

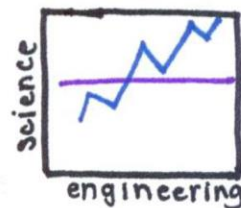
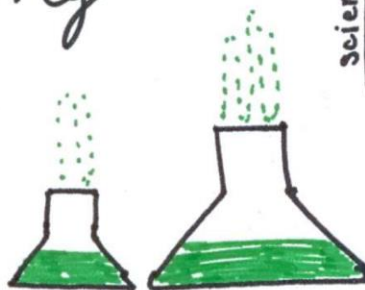
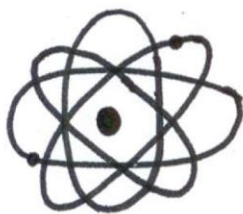
66th Annual

research
question
hypothesis
observe
analyze
test
REGION

V



science
&
engineering
fair



MASSACHUSETTS
REGION V
Science & Engineering Fair

March 2, 2024

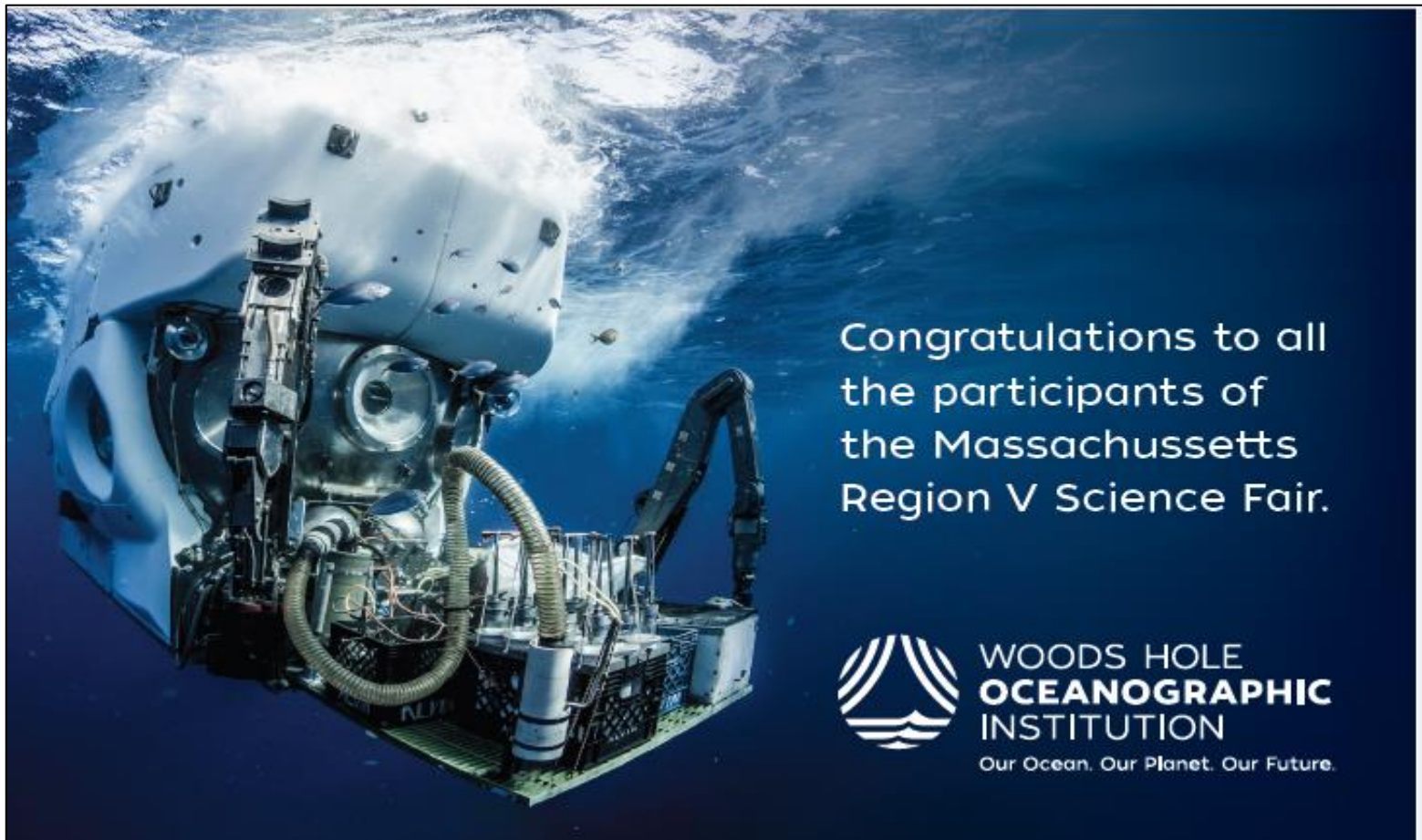
66th Annual Massachusetts Region V Science & Engineering Fair Bridgewater State University, Rondileau Campus Center Ballroom

Saturday, March 2, 2024
Program

- | | |
|-------------------|---|
| 8:00 AM - 8:45 AM | Registration, setting up of projects. |
| 8:00 AM – 9:00 AM | Safety Checks. |
| 9:00 AM -1:00 PM | Judging of projects. |
| 1:00 AM -1:45 PM | Lunch at BSU's dining hall, the Bear's Den, provided by BSU. |
| 1:45 PM -2:45 PM | Tours of BSU Science & Math Center; additionally, students will design entries for design entries for the Region V Science Fair 2025 Program Cover Contest. |
| 3:00 PM -3:45 PM | Fair open to the public. Exhibitors will be at their projects. |
| 4:00 PM -5:00 PM | Awards Ceremony at Rondileau Campus Center auditorium. |
| 5:15 PM -6:00 PM | Dismantling of projects. No student is to take down his or her project prior to 5:15pm. Student are required to sign out. |

First, Second and Third Place Award recipients will represent Region V at the Massachusetts Science & Engineering Fair at Gillette Stadium, Foxborough on Friday, April 5, 2024.

The top winner in the MA Region V Science and Engineering Fair will attend the Regeneron International Science & Engineering Fair, May 12-17, 2024 in Los Angeles, CA – expenses paid. Details will be provided to the student after the Awards Ceremony.





Welcome to the 2024 Massachusetts Region V Science and Engineering Fair!

On behalf of the STEM teachers and other STEM professionals who have worked diligently for the past eight months to put together our 2024 Science & Engineering Fair we are thrilled to have more than 110 students showcasing their hard work and great scientific accomplishments, representing 37 schools in Region V. It's great to be back, live-and-in-person, for the first time in three years!

We learned many years ago that anyone with the right tools can follow directions to build a model, fix a kitchen faucet or bake a cake. In this digital world, it's easy for students today to visit a website or click on a link to find answers to just about any question. However, for the United States to compete in a global economy we must help our youth to not just follow directions, but to think creatively and critically, and test their own ideas for validity. This is what science fair is all about. Science is all around us, and you probably don't realize how much you use it every day. But I've always said that the key value to science fairs isn't necessarily in working on science projects, but in all the other skills students learn in the process: research, organization, time management and meeting deadlines, how to create tables & graphs, how to present ideas and how to respond to questions from judges on the spot. It's an experience that lasts a lifetime!

Our thanks to the more than 45 professors, science researchers and other STEM professionals who have given their time this weekend to judge the efforts and the accomplishments of our students.

Thanks also to the dedicated cadre of teachers and others who are freely volunteering many hours of their time as part of our fair's Operating Committee to put together this event.

To our sponsors, thank you! Especially our newest sponsors: Cape Cod 5, [Wood's Hole](#) Oceanographic Institute, Brockton NAACP, Granite Telecommunications and [World Wide](#) Antenna Systems. Our continued success in these difficult financial times is a credit to your generosity.

A special nod to parents, many of whom have driven their children all over the place to pick up supplies and make sure that no one falls into the water.

We must also recognize the patience of our teachers, who have endured countless questions about variables, hypotheses, data analysis and everything else that goes into a project.

On behalf of the Massachusetts Region V Science and Engineering Fair Committee, I welcome you to the Sixty-sixth Fair. Congratulations to all our student participants – enjoy the experience and good luck!

A handwritten signature in blue ink that reads "Patricia A. Monteith".

Patricia Monteith, Chair

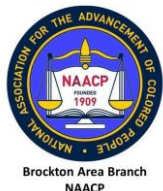
2024 Massachusetts Region V Science & Engineering Fair

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School & Teacher(s) Name; Project #, Student Name(s), and Project Title

Barnstable High School		Mr. William Knittle
SF-CH-057	Nicholas Ramos	Investigating the Effect of Varying Pigment to Binder Ratios on Paint Performance
Brockton High School		Mr. Paul Nessralla
SF-CS-023	Sam Lizotte	Using Machine Learning to Detect Alzheimer's Disease in MRI Scans
Brockton Public Library		Ms. Patricia Monteith
SF-CH-089	Kyle Denny	Biochar's Potential for Mitigating Climate Change
SF-EES-079	Yvangi Jacques	A Sound Approach to Attracting or Repelling Pollinator Insects
Brookline High		Mr. Edward Wiser
SF-BEPA-086	Yuanbin Wang	The Association Between COVID-19 Infection and Myocarditis in a Large Population
Canton High School		Ms. Rebecca Stang
SF-BCMM-085	Pranav Addanki	Identifying a Novel, Inexpensive, and Noninvasive Biomarker for Fibromyalgia: Using Metabolomics, Genomics, and a Drosophila melanogaster Model
Center for Student Coastal Research		Ms. Susan Bryant
SF-BEPA-031	Christian Bunge, Maxwell Fernald, Finn Yemini	Seagrass Wasting Disease's effect on eelgrass under environmental stressors such as salinity
Dana Hall School		Mr. Ryan Chiu
SF-BCMM-090	Bolin Miao	Exploring the Interactions Between Peritoneal Dendritic Cells and T Cells: Implications for Cancer Metastasis
Dedham High School		Ms Amy Hill
SF-BCMM-067	Evan Channa, Adam Lagare	RNA Interference: A Post-transcriptional Process for Effective Gene Silencing
Dennis-Yarmouth Regional High		Mr. Adam Cutler
SF-EES-087	Molly Gedutis	Insecticide Resistance and Efficacy in Culex Mosquitoes on Cape Cod
SF-EEN-017	Maxwell Mingo, Ryan Netto, Ryan Shea	Affordable IA Two-Part Septic System
Dover-Sherborn Regional High School		Mr. Kurt Amber, Ms. Wendy Rush, Mr. Ken Macie
SF-BCMM-093	Elaine Zhang	Computational Analysis of Cell Type-Specific Transcriptional Dynamics in Major Depressive Disorder

Falmouth Academy		Mr. Daniel Nightingale, Ms. Liza Fox, Ms. Katherine Seltzer
SF-BEPA-026	Maverick Pil	Comparing Morphology to Sex in Limulus polyphemus
SF-BEPA-021	Amelia Russell Schaeffer	Do essential oils repel Lone Star larvae as effectively as DEET?
SF-EES-038	Faye McGuire	Examining Hurricane Intensities and their Impacts Using SLOSH Models
SF-EES-028	Luke Okoshi-Michel	Investigating the Impact of Oyster Aquaculture on Water Quality
SF-AS-014	Yaz Aubrey	Is the Source of Dark Energy Time Dependent?
SF-BEPA-011	Erik Gulmann	Studying the Effect of Environmental Variables on the Settlement and Post-settlement Mortality of Semibalanus balanoides in Kongsfjorden, Norway Using CATAIN Camera
SF-BE-082	Willow Wakefield	The effects of alcohols and their affect on multicellular organisms behavior and reproduction
SF-CH-066	Max Donovan	Determining the Sustainability of Different Wood Pellet Types
SF-BCMM-018	Taleena Gonnee	Observing the Effect of Microplastics on Zebrafish Macrophages
SF-CH-088	Jaiden Elber and Matthew Kellogg	Producing a Biofuel From Peanut Shells
Falmouth High School		Ms. Carmela Mayeski, Ms. Stacey Strong
SF-EES-064	Maisie Chase, Celia Suttles	The Impact of Invasive Phragmites on Soil Carbon Density, and Hydraulic Conductivity
SF-BCMM-056	Gayatri Chaturvedi	The effect of ocean acidification on seaweed physiology
SF-EEN-076	Ethan Parmentier	Self-sustaining microgarden
SF-BI-041	Ella Rosenthal	Biofuel Potential of Cape Cod Seaweeds
SF-PH-059	Robert Simpkins	Dusty Plasma
Hanover High School		Ms. Renee Parry
SF-CH-071	Catherine Reinhart, Abby Taylor	How does Flour Effect Baking Cookies?
Maimonides School		Ms. Maria Lazebnik
SF-CH-075	Hayim Sims	Nanoparticle Guided Synthesis of Size-Tunable Photonic Crystals
Martha's Vineyard Regional High School		Ms. Hall, Mr. Hall, Ms. Munn
SF-CH-045	Molly Crawford	Revolutionizing Menstrual Hygiene: A Green Approach with Reusable Tampons
SF-EE-060	Jack Engler	Wheel Chair Harness of the Future
SF-BCMM-024	Kyle Levy	Does humidity level in the classroom affect bacterial growth and transmissivity?

SF-CS-019	Elliot Stead	Developing a Flight Computer for Class 1 Rockets
Millis High School		Mr. Scott Alconada
SF-BCMM-073	Vera Medvedeva	Silent Protectors: The Covert Transformation of Angiogenin in Cancer Defense
Milton Academy		Ms. Emma Bradford, Mr. Jim Kernohan
SF-EES-033	Chisom Unamka	Comparison of Airborne Particulate Matter in Suburban and Urban Areas in Eastern Massachusetts
SF-BE-084	Simon Farruqui, Ching Hei Andre Leung	Words That Shape the World: A Word2Vec Analysis of U.S. Presidents' Political Rhetoric and its Implications on Minority Immigrant Rights and the American Dream
Natick High School		Mr. Jim Araujo
SF-PH-068	Om Sharma	Can you create waves by clapping?
Newton Country Day School		Ms. Patricia Di Eduardo, Ms. Cindy Erickson, Ms. Genevieve Fein, Ms. Martha Haddad, Mr. Tamas Molnar, Dr. Michael Pahre, Mr. Brett Schusterbauer, Dr. Rebecca Sen, Ms. Carolyn Skudder-Pocius, Dr. Sarah Webster, Ms. Shifra Yonis
<i>Please refer to the enclosed insert</i>		
Newton North High School		Ms. Heather Hotchkiss, Ms. Tracey Stewart
SF-MA-044	Alex Kuai	Early Diagnosis of Alzheimer's With Advanced 2.5D Deep Learning
SF-EEN-012	Esha Bhawalkar, Caitlin Riordan, Findlay Toone	Improving Size Control Following Hydrothermal Synthesis Preparation of Carbon Quantum Dots
Newton South High School		Mr. Gerard Gagnon
SF-BCMM-040	Husang Lee	Inhibition of melanin synthesis and anti-inflammatory effects of Leuconostoc mesenteroides derived exosomes separated from Camellia japonica flower
SF-EES-035	Andrea Tang	Transgenerational Effects of Extreme Temperature Exposures on Children's Health
Noble and Greenough School		Mr. Max Montgomery, Mr. Andrew Shumway
SF-EE-032	Christopher Yoo	Machine Learning Approaches to Enhance Inverse Kinematics in Robotics
SF-CS-027	Andrew Kan, Christopher Kan	Video and 3D Image Analysis with Masked Auto Encoders and Contrastive Learning

North Quincy High School		Ms. Lauren Abbott, Mr. Patrick Kessler, Dr. Nicole Kymissis
SF-EES-058	Brian Chau	The Effect of Insecticides on the Acidity of Water and Growth of Dwarf Sagittaria
SF-EES-074	Michelle Chen	Balance in Carbonate Convergent Waves
SF-EES-048	Elmeria Cheung	Decomposition of Different Bioplastics
SF-BI-036	Madison Evans	Chemical Profiling of the Triglycerides in Two Species of Microalgae Using a Green Extraction Method
SF-EES-043	Anna Li	How the Species of Microalgae Reduces the Effects of Carbon Dioxide in Modified Seawater on Calcium Carbonate
SF-PH-063	Belle Li	Observing the Visible Spectrum after the Interference of Water, Isopropyl Alcohol, and Acetone
SF-EES-053	Catherine Liang	The Effect of Water pH on the Germination Rate of Snap Pea Seeds
SF-EB-042	Marko Mano	Synthesizing and Optimizing Biodegradable Pectin-Manuka Honey Hydrogels for Transcutaneous Electrical Nerve Stimulation (TENS) Therapy and its Applications in Tissue Engineering
SF-EES-083	Alvin Nikolla	Environmental Effect on Biogas Emissions of Decomposition
SF-CH-062	Brian Zhang	The Effect of Ethanol Solvent of Various pH on Beetroot Dye
Quincy High School		Mr. Ronald Boudreau, Ms. Meghann Murray
SF-BCMM-052	Maya Tittel	How Do Various Forms of Sucrose Affect Saccharomyces cerevisiae's Growth?
SF-PH-072	Priya Parasar	Science behind the Titan Submarine Implosion
Rivers School		Ms. Betty Bloch
SF-BCMM-034	Zimon Li	RBC Folate's Effect on Cardiovascular Disease
Sharon High School		Mr. David Accardi, Ms. Emily Burke, Mr. Zach Snow
SF-CH-081	Avaneesh Mohan	Filtration Capabilities of different chemicals for PFOAs and PFAS molecules
SF-BCMM-029	Agastya Sarmah	Identification of Potential Biomarker and Survival Analysis for Hepatocellular Carcinoma Utilizing Bioinformatics Approach: An Investigation Utilizing Cancer Datasets
SF-EB-047	Aishwaryalakshmi Saravanan	Inhibiscore: Utilizing Artificial Intelligence to Discover a Promising ER α -Targeted Breast Cancer Therapy

SRC-EE-948	Soumalya Chatterjee	Can Ultrasound be Used as a Solution to Vision Impairment?
Southeastern Regional Vocational Technical High School		Ms. Jennifer Fitch-Tewfik, Ms. Kathryn Manigan, Ms. Christine Warren
SF-EE-095	Olivia Charlesworth	Bridges and Bonds
SF-BEPA-091	Rachel Spring	Effects of Different Growing Methods on Cucumis sativus (Cucumber) Seed Germination and Growth
SF-EES-010	Fany Benitez, Skyla Sturtevant	What's the Buzz on Bee Pan-Trap Preference?
St. John Paul II High School		Mr. Alex Chen, Ms. Shannon Gilliland, Ms. Annie Poirier
SF-BCMM-046	Autumn Ozolins	Natural Antibiotics- The Antidote to Antimicrobial Resistance
SF-EE-065	Grace Egmore	Exploring Aerodynamics: The Effect of a Rocket's Fins During Flight
SF-MA-049	Jamison Ballou	Shuffle Science: Analyzing Machines, Riffles, and Algorithms in Card Shuffling
SF-CH-050	Devan Rodes	The Effect of Temperature on the Luminol Reaction
SF-BEPA-016	Zach Jones	Road Salt vs Chemical De-Icer: Effects on Plant Growth
SF-EES-069	Isabella Scioletti, Nora Bruinooge	Microplastics: a threat posed for ocean ecosystems demonstrated by sea anemones
SF-EES-025	Kiara Miller	Effects of Pollutants on Aquatic Plants
SF-PH-077	Grant Silver	Quantum Computation with Black Holes
SF-EE-055	Ben Kowal	What is Maglev Technology
SF-EES-030	Evalyn Evans	Pollution and Its Effects on Ocean Water
Stoughton High School		Ms. Courtney Sasin
SF-CH-094	Emily Dupont	The Chemistry of Dyeing
Sturgis Charter Public School		Ms. Shiobhan Curran
SF-MA-039	Brenna Duffy, Teagan Tierney	Relation Between Nuclear Power Plants and Childhood Cancer Deaths
Tabor Academy		Mr. David Wellstead
SF-EEN-022	Huiyi Wen	Novel Water Collection Through Shell-Inspired Origami
SF-EES-015	Zhiyang Zhong	The impact of global warming and ocean acidification on marine biodiversity

Thayer Academy		Mr. Richard Sucher
SF-EE-051	Yuyao Wu	Bionic Insect Jumping Device
The Cambridge School of Weston		Mr. Kevin Smith
SF-BCMM-092	Xiaofeng Li	Identification of novel differentially expressed genes related to hepatocellular carcinoma
The Fessenden School		Mr. John Palermo
SF-MA-054	Ganghun Kim	On the properties of quadrilaterals determined by triangle centers
The Windsor School		Mr. Jason Cox, Mr. Christopher Player
SF-CS-037	Yuyuan Huang	DebateGPT: Assessing the Accuracy of Context-Dependent Generative AI Responses to American Parliamentary Debate Queries
SF-BCMM-078	Remy Kim	Dopaminergic synapse organizing molecules and their implications for Parkinson's Disease
Ursuline Academy		Ms. Elizabeth Mathew
SF-CH-013	Chelsea Adams, Allyson Bligh, Mia Caparrotta	How does pH Affect Skincare Products?
Wellesley Sr. High School		Mr. Derrick Genova, Ms. Sylvia Kaczmarek, Mr. Michael Krieger, Mr. Thomas Van Geel
SF-BCMM-061	Arin Nazarian	Drop the MYC: Synthetic Protein Design for Abrogating MYC Signaling
SRC-CH-305	Jack Li, Jayson Wang	Building an AI-driven Computing Model for Selecting Green and Bio-based Sustainable Solvents in
SRC-CS-1029	Yaniv Taussky	Preventing Abortive Spinal Surgery Using a Novel Machine Learning Classification of Posterior Thoracolumbar Systems
Weston High School		Mr. Stephen Ribisi
SF-EES-020	Thomas Li	Analysis and Machine Learning Modeling of Spatial Data to Identify Asthma Hotspots in Massachusetts
SF-EE-070	Lucas DeFilippo, Kyle Wu	Digital Night Vision Goggles

2024 MA Region V Science &Engineering Fair

Operating Committee Members

- Patricia Monteith
Chair, Region V Science Fair
Brockton Library Makerspace
- Dr. Sarah Webster,
Chair, Scientific Review Committee
Newton Country Day School
- Jennifer Aizenman, Director
Center for the Advance of STEM Ed (CASE)
Bridgewater State University
- Claire Boudreau,
Program Book/Certificates
North Quincy High School
- Jennifer Flannery, Communications
Bridgewater-Raynham Regional High
- Katherine Honey
SE MA Stem Network
- Liz Klein, Outreach
Falmouth Middle School
- Renee Parry
Hanover Public Schools
- Mary Ellen Stephen
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- Samuel Sharon, Technical Operations
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Special Thanks

- Maura Whittemore
Bridgewater State University
- Elizabeth Kronberg, Helen Rosenfeld, Bekah Stendahl
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- Volunteers: Laura Biechler, Eileen Estudante, Bill Rigney, Sue Porazo, Susannah Leslie, Lucia Shannon
- Program Book Cover Design:
Anjali Reddy, Newton Country Day School
- Region V Logo: Barnas Monteith



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