the design process?
- ❑ Is your plan aligned with your hypothesis or design plan?
- ❑ What parameters will you use to accept or reject your hypothesis OR success of your prototype?

PLAN for EXPLORE: Experimentation and Investigation


Set a personal deadline for review of this stage: _____

Rough Draft for STEPS	**Student Plan**	**Mentor, Teacher, or Peer: Feedback/ Comments**
Explore: Test, Collect Data		
Explore: Analyze, Adjust, Collect more		

Explore: Questions to Consider

- Did your experiment or prototype building differ from your plan? If so, how?
- Do you need to refine your experiment and run it again OR iterate your design and make adjustments to your prototype? If so, why?
- How long did it take you to build your prototype or set up your experiment?
- How much time did it take to run each trial and record the data?
- Did your prototype meet the requirements? Are there ways to improve your design?
- How many times did you modify & re-test your prototype?
- What were possible sources of error in your experiment?

PLAN for EXPLAIN: Communication and Presentation


Set a personal deadline for review of this stage: _____

Rough Draft for STEPS	**Student Plan**	**Mentor, Teacher, or Peer: Feedback/ Comments**
Explain: What will you want to share?		
Explain: How will you share what didn't work or what you would do differently? *Telling the story of a challenge often shows how and what you learned.*		

Explain: Questions to Consider

- Is your Project Notebook complete?
- How did you analyze your data?
- What types of graphs will you create to present your data?
- What is represented by each data point?
- Did the results of your experiment support or reject your hypothesis? What does this mean?
- Was your prototype more successful after you made adjustments to the design?
- Can you explain how the background information ties into your results?
- Did you collect all data under the same conditions (such as time of day or lighting conditions)?
- Were there any factors that you were not able to keep constant in all trials? How might this have affected your results?

PLAN: Template for your Research (Project) Plan

This template aligns with the Research Plan you will have to submit.

1. Question or Problem to Solve

2. Hypothesis Statement OR Statement of Goals

Scientific Hypothesis

- ➔ Define a clear hypothesis and explain its significance.
- ➔ Conduct background research using at least 3 reliable sources; include citations.
- ➔ Design a detailed experimental plan with variables, controls, and repetitions. Execute the experiment multiple times to ensure reliability.
- ➔ Collect and analyze data using graphs, tables, and basic statistics.
- ➔ Draw conclusions supported by your data and discuss feasibility and implications.

Engineering Goals

- ➔ Define a clear design goal and explain its significance.
- ➔ Conduct background research using at least 3 reliable sources; include citations.
- ➔ Design a detailed engineering plan including multiple tests and prototype iterations
- ➔ Collect and analyze data using graphs, tables, and basic statistics.
- ➔ Draw conclusions supported by your data and discuss feasibility and implications.

3. List all of your materials

PLAN: Template for your Research (Project) Plan

4. Methods & Procedures

Diagram(s) of your set up (if applicable)

5. Risk Assessment

Be sure you've performed a full safety review of your project using the Rules and Regulations in Section 3. You'll state here if additional paperwork is required.

Student Participation Guide
PLAN → Paperwork Required

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PAPERWORK REQUIRED:
Note that Form A is required for EVERY student, Form B requires one form per PROJECT, and Forms C, D, & E are project dependent and may not be required.

Form A: Permissions (required for each student)

- Students and adults must review the Ethics Statement
- Parent/Guardian must give permission on Required Release

Form B: Project Research Plan (one per project)

- Question you are addressing or Problem you will solve
- Hypothesis or Possible Solution
- Materials - with details of amounts and product type
- Location of your experimentation (home, school, both, other)
- Methods or Procedures - should include enough steps so someone could replicate your project
- Acknowledgement of any risks beyond day-to-day activities for the age. For human subjects projects, you should include detail of how you will recruit participants, keep them and their data safe.

Form C: Human Subjects - ONLY needed for HUMAN SUBJECT projects.

- This includes projects where you give surveys, make observations of human subjects, and/or have humans test a device or application.
- This form is designed to disclose risks to participants - informed consent.
- Once approved by SRC, make copies of this form, including copies any survey you will give or material your will use to share with participants.
- Then you give this Form C to your human subjects for approval, so they understand and can agree to participate in the study.
- Your human subject participants must agree and sign the form before participation in your study. Human subjects under the age of 18 need their Parent/Guardian's signature to participate.
- Bring signed forms to the Fair.
- Submit for SRC approval BEFORE experimentation.

Form D: Risk Assessment and Supervision - ONLY for projects that require additional supervision according to Middle School rules. Submit for SRC approval BEFORE experimentation.

Form E: Student Disclosures - ONLY needed for projects that are continuing topics from past years, working with a mentor other than your teacher, or using Generative AI.

Student Participation Guide
Stage 3: EXPLORE

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Stage 3: EXPLORE

During EXPLORE you will get at the heart of your project. If you're performing an experiment, you will test your hypothesis, collect data, and analyze results. For engineering projects, this is when you'll build your prototype, test it, and improve. This is usually the most exciting part of your project. Enjoy it!

It's also a great idea to start your Project Report early. You can start by writing the Background Research section, begin your methods and materials section, and bibliography – all before and during the experimenting or building. This is a great way to fill time while you wait for approvals, materials, trials to run, glue to dry, codes to process, etc. You can make efficient use of your time and be better prepared for the EXPLAIN stage later on!

What to do:

- ➔ Once your project is approved, you can begin! Start your experiment or build your prototype.
- ➔ Follow your plan, but don't panic if things don't go as expected. Unexpected results are part of real science and engineering.
- ➔ Document EVERYTHING in your Project Notebook as you go.
  - ◆ Methods and materials used
  - ◆ Observations you make along the way
  - ◆ Data collected (numbers, measurements, results, data graphs)
  - ◆ Challenges or setbacks — and how you responded to them
  - ◆ Any changes you made to your original plan and why
- ➔ Take photos and videos of your setup, process, and results — the more documentation, the better.
- ➔ Stay on track with your timeline so you have enough time to analyze your data and draw conclusions. You can use the *Plan Your Work* checklist and/or the *Tracking Progress* page to help you stay on track .

TRACKING PROGRESS

Schedule periodic check-ins with your teacher to make sure you stay on track and get the feedback you need. This will also help you remain independent in your work which is critical for science fair students! *(Use the back of the sheet if needed)*

CHECK-IN # ☐

DATE

DATE OF PREVIOUS CHECK-IN

STUDENT(S) NAME(S)

MENTOR/TEACHER NAME

PROJECT TITLE

UPDATE SINCE LAST CHECK-IN (RESULTS, ETC)

ISSUES TO DISCUSS (MATERIALS, EQUIPMENT, PROCEDURE, SURPRISES)

fill out the section below together

QUESTIONS FOR THE MENTOR/TEACHER (PROCEDURAL OR THEORETICAL)

QUESTIONS FOR THE STUDENT (PROCEDURAL OR THEORETICAL)

TIMELINE REVIEW & NEXT STEPS FOR STUDENT

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Record this meeting in your notebook: summarize your notes or add this sheet

Student Participation Guide
Stage 4: EXPLAIN

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Stage 4: EXPLAIN

PROJECT COMPONENTS:
At this point, your Research Plan and Project Notebook should be ready. Now you must prepare the other three components to be ready for the Day of Fair. It's smart to start writing your Project Report early on, adding information when you can (such as background research and information included in your Research Plan). Hopefully, you already have a solid start on your Project Report!

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

Real scientists and engineers share their findings within their professional communities and with the world. That's how knowledge grows and innovations happen! This stage is your chance to present your work clearly and proudly. Use the Judge's Checklist on the next page to ensure you fulfill the expectations for Science & Engineering Fair.

The information will be in multiple formats, just presented differently. There are templates and guides for you using the button below.

Before the Day of Fair, you must complete and include ALL of the following:

- ➔ **Research Plan**: You will have already completed this during the PLAN stage.
- ➔ **Project Notebook:** Your record of everything you did during the EXPLORE stage. Be sure it's organized!
- ➔ **Project Report**: A written report that includes your background research, question or problem, methods, materials, raw data, graphs, figures (otherwise known as pictures!), your conclusions, and full bibliography.
- ➔ **Project Display**: A visual display board summarizing your project.
- ➔ **Oral Presentation**: Be ready to talk about your project and answer questions from judges.

Student Participation Guide
Judging Checklist

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Stage 4: EXPLAIN - Checklist for Judging

Judges evaluate your project based on several key areas. This planning guide will help you understand what elements judges will look for in your project, and where there may be room for improvement.

TECHNICAL APPROACH AND METHOD

- ❑ Define a clear research question and hypothesis, explaining its significance or define a clear problem and explain its importance.
- ❑ Conduct background research using at least 3 reliable sources – include citations.
- ❑ Design a detailed experimental plan with variables, controls, and multiple trials or a detailed solution with labeled diagrams and a list of materials.
- ❑ Run or trials or build your prototype, iterating as appropriate for your project.
- ❑ Collect and analyst data using graphs, tables, and basic statistics.
- ❑ Draw conclusions supported by your data and discuss feasibility and implications.

SCIENTIFIC UNDERSTANDING

- ❑ Use research to interpret your results and explain scientific principles involved.
- ❑ Clearly describe your methods, including troubleshooting, adjustments, and iterations.
- ❑ Reflect on what your experiment or design testing reveals and its limitations.
- ❑ Suggest future research directions, improvements, and/or next steps.
- ❑ Connect your project to real-world applications or other STEM disciplines.

INNOVATION AND CREATIVITY

- ❑ Choose a project based on personal curiosity or interest-be prepared to explain why.
- ❑ Demonstrate independence in planning and execution.
- ❑ Make thoughtful decisions based on available resources-this shows creativity.
- ❑ Highlight any unique methods, designs, or materials used.
- ❑ Document creative problem-solving and any iterations or changes made.

COMMUNICATION & PROJECT COMPONENTS

- ❑ Prepare a clear and concise Oral Presentation of your project.
- ❑ Create a neat, organized Project Display board with visuals, charts, and graphics.
- ❑ Write a report including your research, methods, results, and sources.
- ❑ Maintain a Project Notebook with all plans, observations, and reflections & dated entries.
- ❑ Ensure all team members (if applicable) can explain the project thoroughly.
- ❑ Show attention to detail in every part of the project—from planning to presentation

Judges Scoring Rubric

Student Participation Guide
Day of Fair

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Getting Ready for Day of Fair

Before the Day of Fair, you must be sure you have created an account, entered your project, and uploaded all required paperwork on zFairs (see Section 4) according to the deadlines outlined in Section 2.

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/guardian 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, photographs, videos, 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.

Why are there two sets of safety guidelines?

One set of safety guidelines refers to the time during which you are working on your project. The other set of safety guidelines refers to what you can bring the Day of 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 Fair there will be safety checks of all projects before the judging takes place.

Student Participation Guide
Day of Fair

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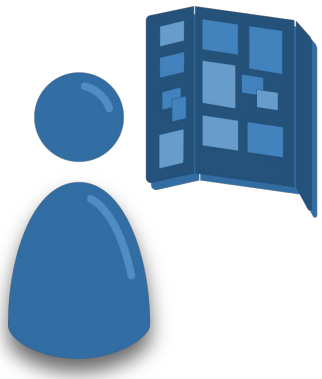
Day of Fair: Guidelines and Expectations

All Science Fair participants must adhere to the following safety aspects of their project displays:

- 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 may 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 item(s) may 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-prong extension cord.
- The power supply cord for electrical apparatus must terminate in a three-prong grounded outlet.
- If applicable, printed and signed Form C (Human Consent Form) should be in a separate notebook, not displayed on the table, should the safety judge ask to see it.

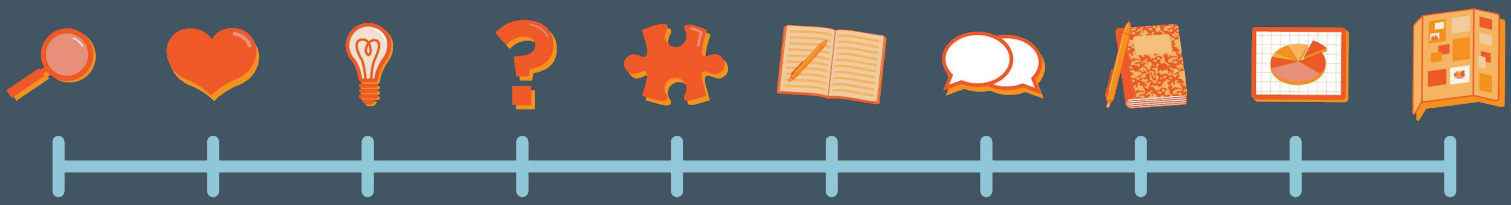
Do all students have access to electricity?

No. 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. Students who need electricity specifically for their project, may have less space than other projects.



Section 3

Project Rules & Restrictions



Rules & Restrictions
Project Categories

MSEF

Science & Engineering Fair Projects may involve science research and experimentation, engineering design, computer science, and/or mathematics. Multiple qualified judges will review each project, individually and independently. In order for the judging to be conducted fairly and accurately, it is important that students properly categorize their project. Please consult with your teacher and/or mentor to be sure you choose the appropriate category.

Behavioral & Social Science:
The study of thought processes and behavior of humans or other animals studied through observational and experimental methods. Includes: psychology, educational testing, animal behavior, neuroscience, sociology, and anthropology.

Biology:
The study of living organisms and how they grow, function, interact, and change. Includes: anatomy, biomedical science, ecology, genetics, genomics, health science, microbiology, nutrition, physiology, plant science (botany), toxicology, biomedical science, health science, veterinary medicine, and zoology.

Chemistry:
The study of the composition of substances, their structure, their behavior, reactions, analysis and synthesis. Includes: physical chemistry, organic chemistry, inorganic chemistry, materials chemistry, computational chemistry, and environmental chemistry.

Computer Science:
The study or development of computer systems, software, and algorithms used to solve problems or analyze information. Includes: artificial intelligence, machine learning, programming, robotics, and systems software. Note: See tips below about use of AI as a tool vs a topic.

Engineering (Electrical & Mechanical):
The application of science and mathematics to design, build, test, or improve devices, machines, structures, or systems that solve real-world problems. Includes: aeronautical, automotive, civil, electrical, environmental, geothermal, marine, materials, mechanical, photographic, solar, and sound engineering.

Earth and Environmental Science:
The study of Earth, its systems, and the interactions between living organisms and their environment. Includes: climate science, meteorology, conservation, ecosystems, oceanography, geoscience, invasive species, natural resource management, pollution, and water quality.

Rules & Restrictions
Project Categories, cont.

Mathematics:

The study of numbers, patterns, relationships, and mathematical models used to solve problems and answer questions. Includes: computational modeling (including computational biology), data science, game theory, geometry, number theory, probability, and statistics. Note: calculus and abstract algebra may be more suitable for High School projects.

Physics & Electronics:

The study of matter, energy, forces, motion, electricity, and the interactions between them. Includes: aerodynamics and hydrodynamics, solid-state theory, optics, acoustics, particle, nuclear, atomic, plasma, thermodynamics, semiconductors, magnetism, quantum mechanics, biophysics, circuits, Internet of Things, sensors, signal processing, and electronic phenomena, devices and systems.

Artificial Intelligence (AI) is a tool, not a project category. Choose the category based on the scientific or engineering problem your project addresses. Be sure to read the Rules and Restrictions for AI thoroughly.

Where does my AI project go?

If your project...	You're probably in...
Builds an AI chatbot	Computer Science
Uses AI to study plant growth	Biology
Uses AI to predict weather	Earth & Environmental Science

Rules & Restrictions
Project Categories, cont.

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Need help choosing a category?

If your project...	You're probably in...
Studies plants, animals, cells, or microorganisms	Biology
Studies people, learning, or behavior	Behavioral & Social Science
Investigates chemicals or chemical reactions	Chemistry
Creates software, programs, or AI models	Computer Science
Designs, builds, or improves a device or machine	Engineering
Studies weather, rocks, pollution, ecosystems, or natural resources	Earth & Environmental Science
Uses mathematical models or statistics to answer a question	Mathematics
Studies motion, electricity, light, sound, or energy	Physics & Electronics

Common Questions

I'm not sure if…	Choose…
I built a robot	Engineering if you're designing the robot or Computer Science if you're developing the software or AI
I used AI to analyze plant growth	Biology
I used AI to predict the weather	Earth & Environmental Science
I collected survey data and used statistics	Behavioral & Social Science if you're studying people or Mathematics if the project is about the statistical method itself

Rules & Restrictions
Project Safety

MSEF

Staying Safe With Your Project

Before you start your project, you should ask yourself "What could go wrong and how can I keep myself, others, and the environment safe?" This is called a risk assessment and it's a normal and very important part of being a scientist or an engineer. Think about your materials, tools, and procedures and write down anything that could be risky. Things to think about are sharp objects, power tools, machines, chemicals, and biological components (plants, animals, bacteria). Then write a simple safety plan to include in your Research Plan that explains how you will handle, store, clean up, and dispose of anything that is risky. You should work with a supporting adult on your Risk Assessment and Safety Plan.

Sometimes the materials or tools you imagine for your project are not allowed, aren't safe, or not available. That's totally OK! This is part of the iterative process of being a scientist or engineer and professionals run into this problem all the time. Brainstorm and seek support from the adults supporting your project to figure out alternatives to accomplish your goals. Adjusting your plan, as needed, is a very important skill to learn.

You should always wear personal protective equipment (PPE) when needed – such as safety glasses, gloves, lab coats. There should always be an adult supervising any steps that include risk. It is your responsibility to learn what PPE is needed for various materials, tools, and procedures and include that in your Safety Plan.

The tables within this section illustrate materials, tools, and procedures commonly used by middle school students and examples of what is absolutely not allowed. For items in the "Low to No Risk" category – you should be able to work with independently – with the expectation that you have been properly taught how to do so. Items in the "Moderate Risk" category will require Form D - Risk Assessment and Supervision.

Project Safety Zone	Approvals and Requirements
Green **Low to No Risk**	• Teacher approval • Parent/Guardian approval • Question 5 in Research Plan (for select projects) • zFairs submission by January 31st
Yellow **Moderate Risk**	• Teacher approval • Parent/Guardian approval • Risk Assessment and Supervision (Form D) and/or Human Subjects (Form C) • zFairs submission by December 1st • **SRC approval (must wait for approval before EXPLORE)**
Red **High Risk**	• Student must redo Research Plan to not include processes, materials, or tools in the Red Zone.

Project Rules & Restrictions
Human Subjects

MSEF

Human Subject Research Projects

Human research projects include any project where humans (other than the students leading the project) are testing products, devices, filling out surveys, or involved in activities. These projects are considered Yellow Safety Zone projects. Human Research projects are only allowed with minimal risk, anonymous data collection, and it fits into 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
- ★ 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.

Human Subject Research - Requirements

MSEF requires the following for ALL Human Research Projects:

- ➢ **Form B: Research Plan - Question 5** should address recruitment of participants and safety of people and their personal data. Include info on how personal data will be stored and for how long.
- ➢ **Form C: Human Subjects**
- ➢ Copies of standardized and/or student prepared tests, surveys, data security, etc. to be used
- ➢ Scientific Review Committee approval
    - **After approval, Human Subjects Form C (informed consent) 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 before participation.**
    - The individual forms signed by participants do not need to be uploaded *but should be brought to the fair for proof of consent.*

NOT ALLOWED:

- ➢ Surveys and questionnaires can NOT involve gathering personal information, invasion of privacy, or potential for emotional distress such as sensitive personal history, physical health, or mental health.
- ➢ Ingestion, inhalation, or application of any substance by or to a human subject
- ➢ Personal data or photographs used with any generative AI platforms

Project Rules & Restrictions
Vertebrate Animals

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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. **Observational only projects do not need any additional paperwork than Forms A & B.**

What may 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 and analysis of animal data from research institutions.
- ★ Data mining and 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 applications that record sounds (see 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:

- ➢ There can be NO interaction with the animals being observed – including:
  - Touching and verbal interaction.
  - Any in-home observation of domestic pets.
- ➢ There can be NO manipulation of the animal's environment in any way – including:
  - Changing food sources, limiting movement with gates, introducing sounds or smells.
  - Any obtrusive recording equipment that include lights, sounds, or change to the physical space.
- ➢ There can be NO interaction with any animal parts, fluids or excrement.

Project Rules & Restrictions
Biological Agents

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Potentially Hazardous Biological Agents (PHBAs)

As a general rule, projects may only use microorganisms that are classified as BSL-1 (Biosafety Level 1), meaning they are well-understood, pose minimal risk to healthy individuals, and are commonly found in educational settings. Projects involving unknown microorganisms, samples collected from the environment (such as soil or water), or any agent that could potentially cause disease are not permitted without explicit SRC approval and appropriate containment measures. For additional clarification, email SRC@scifar.com.

ALLOWED **Low to No Risk** **Form D not required**	**ALLOWED WITH RESTRICTIONS or PRECAUTIONS** **Moderate Risk** **Form D required**	**NOT ALLOWED** **High Risk**
Including but not limited to: Plant studies Sterile, bagged potting mix Studies involving fermentation of baker's yeast and brewer's yeast Fossilized tissue and archeological specimens	Studies involving bacteria, fungi (other than yeast), protists, and/or archaea must be limited to known Biosafety Level 1 (BSL-1) organisms with clear plan for safe handling and disposal: Studies of slime molds and edible mushrooms Mold growth on food items if the experiment is terminated at the first evidence of mold Microbial fuel cells in which the device is sealed during experimentation and disposed of properly at the conclusion of the study Studies involving E. coli OP50 and other strains of E. coli that are used solely as a food source for C. elegans and are performed at school and are not subject to additional rules for recombinant DNA studies or use of antibiotic-resistant organisms Studies involving E. coli K12 that are performed at school and are not subject to additional rules for recombinant DNA studies or use of antibiotic resistant organisms Meat (frozen, fresh, and by-products), eggs, and pasteurized milk obtained from food stores, restaurants, or packing houses **collected** soil samples for environmental testing and evaluation. (Projects requiring soil for plant/fungi growth should use sterile potting mix to account for potential pathogens.)	Blood and other bodily fluids Raw or partially processed human/animal waste Recombinant DNA Ingestion, inhalation, or application of any substance by or to a human or animal subject (i.e. tasting food, chewing gum, applying lotion) Culturing unknown bacteria (i.e. from swabbing doorknobs, pond samples, soil samples) Manure, untreated compost

Project Rules & Restrictions
Substances & Chemicals

MSEF

Hazardous Substances & Chemicals

A good rule of thumb for substances and chemicals is that anything not found in a grocery store and/or not being used for its intended purpose or as directed is likely NOT allowed. Just because a product can be purchased for home use doesn't mean it's automatically safe. For additional questions email SRC@scifair.com.

ALLOWED Low to No Risk	ALLOWED WITH RESTRICTIONS or PRECAUTIONS Moderate Risk	NOT ALLOWED High Risk
baking soda vinegar dish soap food coloring cornstarch flour yeast lemon juice/citric acid milk vegetable oil hydrogen peroxide (3% dilution) rubbing alcohol / hand sanitizer shampoo / conditioner epsom salt cream of tartar coffee / tea potting soil activated charcoal iodine (dilute) alum (potassium aluminum sulfate) glycerin petroleum jelly	bleach - never mix with other substances/chemicals ammonia - never mix with bleach strong acids and bases: • nitric acid (≤0.01 M) • sulfuric acid (≤0.01 M) • hydrochloric acid (≤0.1 M) • sodium hydroxide (≤0.1 M) hydrogen peroxide (higher than 30% - adult supervision) acetone isopropyl alcohol (91-99% - need adult supervision) - flammable pool chemicals fertilizers - brands must be listed to check specific ingredients plaster of paris resins and epoxies solvent-based inks dry ice **collected** soil samples for environmental testing and evaluation. (Projects requiring soil for plant/fungi growth should use sterile potting mix to account for potential pathogens)	drain cleaner oven cleaner concentrated: • nitric acid (>0.01 M) • sulfuric acid (>0.01 M) • hydrochloric acid (>0.1 M) • sodium hydroxide (>0.1 M) elemental halogens chlorate or perchlorate salts formaldehyde methanol chloroform ether benzene toluene mercury mercury compounds lead compounds asbestos phosphorus controlled substances (including DEA-classed) prescription medications alcoholic beverages tobacco

Safe Use of Substances & Chemicals

- ➔ Keep containers in good condition with manufactures' labels.
- ➔ Store all substances and chemicals in an orderly way – be sure incompatible chemicals are separate from each other. Obtain Safety Data Sheets for chemicals used. These sheets provide information on the correct handling of spills or injuries.
- ➔ Use appropriate PPE.

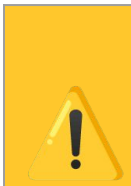
Project Rules & Restrictions
Tools & Materials

MSEF

Potentially Hazardous Tools & Materials

A good rule of thumb for tools and devices is if it potentially poses a hazard, it is either restricted or adult supervision is required at the middle school level. A few caveats to consider is that "safe without supervision" still assumes students have received proper instruction on each tool, that the workspace is appropriate, and that a teacher or responsible adult is accessible nearby, even if not directly watching. No tool is universally safe in every context. For additional questions, email SRC@scifair.com.

ALLOWED Low to No Risk Form D not required	ALLOWED WITH RESTRICTIONS or PRECAUTIONS Moderate Risk Form D required	NOT ALLOWED High Risk
Scissors, tape, school & wood glue	Power operated tools	High velocity projectiles (such as bb guns, potato launchers, paintball guns)
Rulers, meter sticks, measuring tape	Laser cutters	Radioactive materials
Digital thermometers	3D printers	compressed gas (except helium, oxygen, carbon dioxide)
Magnifying glasses	Compressed helium, oxygen, carbon dioxide	Carcinogenic materials
Battery-powered LED lights (low voltage, AA, AAA)	Class 1 & 2 lasers	Mutagenic materials
Beakers, graduated cylinders	Woodshop machines	Explosives, firearms
Pipettes, droppers	Sharp hand tools (box cutters, x-acto knives, saws)	High voltage equipment
pH strips	Soldering irons	Class 3 & 4 lasers
Magnets	Electric scissors	Ionizing radiation
Hand tools (except sharps)	Candles, flames	x-rays
	Oven use, stovetop	Nuclear energy
	Drones under 250 grams (must follow all state, federal and country laws)	Drones ≥ 250 grams (requires FAA registration)



Safe Use of Tools

- ➔ Always check tools before use - do not use defective, dull, or broken tools.
- ➔ When using a tool, place the work on a bench or a hard surface and not your hand.
- ➔ When using knives/blades always direct your cutting strokes away from your hand and body and be aware of those around you
- ➔ Wear safety safety glasses or goggles

Project Rules & Restrictions
Artificial Intelligence

Artificial Intelligence (AI), including generative AI platforms, Machine Learning (ML), and Large Language Models (LLMs) help students with innovation. However, this brings additional challenges including ethical dilemmas like bias in AI decisions and safety risks such as exploiting personal data. MSEF's guidance on the use of AI is updated to address concerns about safety, ethics, and learning for all MSEF students. It also supports MSEF's missions to advance science literacy by helping young scientists to grow in their field while staying honest to research practices. The guidance covers student data protection, data integrity, transparency, authorship, disclosures, compliance, and consequences. Please see the full AI Policies and Guidelines on the Resources page.

The capabilities of AI models are accelerating far too quickly to advise on all possible use cases. Therefore, the information provided should be considered a guide for how to think about AI use, and not a definitive text. Like any tool, AI tools can be used appropriately to help students access and understand their world, but misuse can be harmful (to learning, to ethical scholarship, and to privacy). For additional questions about appropriate use, contact SRC@scifair.com.

Generating Images

Unless AI image generation is the project focus, the use of AI tools to generate images, art, or diagrams for their poster boards or reports is discouraged.

Citation Requirements for using AI
If you are quoting or relying on specific, generated text and the AI tool provides a shareable URL, use this format: **Reference Entry:** Author Company. (Year, Month Day). Title of chat [Description, e.g., Generative AI chat]. Tool Name. URL **Example:** OpenAI. (2025, September 21). High school grammar concepts [Generative AI chat]. ChatGPT. chatgpt.com... **In-Text Citation:** (Author Company, Year) **Example:** (OpenAI, 2025)

Suggested AI Guidelines Across the Project Lifecycle
Observe: Find primary resources, determining project feasibility, adjust reading level of primary sources
Plan: Help brainstorm safety protocols, ie. 'is this sensor safe?'
Explore: Help debug code, drafting outlines, clarifying concepts
Explain: Create Project Report outlines, compile citations, polishing grammar and syntax, creating charts or visuals from your own data

Project Rules & Restrictions
Artificial Intelligence

MSEF

ALLOWED Disclosure Required	NOT ALLOWED
Brainstorming and safety planning. Identifying real-world problems, assessing feasibility, or drafting safety checklists (e.g., asking an LLM what safety gear is needed), verified with a teacher or trusted source. **Clarification.** Asking AI to explain complex topics or academic publications at an appropriate reading level. Students must engage with the original source to verify accuracy. **Programming assistance.** Fixing or debugging code the student wrote (e.g., GitHub Copilot), provided the student tests and understands the fix themselves. **Accessibility.** Generating alt-text, captions, or meeting notes; translating content into a student's home language. **Language polishing.** Correcting grammar, spelling, and syntax in the student's own writing (e.g., Grammarly). **Visualizing the student's own data.** Dedicated tools such as Microsoft Excel or Google Sheets may be used to create charts or graphs from student-collected data. Tools not designed for this purpose may introduce hallucinations in their data sets. **Summarizing student-provided documents.** Summarizing a paper the student uploads (e.g., NotebookLM with search off), always checked against the original source.	**Question, hypothesis, or procedure generation.** Using AI to produce the research question, hypothesis, or step-by-step procedure. These must be the student's original work. **Ghostwriting.** Using AI to write the methodology, data analysis, conclusions, abstract, report sections, or presentation content. **Generating research or data.** Using AI to generate background research, sources, or data to support a hypothesis. AI citation tools are also known to hallucinate and falsify references. Students should not rely on AI summaries in search engines, but they may be used to find primary sources. **Unverified AI summaries as sources.** Relying on search-engine AI summaries or LLM responses as research sources. These may be used only to locate primary sources, which must be read and cited directly. **Data privacy violations.** Entering personal details (names, addresses), confidential mentor notes, or proprietary information into public AI platforms. Using ID numbers, not identifying information, would be appropriate for human subjects' data.

Project Rules & Restrictions Resources

MSEF

Understanding Biosafety Levels (BSL)

Safety Data Sheets (SDS)

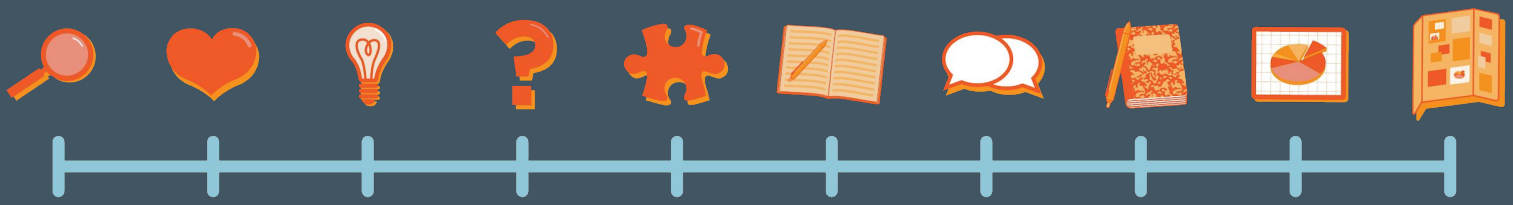
National Institutes of Health

MSEF Artificial Intelligence Policy

MSEF Artificial Intelligence Guidelines

Section 4

zFairs
The Student's Guide



zFairs
What and How

MSEF

What is zFairs?

zFairs is the online platform that MSEF uses to review student projects to help students be Science Fair Ready - and also to make sure students, their community, and their environment are safe.

You will use it to create an account, enter your project, and upload your project paperwork for approval. While paperwork can seem cumbersome at times, this process has the added benefit of strengthening your plans through review and feedback from professionals. While it isn't the reviewers' job to tell you what will or won't work, by asking you to plan out details of your project, you will be better prepared for your work ahead.

Yellow Safety Zone Projects need to be approved through zFairs **before** you can start your experiments. Earlier deadlines mean you'll have time to make some changes.
Green Safety Zone Projects require teacher approval before experimentation, but do not need approval through zFairs before experimentation. All projects seeking participation in a Regional or State Fair still need to be reviewed before being judged. Talk to your teacher about when to upload forms to zFairs, using the deadlines in Section 2.

Using zFairs

Your teacher needs to have an account in zFairs before you can create one!

Remember, if you are working with a different adult as your 'Adult Sponsor' you still need a teacher at your school to sign off on your work. Only teachers can create accounts in zFairs – all adult communication on zFairs must go through your teacher.

You will use zFairs for your **participant** information – 1 account per student.

Team leads need to finish creating their accounts before their teammates start theirs.

You will also use zFairs for your **project** information – uploading paperwork.

Paperwork can be downloaded and filled out electronically, or by hand and scanned. Either way, you should make sure that uploaded paperwork is **easy to read** and **complete**. Once the paperwork is uploaded, let your teacher know so they can go in to their dashboard to double-check. It is their job to '**Mark Ready for Review**'. This is the key step so it will be assigned to a reviewer.

Once assigned, reviewers may mark it approved right away or may ask for more details or changes. This back-and-forth is normal! It is your job (with your teacher and/or parent/guardian) to keep an eye on your emails and your zFairs dashboard in case the reviewers have questions. We want all projects to be approved within 2 weeks but need your help to respond to any questions you receive.

Please email middleschool@scifair.com with the project number if you have any questions or need assistance.

zFairs
Creating Your Account

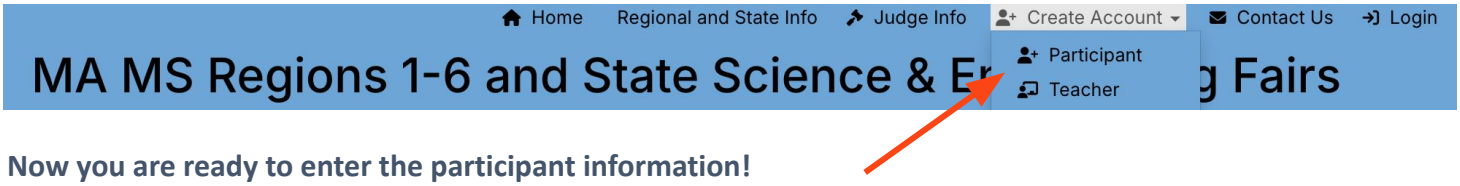
MSEF

Step 1 → Preparing for your zFairs account

Once you get the okay from your teacher, gather the following information before you open zFairs:

❑ username you want to use (you'll use this to log on)	
❑ your First Name & Last Name	
❑ your email - if you know school blocks external emails use a personal, parent/guardian, or teacher email	
❑ your gender and race (this is helpful to MSEF, but you can 'prefer not to answer')	
❑ password you want to use (at least one uppercase, one lowercase, one number)	
❑ parent/guardian's first name and last name	
❑ parent/guardian's email	
❑ parent/guardian's phone number	
❑ your address - street address, city, state, and zip code	
❑ if your school is public or private	
❑ the town(s) your school serves (public), or is located in (private)	

Step 2 → Ready to Create a zFairs Account



Now you are ready to enter the participant information!

Log on to https://MAMS.zfairs.com. Choose 'Participant' from the Create Account menu.

Use the answers you recorded above to get to the project ENTRY page.

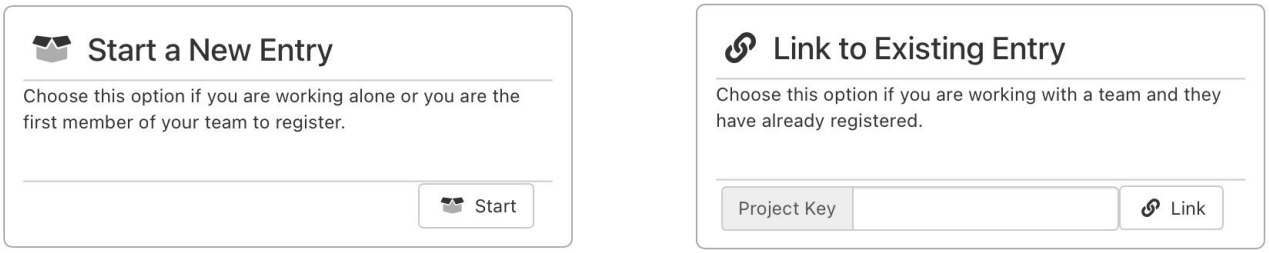
zFairs
Entering Your Project

MSEF

Step 3 → Project Entry

Once you have created your participant account you'll be asked for Project Information.

You'll see this screen:



- Team Leads and Individuals will choose '**Start a New Entry**.'
- 2nd and/or 3rd teammates will use the Project Key from the team lead to **'Link to Existing Entry.'**
  - **Do NOT need to continue with the next few steps as the Team Lead has already.**

NEXT:

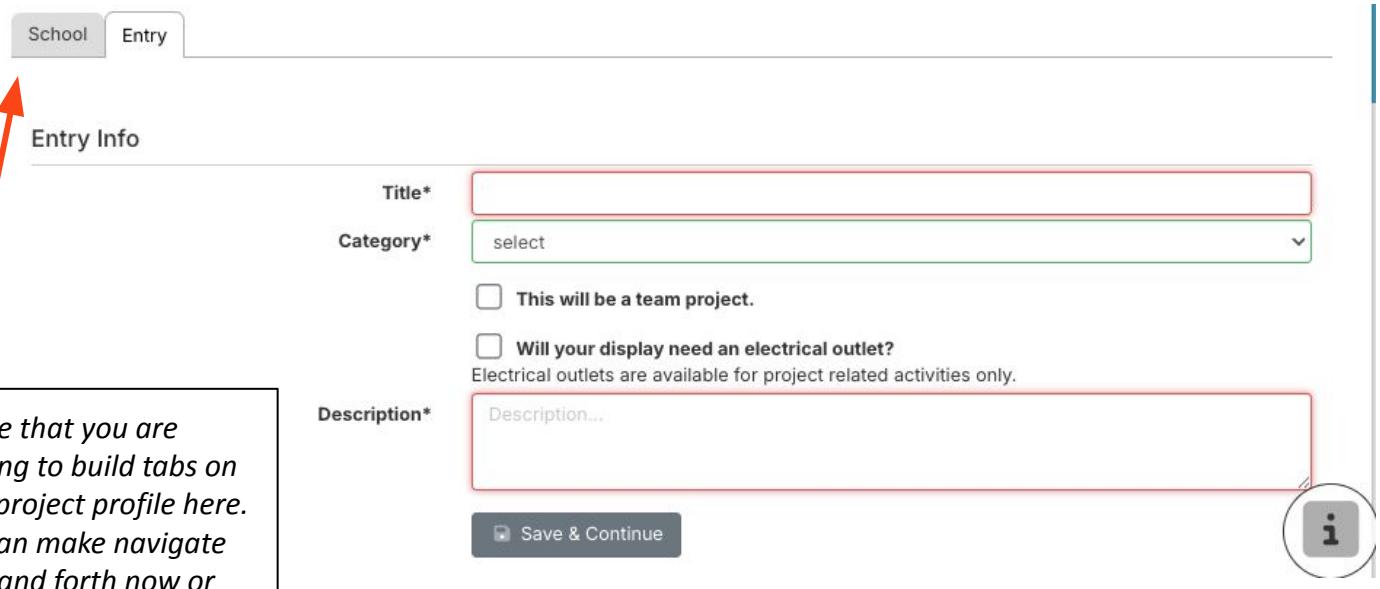
List your SCHOOL:

Your TEACHER:

Your GRADE:

If your school and/or teacher aren't listed, check with them to make sure they have an account and you are using the correct names. Reach out to middleschool@scifair.com if you need additional assistance.

NEXT: On the 'Entry' tab you'll be asked for your **TITLE**, the **PROJECT CATEGORY**, if it's a **TEAM** project, if you expect to need ELECTRICITY for your project device at the Fair, and a short **DESCRIPTION** of your project.



Notice that you are starting to build tabs on your project profile here. You can make navigate back and forth now or later to make changes.

zFairs
Forms Upload

MSEF

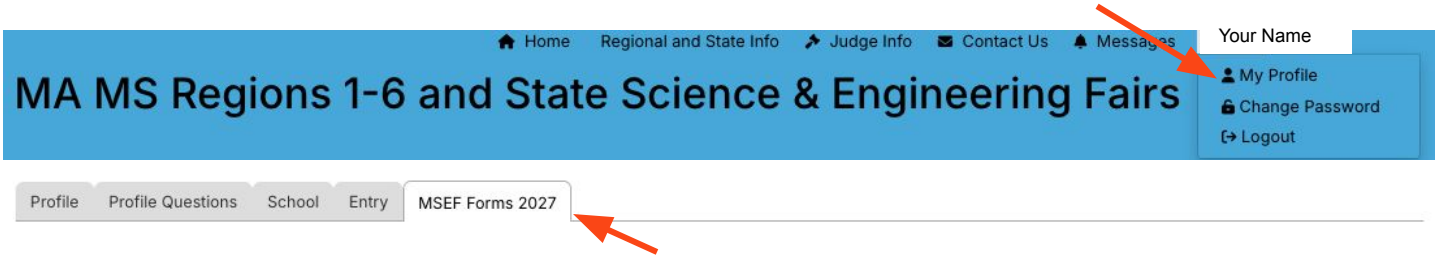
Step 4 → Confirmation of Participation

To finalize your account there are statements you need to confirm about your eligibility, your understanding of the ethics, and rules compliance. Read this statement and then hit the green **Save & continue** button.

Your account is now complete! You can share the project key with your teammates so everyone else can get set up their accounts.

MSEF Forms Dashboard

Once your accounts are created you'll need to go into your Profile to update your project details and get your paperwork dashboard ready to go. Click on your name in the menu and choose '**My Profile**'.

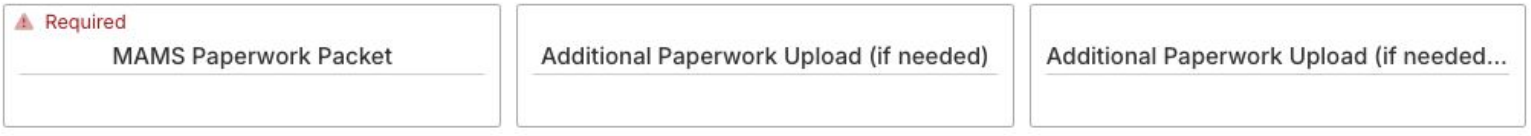


Remember we pointed out you were building the tabs for your project? When you click on '**My Profile**' you will now see those tabs. Choose **MSEF Forms 2027**.

A 'MSEF Forms 2027 Wizard' will pop up with the following questions to determine what paperwork is automatically added to your project account. If you answer yes to any of these questions you will need form C, D, and/or E.

- ❑ Does your project involve Humans other than you and your teammates? This includes asking people to take surveys or test products or designs. SRC approval needed BEFORE experimentation. Submission period is September 1st until December 1st.
- ❑ Does your project include 'Yellow Zone Safety' risks that require additional adult supervision? See Section 3 for details. This includes potentially hazardous chemicals, procedures, tools, and biological agents. Submission period is September 1st until December 1st.
- ❑ Is your project on a topic that you worked on in a past science fair (Continuation Project)?
- ❑ Did you or will you use generative AI for your project work?
- ❑ Does your project involve additional adults as mentors, beyond your teacher?

If you answer NO to those questions then you will have just the MAMS Paperwork Packet (Forms A & B), and a couple additional spots if you need to add anything later.



zFairs
Forms Upload

MSEF

Navigating Forms

MAMS Paperwork Packet
This packet is automatically assigned to all projects and includes a merged PDF for the Permissions (Form A) and Research Plan (Form B).

- **Form A: Permissions** - student info and approvals (1 per **student**)
- **Form B: Research Plan** - include step by step details of your project (1 per **project**)

Note: If you need to edit one of the forms after submission, you can re-upload the entire packet or use one of the 'Additional Paperwork' entries in zFairs. This can be done in the Forms tab in their profile.

Human Subjects Form C
Required for all research involving humans. Submission and approval by SRC required before experimentation.

Risk Assessment Form D
Required for projects requiring **additional supervision**, such as the use of non-pathogenic microorganisms, other hazardous materials and devices, or vertebrate animals. The supervisor may be a teacher, a parent, or another experienced adult. Approval by SRC required BEFORE experimentation.

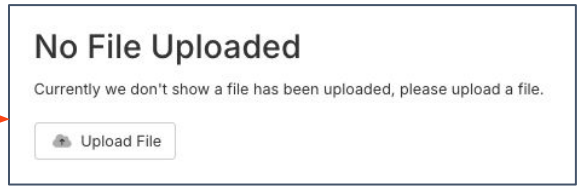
Student Disclosure Form E
Required for all projects that meet one or more of the following conditions:

(1) **continued work** on a topic submitted in a previous year;
(2) **work with mentors** other than your teacher;
(3) use of **generative AI**.

Form Uploads

You will need digital copies of the forms - either filled out electronically or scanned from handwritten copies. You should save completed and signed forms on your or on your teacher's computer. Save them with your name and form number so it will be easy to find when you are uploading them.

Click on any of the Paperwork boxes on your 'Forms' tab and follow the instructions to 'Upload File.'
You can also replace previously uploaded files the same way.



Double check to make sure your uploads are correct and then notify your teacher that they are ready to be checked out and 'Marked Ready for Review.'

Now it's time to wait for any news from the Reviewers, either approval or request for updates. Keep an eye on your dashboard and your email.

zFairs
After Approval

MSEF

After approval, what's next?

For projects in the Yellow Safety Zone, once approval is received from the SRC, you may start their project work.
For all Green Safety Zone projects, approval means that you are eligible to participate in the Fair **if chosen** by your school to move forward.

Sometimes the original plan doesn't work. If you have time to make minor changes to your Project Plan you can email middleschool@scifair.com in case it needs to be approved again.

The final decision on which students will participate at the Fair is made at the school level. This may be done through a school fair, a showcase, or using another process that works for your school. Regional Fairs will communicate how many projects per school can participate at the Fair event.

Regional Fair

Regional Fairs committees will communicate details to your teacher for providing lists of participating projects by the deadlines they've set. Typically this is 2-4 weeks before the Day of Fair.

State Fair

May 8, 2027
Clark University

Students who are selected to participate in the State Fair will automatically be moved to the state level fair in zFairs. You will also start receiving information from MSEF approximately 3 weeks before the State Fair. Teachers and Parents/Guardians are typically included on these communications so please make sure you are getting this information! Accounts will still be accessible in zFairs but you should NOT make changes to your project details in zFairs unless requested.

MSEF
Massachusetts Science
+ Engineering Fair

Hope to see you at the Fairs!

For questions contact middleschool@scifair.com
Marc Bliss, MSEF Middle School Program Manager

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Cambridge MA 02139

617.491.1500

HOME