

MSSEF
Middle School Division



Massachusetts



2014 Middle School Manual

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SPECIAL ACKNOWLEDGMENTS

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In Appreciation: Worcester Technical High School, Worcester



MASSACHUSETTS MIDDLE SCHOOL SCIENCE & ENGINEERING FAIR

About the Fair

The Massachusetts Middle School Science & Engineering Fair (MMSS&EF) is an annual one-day fair for students in grades 6, 7, and 8 attending public, private, parochial schools or home schooled in the Commonwealth. The Fair is sponsored by Cabot Corp., Boston and hosted by Worcester Technical High School. Administrative services are provided by University of Massachusetts Medical School, Worcester.

Entrants exhibit their projects to their peers, a team of judges and the public. This experience is an outstanding opportunity for students to actively engage in an aspect of science and technology in which he or she is interested and to become proficient in the scientific process.

There are categories of projects: individual and team. Team projects may include up to, but not more than three members. The top 40 winning projects from each Regional Fair may enter the State Fair. Regional Fairs are held in the following regions: Worcester, Boston, Fall River, North Adams, Lowell, and Weston. Check the website for regional updates. In addition, one project may be sent to the State Fair directly from an individual school. All required safety forms and registration forms found in the Research and Registration Forms section must be submitted by deadlines indicated in the Deadlines section.

To The Teacher

CHOOSING A PROJECT

The project should be of an **experimental** nature. Although the aesthetics of the exhibit will be taken into consideration, the main concerns are the scientific approach and thought processes used in completing the project. It is not the choice of topic that is of prime importance, but the manner in which the student handles the project. Often 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.

RESEARCH PLAN

Prior to a student beginning his/her independent research project for a regional or state fair, he/she is **required** to complete the Research Plan Form for teacher approval. The form is then sent to the Regional Safety Review Committee (RSRC) for approval. Contact information for the Regional Safety Review Committees is found in the Regional Contacts section of this Manual. **The RSRC must approve this research plan before the student begins the project.** The RSRC approved forms will be returned to the student to be submitted with the Registration Form. If during project completion the research plan changes significantly, a new research plan must be resubmitted. Any project that has not received approval by the RSRC will not be eligible to compete at the State or Regional Level. Research Plan Form 1A, 1B, Form C & Form D are found in the Research and Registration Forms section.

If your region does not have a Regional Fair or a RSRC, submit your research plans for safety approval to:

Karin Lebeau, MMSSEF Chair
c/o Regional Science Resource Center
UMass Medical School
222 Maple Avenue
Shrewsbury, MA 01545.

RESEARCH REGULATIONS

1. The Science Fair projects may not involve at any stage of the project the following:

- Blood products, fresh tissue, teeth or bodily fluids
- Nonhuman vertebrate animals and their parts, exception eggs
- Ingestion or inhalation of any substance by humans subjects (**no smelling or chewing of ANYTHING**)
- Pathogenic agents*
- Recombinant DNA
- Carcinogenic or mutagenic chemicals
- Compressed gas (including, but not limited to CO₂)
- Controlled substances*
- Explosive chemicals
- Hazardous substances or devices (including, but not limited to BB guns, paint ball guns, potato cannons, air cannons)
- High voltage equipment
- Highly toxic chemicals
- Lasers (any strength)
- Ionizing radiation X-rays or nuclear energy
- Radioactive materials (except non-ionizing, naturally occurring materials)

***FURTHER EXPLANATIONS**

Controlled Substances

Controlled substances, including DEA-classed substances, prescription drugs, alcohol and tobacco are **not** allowed.

Pathogenic Agents

- Pathogenic agents are 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) are considered potentially pathogenic and experiments using these procedures will not be allowed.

- Raw or partially processed human/animal waste is considered to contain potentially pathogenic agents.

Please refer any safety questions to:

MMSSEF Review Committee
Karin Lebeau, 508 856-1529, or
karin.lebeau@umassmed.edu

2. All human research projects must have an Informed Consent Form (Form C) attached.

- All human research projects including surveys, professional tests, questionnaires, and studies in which the human subject used is also the researcher need Regional Safety Review Committee (RSRC) approval. Copies of standardized and/or student prepared tests, surveys, etc. to be used must be attached to the Research Plan for approval. Questions 1, 2, and 3 on the Informed Consent Form must be filled out by the student researcher before submission to the RSRC for approval.
- After safety approval, Informed Consent Form (C) must be signed by all subjects involved in human research projects prior to the experimentation. Copies of all signed Informed Consent Forms must be submitted with the Registration Form to enter the Fair. If a participant is under 18 years old, the parent/guardian signature is required.

3. Experiments with non-pathogenic microorganisms* must have a Designated Supervisor Form (Form D) completed and submitted for RSRC approval.

Experiments with any non-pathogenic organisms may only be conducted in a laboratory setting (not in the home) with the following capabilities:

- a. The laboratory work is to be supervised by an individual with general training in microbiology.
- b. Standard practices for sterile technique must be observed.

- c. Work is to be done on an open bench or fume hood.
- d. 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. Lab coats must be worn.
- f. Culture plates/tubes of bacteria must be sealed and not opened in the laboratory after culturing and growth.
- g. Sub-culturing is not allowed.
- h. Decontamination must be achieved by either chemical disinfectants or steam autoclaving.

****Two exceptions: Baker's and Brewer's yeast do not need Form D.***

4. Special Safety Concerns

Other situations such as use of power tools, chemicals, etc. which require adult supervision of the middle school student's project need to be documented on Form D, Designated Supervisor.

5. General Requirements

- Only new research project done in the current school year will be eligible for participation.
- Individual projects must be entirely the work of the individual student and team projects must be entirely the work of the team.
 - Students are expected to keep a bound logbook with original, hand-written, and dated entries that record each step taken in the development of the project.
- During judging and exhibition times, students must remain with their projects. 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.

PROJECT DISPLAY GUIDELINES

Students must adhere to all display guidelines provided in this Manual. If the MMSS&EF Safety Committee considers the presence or operation of any equipment or material to be dangerous or unsafe, it shall have the right to prohibit the presence or operation of such equipment or material. Exhibitors may demonstrate the safe use of materials through photographs, videotapes, charts, diagrams and other simulations.

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

- Projects must fit into a 40" x 26" table space.** Wall space for posters is not available. Design your exhibit 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****
- No laser pointers allowed.
- Glass is prohibited from display area but 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**.
- No liquids may 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.
- All power driven parts must be suitably guarded to prevent unauthorized or accidental access.
- Access to electrical outlets is limited, so please bring a heavy-duty/three-pronged extension cord. Please check the appropriate space on the registration card if electricity is needed.

- All exhibits that require an external source of electricity for operation must be designed for a standard 110-125 volt AC supply. *(continued next page)*
- All wiring, switches, power cords and metal parts carrying current in an AC circuit must be properly selected for load requirements and soldered or fixed under approved connectors with insulated connecting wires. No exposed wires, switches, joints, or un-insulated fasteners will be permitted.
- The power supply cord for the electrical apparatus must terminate in a three-prong grounded outlet. **All power supplies and electrical equipment must be grounded.**
- Bare wire and exposed knife-type switches are permitted on 12-volt DC circuits or less. Approved standard enclosed switches are required for all other electrical installations.
- Wet-cell batteries with open tops are not permitted. Closed-cell or dry-cell batteries are permissible.
- The operation of high-pressure vessels and pressurized systems is **not** permitted.
- There must be no open flame, torch or burner in the display area.
- All microwave and radio frequency sources must be designed and operated in compliance with state and federal regulations as well as applicable standards of the American National Standards Institute.
- Robotics projects should have interlocks or other controls.



TOPICS FOR CONSIDERATION IN 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 on the basis of the student's ability to discuss intelligently the overall scope and significant results of his or her work. Judging criteria for team and individual projects are identical.

1. Scientific Approach

- A. Did the student start with a clearly stated hypothesis or statement of an engineering goal?
- B. Was the student orderly and logical with the setup and follow through of the project?
- C. Were the student's conclusions consistent with the data he or she collected?

Possible 25 points

2. Knowledge of Project Area

- A. How effectively did the student conduct preliminary research?
- B. What was the extent of the student's knowledge of material related to project?
- C. Was the student aware of both the scope and limitations of the project?

Possible 20 points

3. Thoroughness

- A. Did the student do sufficient research in the literature before starting the project?

- B. Was thorough use made of data and observations?
- C. Was the original plan successfully followed through to completion?

Possible 20 points

4. Written Records and Reports

- A. Did the student keep an original handwritten, bound logbook with all plans, procedures, observations, and conclusions for failures as well as successes?
- B. Did the student put together an accurate written report, complete with a bibliography?

Possible 15 points

5. Ingenuity and Creativity

- A. Was the explanation of the project clear and precise?
- B. How well did the student use his or her materials in the solution of problems?
- C. Did the student present any new or unique ideas?

Possible 15 points

6. Visual Presentation

- A. Was the project displayed in a logical and organized manner?
- B. Were charts and graphs used where needed?
- C. Did the display and posters effectively convey the message in an understandable manner?

Possible 5 points



Timelines – Regional & State Middle School Science and Engineering Fairs

2014 Form Due Dates

Due prior to experimentation

The following Forms must be sent to either your Middle School Regional Safety Review Committee (see contact information in Manual) or Middle School State Safety Review Committee):

- Research Plan Forms 1A and 1B
- If necessary, human Informed Consent Form (Form C) that will be given to subjects before experimentation, and
- Designated Supervisor Form (Form D)

Massachusetts Middle School Science & Engineering Fair Worcester Technical High School Saturday, June 14, 2014

Due prior to, but no later than May 14, 2014

- Registration Form (Approved Research Plan, 1 A and B included), and
- Approved Forms C and D, if necessary

To enter the Massachusetts Middle School Science and Engineering Fair:

Contact: Karin Lebeau at 508 856-1529, or karin.lebeau@umassmed.edu

Mail to: Regional Science Resource Center, UMass Medical School, 222 Maple Avenue, Shrewsbury, MA 01545



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karin.lebeau@umassmed.edu

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MMSSEF Regional Fair District Information

Middle school teachers should contact their respective regional chairs for further information about the regional middle school science fairs.

Region I: Western Massachusetts

Western Massachusetts Middle School Science & Engineering Fair
Massachusetts College of Liberal Arts
2014 Date TBD

Chair: Chris Himes, Ph.D.
Berkshire STEM Manager
Tel: (413) 662-5222
Email: c.himes@mcla.edu

Region II: Central Massachusetts

Worcester Regional Middle School Science & Engineering Fair
Worcester Polytechnic Institute
Monday, May 5, 2014

Chair: Lisa Greenwald
379 Cross Street
Boylston, MA 01505
Tel: (508) 869-0194
Email: Greenwal@westborough.k12.ma.us

Region III: Southwest Massachusetts

Rensselaer @ BCC Region III Science Fair
Bristol Community College, Fall River
Combined Senior High/Middle School Fair
2014 Date TBD

Chair: Dr. James Pelletier
Bristol Community College
777 Elsbree Street
Fall River, MA 02720
Tel: (508) 678-2811, x2200
Fax: (508) 675-2366
Email: James.Pelletier@bristolcc.edu

Region IV: Northeastern Massachusetts

Northeast Regional Middle School Science & Engineering Fair
University Massachusetts Lowell
North Campus/Connock Hall
2014 Date TBD

Chair: Marjorie Dennis, Project Manager
Dr. Carol Barry
UMass Lowell – Graduate School of Education
O’Leary Library, 51 Wilder Street, Rm 500J
Lowell, MA 01954
Tel: (978) 934-4666
Email: Marjorie_Dennis@uml.edu

Region V: Southeastern Massachusetts

Southeastern Massachusetts Middle School Science & Engineering Fair
Regis College
2014 Date TBD

Chair: Walter Horner
Regis College
235 Wellesley Street
Weston, MA 02493
Tel: (781) 768-7125
Fax: (781) 768-7159
Email: Walter.Horner@regiscollege.edu

Region VI: Boston

Boston Public Schools Regional Science Fair
Northeastern University, Boston
Combined Senior High/Middle School Fair
2014 Date TBD

Chairs: Pam Pelletier
Boston Public Schools
1216 Dorchester Avenue
Dorchester, MA 02125
Tel: (617) 635-8750
Email:

Region VI includes all public schools within the City of Boston. Private and parochial schools within the City of Boston are included in Region V

Regional Districts' Cities and Towns

Region I: Western Massachusetts

Adams	Hinsdale	Shutesbury
Agawam Holyoke	South Hadley	
Alford	Huntington	Southampton
Amherst	Lanesborough	Southwick
Ashfield	Lee	Springfield
Becket	Lenox	Stockbridge
Belchertown	Leverett	Sunderland
Bernardston	Leyden	Toland
Blandford	Longmeadow	Tyringham
Buckland	Ludlow	Ware
Charlemont	Middlefield	Warwick
Cheshire	Monroe	Washington
Chester	Monson	Wendell
Chesterfield	Montague	Westfield
Chicopee	Monterey	Westhampton
Clarksburg	Montgomery	West Springfield
Colrain	Mt. Washington	West Stockbridge
Conway	New Ashford	Whately
Cummngton	New Marlboro	Wilbraham
Dalton	New Salem	Williamsburg
Deerfield	North Adams	Williamstown
Easthampton	Northfield	Windsor
East Longmeadow	Northampton	Worthington
Egremont	Orange	
Erving	Otis	Regional High Schools
Florida	Palmer	Amherst
Gill	Pelham	Frontier
Goshen	Peru	Gateway
Granby	Petersham	Hampshire
Granvfile	Pittsfield	Hoosac Valley
Great Barrington	Plainfield	Mount Everett
Greenfield	Richmond	Pathfinder Reg. Voc.
Hadley	Rowe	Taconic
Hampden	Russell	Wahconah
Hancock	Savoy	Ralph C. Mahar
Hatfield	Sandisfield	Minnechaug
Hawley	Sheffield	Mohawk Trail
Heath	Shelburne	Monument Mountain
		Mount Greylock
		Pioneer Valley
		Turners Falls

Region II: Central Massachusetts

Ashburnham	Lancaster	Templeton
Ashland	Leicester	Upton
Athol	Leominster	Uxbridge
Auburn	Lunenburg	Wales
Barre	Marlborough	Warren
Berlin	Maynard	Webster
Blackstone	Mendon	Westborough
Bolton	Milford	West Boylston
Boylston	Millbury	West Brookfield
Brimfield	Millville	Westminster
Brookfield	New Braintree	Whitinsville
Charlton	Northborough	Winchendon
Clinton	Northbridge	Worcester
Douglas	North Brookfield	
Dudley	Oakham	Regional High Schools
East Brookfield	Oxford	Algonquin
Fitchburg	Paxton	Assabet Valley
Framingham	Phillipston	Bay Path
Gardner	Princeton	Blackstone-Millville
Grafton	Royalston	Lincoln-Sudbury
Hardwick	Rutland	Montachusett
Harvard	Shrewsbury	Narragansett
Holden	Southborough	Nashoba
Holland	Southbridge	Nipmuc
Holliston	Spencer	Oakmont
Hopedale	Sterling	Quabbin
Hopkinton	Stow	Quaboag
Hubbardston	Sturbridge	Shepherd Hill
Hudson	Sudbury	South Middlesex
	Sutton	Tahanto
		Tantasqua
		Wachusett

Region III: Southwestern Massachusetts

Acushnet
Attleboro
Berkeley
Dartmouth
Dighton
Fairhaven
Fall River
Foxborough
Franklin
Lakeville

Mansfield
New Bedford
Norfolk
North Attleboro
Norton
Plainville
Raynham
Rehoboth
Seekonk
Somerset

Swansea
Taunton
Westport
Wrentham

Regional High Schools

Apponequet
Bristol-Plymouth
Dighton-Rehoboth
Diman Regional
King Philip

Region IV: Northeastern Massachusetts

Acton
Amesbury
Andover
Arlington
Ashby
Ayer
Bedford
Belmont
Beverly
Billerica
Boxborough
Boxford
Burlington
Cambridge
Carlisle
Chelmsford
Chelsea
Concord
Danvers
Dracut
Dunstable
Essex
Everett
Georgetown
Gloucester
Groton
Groveland
Hamilton
Haverhill
Ipswich

Lawrence
Lexington
Lincoln
Littleton
Lowell
Lynn
Lynnfield
Malden
Manchester
Marblehead
Medford
Melrose
Merrimac
Methuen
Middleton
Nahant
Newbury
Newburyport
North Andover
North Reading
Peabody
Pepperell
Reading
Revere
Rockport
Rowley
Salem
Salisbury
Saugus
Shirley
Somerville
Stoneham
Swampscott

Tewksbury
Topsfield
Townsend
Tyngsboro
Wakefield
Waltham
Watertown
Wenham
Westford
West Newbury
Wilmington
Winchester
Winthrop
Woburn

Regional High Schools

Acton-Boxborough
Concord-Carlisle
Greater Lawrence
Greater Lowell
Groton-Dunstable
Hamilton-Wenham
Masconomet
Metropolitan
Nashoba Valley Tech
Northeast
North Middlesex
Pentucket
Shawsheen Valley
Triton
Whittier Regional

Region V: Southeastern Massachusetts

Abington	Lakeville	Truro
Avon	Marion	Walpole
Barnstable	Marshfield	Wareham
Bellingham	Martha's Vineyard	Wayland
Bourne	Mashpee	Wellesley
Braintree	Mattapoisett	Wellfleet
Brewster	Medfield	West Bridgewater
Bridgewater	Medway	Weston
Brockton	Middleborough	Westwood
Brookline	Millis	Weymouth
Canton	Milton	Whitman
Carver	Nantucket	Yarmouth
Chatham	Natick	
Cohasset	Needham	Regional High Schools
Dedham	Newton	Apponequet
Dennis	Norwell	Blue Hills
Dover	Norwood	Bridgewater-Raynham
Duxbury	Orleans	Cape Cod Regional
East Bridgewater	Pembroke	Dennis-Yarmouth
Eastham	Plymouth	Dover-Sherborn
Easton	Plympton	Martha's Vineyard
Falmouth	Provincetown	Nauset
Freetown	Quincy	Old Colony Regional
Halifax	Randolph	Old Rochester
Hanover	Raynham	Silver Lake
Hanson	Rochester	Southeastern Regional
Harwich	Rockland	Upper Cape Cod Regional
Hingham	Sandwich	Whitman-Hanson
Holbrook	Scituate	
Hull	Sharon	All Boston parochial
Hyannis	Sherborn	and private schools.
	Stoughton	

Region VI Boston

Boston Public Schools Regional Science Fair

Includes all public schools within the City of Boston. Private and parochial schools within the City of Boston are included in Region V.