

85th Twin Cities Regional Science Fairs Awards
31st St. Paul Regional Science Fair
29th Western Suburbs Regional Science Fair
March 3-5, 2023
Research Papers February 3-21, 2023

Students selected to compete at the 2023 Regeneron
International Science and Engineering Fair
Dallas, Texas
May 13-19, 2023

ISEF Finalists (St. Paul)

S-HS- CELL-038	Henry Choi	The Effect of Gefitinib on Cell Proliferation and Invasion in 2D and 3D Cultures of MDA-MB-231 Cells
S-HS- EGSD-325	Maggie Banks	Wood-n't It Be Nice: Toward a Continuous Piezoelectric Charge Pump

ISEF 1st Alternate (St. Paul)

S-HS- CHEM-053	Aaron Lindeman	A Environmentally friendly dry-erase marker composition
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ISEF 2nd Alternate (St. Paul)

S-HS-EBED- 030	Rishi Bhargava, Humza Murad	Project WASP: Watering Atmospheric Self-Irrigating Planters
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ISEF Finalists (Twin Cities)

T-HS-PLNT-454	Sriram Sureshkumar	Impact of Biochar as soil amendment in increased produce yield (Year 1)
T-HS-SOFT-418	Lakshika Nanda Kumar Reddy	Detecting Cataracts From Retinal Fundus Using Machine Learning: An AI Approach to Identifying Cataracts Using Convolutional Neural Networks
T-HS-EGSD-269	Sarah Zamudio	Making Natural Gas from Compost
T-HS-ENEV-280	John Liu	Green Electronics: A Prospective Proof-of-Concept Study

ISEF 1st Alternate (Twin Cities)

(promoted)

ISEF 2nd Alternate (Twin Cities)

T-HS-EAEV-445	Lynne Hu	A Comparison of Thymus Vulgaris and Origanum Vulgare in the Adsorption of NO ₂ and NO ₃ in Aquaponics Systems
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ISEF 3rd Alternate (Twin Cities)

T-HS-ANIM-324	Norah Dillner, Linnaea Dillner	Atta and Acromyrmex Waste Deters Tropical Agricultural Pests
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ISEF 4th Alternate (Twin Cities)

T-HS-MCRO-429	Griffin Anderson	Identification of Trends in Oil-Instigated Bacterial Growth
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ISEF Finalists (Western Suburbs)

W-HS-CELL-347	Arreh Jain	Neurological Nuances: Quantifying and measuring the length and spacing of arterioles in the visual cortex using scans from two-photon imaging in vivo
W-HS-EAEV-026	Sarah Peterson	Protecting Plants: Investigating the relationship between fertilizers and insect damage in an urban garden
W-HS-EBED-111	Shreshth Shrivastava	Wi-C.A.R.E: Wifi Computer-Assisted Remote Eldercare (Year IV)
W-HS-ENEV-220	Ana Stewart	The Application of Mushroom Mycelium as a Biomaterial and Leather Alternative
W-HS-MATH-286	Andrew Zhang	Extremal values for the Steiner k-distance and the Steiner k-Wiener index

ISEF 1st Alternate (Western Suburbs)

W-HS-EGSD-424	Yash Dagade	WATT from VAWT : Design of A Novel Vertical Airborne Wind Turbine (VAWT) Clean Energy Farm
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ISEF 2nd Alternate (Western Suburbs)

W-HS-BEHA-009	Noah DeMichaelis	Music and the Mind: the Interection of Reading Readiness and Musical Proficiency
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ISEF 3rd Alternate (Western Suburbs)

W-HS-PLNT-056	Quinn Hughes, Tyler Clair	Using Monte Carlo Simulation to Optimize Vitamin C Production in Lactuca sativa by Varying Light Intensity and Wavelength, Year II
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ISEF 4th Alternate (Western Suburbs)

W-HS-ENEV-254	Anika Lang	Valorization of winery wastewater to grow Chlorella vulgaris
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ISEF 5th Alternate (Western Suburbs)

W-HS-CELL-004	William McNally, Samuel Bae	The Pleiotrophin Puzzle: Investigating the expression of pleiotrophin in post-injury adult cardiac mouse hearts
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3Mgives Sponsor Award

Plaque and \$500

T-HS-ENEV- John Liu
280

Green Electronics: A Prospective Proof-of-Concept Study

Ecolab Sponsor Award

Plaque and \$500

W-HS-ENEV- Jasmine Goldsmith
253

A comparison of bamboo, conifers, and cacti species' efficiency at removing contamination from water similar to that of SouthEast Asia

DuPont Water Solutions Sponsor Award

Plaque and \$100

W-HS-CELL- Arreh Jain
347

Neurological Nuances: Quantifying and measuring the length and spacing of arterioles in the visual cortex using scans from two-photon imaging in vivo

Northrop Grumman Sponsor Award

Plaque and \$100

W-HS-EGSD- Yash Dagade
424

WATT from VAWT : Design of A Novel Vertical Airborne Wind Turbine (VAWT) Clean Energy Farm

Northrop Grumman MS Sponsor Award

Floret ribbon

T-MS-MATS- Adam Liesch
404

Can Your Plane Fly Under Radar?

Office Depot Sponsor Award Plaque

W-HS-MCRO- Andrew Moline
315

Mastering Microbes: Exploring the Effect of
Temperature on Yeast Metabolism

Premier Bank Sponsor Award Floret Ribbon

W-MS-PHYS- Siri Westberg
181

Does Money Buy Distance?

City of St. Paul Youth Fund Sponsor Award Plaque

S-HS-EAEV- William Richardson
039

Studying the Impact of Microplastics on Quinoa
Growth

Mintahoe Catering and Events Sponsor Award Plaque

T-HS-EGSD- Sarah Zamudio
269

Making Natural Gas from Compost

3M Display Materials and Systems Division

Plaque + \$100 gift card + invitation to 3M Inventor Event

W-HS-ETSD-028	Trisha Samba, Amira Sinclair	Your Training H.I.R.O.: Developing a “Haptic Interface for Real-time Optimization” of Out-of-water Swimming Form
W-HS-ETSD-021	Noah Getnick	Following the Flow: Expanding the Capabilities of a 2D Fluid Simulation to Study Biomimetic Bodies
W-HS-ETSD-350	Muminah Nihaar Mohammed	Unbind the Blind
W-HS-ETSD-127	Lily Salyards	Aerodynamic optimization of proposing and ground-force in Formula 1 vehicles
S-HS-CHEM-109	Julia Colbert	Teeth Cleaning Chewing Gum

3M Engineering and Manufacturing Technology, Optimized Operations

Plaque + \$100 gift card + invitation to 3M Inventor Event

W-HS-MATS-423	Ziyi Qian	The role of water hydration states in a bacteria derived biopolymer (EPS)/nanoclay hydrogel
W-HS-MATS-230	Noah Measells	Development of dual material glove protectors for skiing and snowboarding
W-MS-CHEM-174	Tenley Fransen	The Impact of Salt on Apples
W-MS-CHEM-147	Leah Benoit	Butter's Role in the Science of Baking: Amount of Butter and Height of a Brownie
T-HS-EAEV-445	Lynne Hu	A Comparison of Thymus Vulgaris and Origanum Vulgare in the Adsorption of NO ₂ and NO ₃ in Aquaponics Systems

3M Specialty Materials Development Lab

Plaque + \$100 gift card + invitation to 3M Inventor Event

W-HS-EGSD-424	Yash Dagade	WATT from VAWT : Design of A Novel Vertical Airborne Wind Turbine (VAWT) Clean Energy Farm
S-HS-EGSD-325	Maggie Banks	Wood-n't It Be Nice: Toward a Continuous Piezoelectric Charge Pump
W-HS-CHEM-099	April Wang	A paper-based colorimetric biosensor to detect ciprofloxacin in water
W-HS-MATS-453	Ericka Miller	Blood Spatter Analysis
S-HS-CHEM-053	Aaron Lindeman	A Environmentally friendly dry-erase marker composition

3M Personal Safety Division

Plaque + \$100 gift card + invitation to 3M Inventor Event

W-MS-BEHA- 278	Tobias Oostendorp	How Brain Development Affects Creativity
W-MS-EAEV- 282	Batoul Taha	What is the Effect of Outdoor Air Pollution (Fall and Winter) on Air Quality in Different Outdoor Locations (Forest, Train Station, Neighborhood)?
W-MS-EAEV- 414	Isabelle Wegener	The Impact of Climate Change on Brine Shrimp
W-HS-BMED- 317	Fahima Rashid	The effect of potassium, magnesium and calcium on heart rate
T-HS-EGSD- 269	Sarah Zamudio	Making Natural Gas from Compost
W-HS-EBED- 111	Shreshth Shrivastava	Wi-C.A.R.E: Wifi Computer-Assisted Remote Eldercare (Year IV)
T-HS-BCHM- 341	Julia Harms	Unraveling Alzheimer's: An Investigation into Potential Inhibition of Alzheimer's Tau Aggregation by Cinnamaldehyde

3M Young Inventor Recognition

Plaque + \$100 Gift card + invitation to 3M Inventor Event

W-HS-ENEV- 220	Ana Stewart	The Application of Mushroom Mycelium as a Biomaterial and Leather Alternative
W-HS-ENEV- 254	Anika Lang	Valorization of winery wastewater to grow <i>Chlorella vulgaris</i>
S-MS-CHEM- 175	Ellie Nelson	Which Storage Method Keeps Fruit Fresh for the Longest Period of Time?
T-MS-PLNT- 328	Ethan Finch	Analyzing the Influence of Weather on the Sap Production of Maple Trees to Create a Sap Volume Prediction Algorithm
W-HS-BMED- 025	Kendall White	The Perfect Solution: Optimizing an enzyme-linked immunosorbent assay to determine antibody concentrations in glioblastoma patients
W-MS-ETSD- 256	Logan Ford	Electric Cars...Minnesota Winters
S-MS-ANIM- 394	Michael Beckey	Sneaky Squirrels
T-MS-PHYS- 435	Miles Ervasti	Does Vehicle Suspension Perform better with more or less Weight added to the Vehicle?
W-HS-EAEV- 019	Mina Adabag	Lead's Butterfly Effect: Determining the impact of Lead Pollution on <i>Danaus plexippus</i> and <i>Pieris rapae</i>
W-MS-CHEM- 176	Edwin Lam	Super Solubility
W-HS-PLNT- 056	Quinn Hughes, Tyler Clair	Using Monte Carlo Simulation to Optimize Vitamin C Production in <i>Lactuca sativa</i> by Varying Light Intensity and Wavelength, Year II
W-HS-ROBO- 137	Valerie Nelson	Spectroscopy and Machine Learning for the Prediction of Impurities in Recycled Plastics

Inspiring Excellence Project

\$50 and a certificate

S-MS-CHEM- 175	Ellie Nelson	Which Storage Method Keeps Fruit Fresh for the Longest Period of Time?
W-MS-ENEV- 112	Shagun Shrivastava	100% Biodegradable Plastic. Is it True !!! (Year 3)
W-MS-CHEM- 145	Odessa Kruah	Baking Towers
W-HS-MATS- 423	Ziyi Qian	The role of water hydration states in a bacteria derived biopolymer (EPS)/nanoclay hydrogel

Inspiring Excellence Teacher

\$100 and a certificate

Megan Heitkemp	Salk MS (Elk River)
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Students Achieving Volunteering Excellence (S.A.V.E)

2 certificates & \$200;

W-MS-CHEM- 161	Sadie Beachem, Amelia Severson	Spherification: Sodium Alginate, Liquid Type and Time
W-MS-BEHA- 334	Nora Jaster, Kiera Hoven, Gracelyn Kersey-Schutta	Science of Annoyance/ Song Survey

Students Achieving Volunteering Excellence (S.A.V.E)

6 certificates & \$100

W-MS-BEHA- 447	Frankie Scherer	How Do Different Genres of Music Affect Stress Levels
W-MS-BCHM- 321	John Trinacty	The Benefits of Dairy and Non-Dairy Ice Cream
T-MS-PHYS- 435	Miles Ervasti	Does Vehicle Suspension Perform better with more or less Weight added to the Vehicle?
W-MS-PHYS- 182	Emma Bacigalupo	Batter Up
W-MS-MATS- 448	Sadie Hall	Keeping The Cool-The Effect That Insulation Plays In Keeping Water Cold
W-MS-ENEV- 335	Sophie Abbey	The Importance of Water Purity

Students Achieving Volunteering Excellence (S.A.V.E)

2 certificates & \$100

W-HS-CBIO- 172	Emily McNeil	Evaluating the extent to which ML could be a viable option in ASD diagnosis.
W-HS-MATS- 453	Ericka Miller	Blood Spatter Analysis

United States Department of Agriculture Research Service certificate and book

T-MS-PLNT- 328	Ethan Finch	Analyzing the Influence of Weather on the Sap Production of Maple Trees to Create a Sap Volume Prediction Algorithm
W-MS-EAEV- 282	Batoul Taha	What is the Effect of Outdoor Air Pollution (Fall and Winter) on Air Quality in Different Outdoor Locations (Forest, Train Station, Neighborhood)?
W-HS-EAEV- 026	Sarah Peterson	Protecting Plants: Investigating the relationship between fertilizers and insect damage in an urban garden
W-HS-PLNT- 170	Jordi Malaret	Resistance to abiotic stress due to overexpression of SUPA gene in Arabidopsis thaliana

Integrated Science Award certificate and \$50

S-MS-ANIM- 394	Michael Beckey	Sneaky Squirrels
W-MS-ETSD- 430	Zachary Larson	The ONLY way to Win a Snowball Fight
W-MS-PLNT- 242	Sophia Minakova	Growing Seeds in Microgravity
W-MS-PLNT- 416	Ellie Morris	How Wind Speed Influences the Growth of Plants
T-HS-EAEV- 445	Lynne Hu	A Comparison of Thymus Vulgaris and Origanum Vulgare in the Adsorption of NO ₂ and NO ₃ in Aquaponics Systems
T-HS-ENEV- 280	John Liu	Green Electronics: A Prospective Proof-of-Concept Study

MN Chapter of American Fisheries

Book and a Fishing Pole

W-MS-EAEV- 414	Isabelle Wegener	The Impact of Climate Change on Brine Shrimp
W-HS-CBIO- 364	Chloe McLaren	Using GIS to Map Aquatic Abiotic Indicators for Lake Sturgeon in Minnesota

Minnesota Space Frontier Society Certificate

S-MS-ETSD- 141	Michael Kern	How Does the Aerofoil Shape of a Wing Affect the Amount of Lift In An Aircraft?
T-MS-MATS- 404	Adam Liesch	Can Your Plane Fly Under Radar?
W-MS-PHYS- 151	Shaina Lowe	J.W.S.T. Sunshield
W-HS-MATH- 366	Keira Follette	Arc of Lens
W-HS-PHYS- 316	Jada Chen	A Series of Time: How does Sidereal Time Change over the Course of a Year?
W-HS-PHYS- 444	Aman Goud	Sneaky Particle! true yield measurement of a Dark Matter particle without compromises
W-HS-ROBO- 313	Christopher Belhouse	Creating and demonstrating simple and reliable autonomous flight using a small, radio-controlled aircraft prototypes
W-MS-PLNT- 242	Sophia Minakova	Growing Seeds in Microgravity
W-HS-ETSD- 171	John Armstrong	Design of an unmanned aerial delivery system

US Air Force (St. Paul)

US Air Force Sling pack, Power Bank, USB Flash Memory Drive, USB Car Charger, and Official AF Certificate

S-HS-EAEV-039	William Richardson	Studying the Impact of Microplastics on Quinoa Growth
S-HS-CELL-038	Henry Choi	The Effect of Gefitinib on Cell Proliferation and Invasion in 2D and 3D Cultures of MDA-MB-231 Cells
S-HS-EGSD-325	Maggie Banks	Wood-n't It Be Nice: Toward a Continuous Piezoelectric Charge Pump
S-HS-EBED-030	Rishi Bhargava, Humza Murad	Project WASP: Watering Atmospheric Self-Irrigating Planters

US Air Force (Twin Cities)

US Air Force Sling pack, Power Bank, USB Flash Memory Drive, USB Car Charger, and Official AF Certificate

T-HS-ENBM-397	Karen Nakamura	Personalization of Deep Brain Stimulation Surgery Pre-Operational Planning: Integration of 7-Tesla MRI Segmentations into 3-D Brain Visualization Platform
T-HS-EGSD-269	Sarah Zamudio	Making Natural Gas from Compost
T-HS-EAEV-445	Lynne Hu	A Comparison of Thymus Vulgaris and Origanum Vulgare in the Adsorption of NO ₂ and NO ₃ in Aquaponics Systems
T-HS-BMED-331	Lillie Hanto	The effectiveness of different kinds of antibiotics in killing bacteria

US Air Force (Western Suburbs)

US Air Force Sling pack, Power Bank, USB Flash Memory Drive, USB Car Charger, and Official AF Certificate

W-MS-ETSD- Sam Kessler
246

3D Printing Power Wheel Sizes and Velocity

W-MS-ENEV- Amina Zahid
293

Unlimited Energy

W-HS-PHYS- Aman Goud
444

Sneaky Particle! true yield measurement of a Dark Matter particle without compromises

W-HS-MATS- Carmen McLaren
133

Earthen construction: creation of an earthen dual-wall system as a high-performing alternative to a conventional wall

Office of Naval Research HS School

Certificate, medal, \$50 gift card (send form)

W-HS-EBED- 111	Shreshth Shrivastava	Wi-C.A.R.E: Wifi Computer-Assisted Remote Eldercare (Year IV)
W-HS-EGSD- 424	Yash Dagade	WATT from VAWT : Design of A Novel Vertical Airborne Wind Turbine (VAWT) Clean Energy Farm
T-HS-ENEV- 280	John Liu	Green Electronics: A Prospective Proof-of-Concept Study
W-HS-MATH- 286	Andrew Zhang	Extremal values for the Steiner k-distance and the Steiner k-Wiener index
W-HS-BEHA- 237	Kareena Israni	Bringing meaning to numbers: Randomized controlled trials that inform candidates about which centers transplant patients like them.
T-HS-SOFT- 418	Lakshika Nanda Kumar Reddy	Detecting Cataracts From Retinal Fundus Using Machine Learning: An AI Approach to Identifying Cataracts Using Convolutional Neural Networks

Office of Naval Research MS School

Certificate, medal

W-MS-PLNT- 242	Sophia Minakova	Growing Seeds in Microgravity
W-MS-PLNT- 415	Evan Koelewyn	Aquaponics
T-MS-MATS- 404	Adam Liesch	Can Your Plane Fly Under Radar?
T-MS-PLNT- 328	Ethan Finch	Analyzing the Influence of Weather on the Sap Production of Maple Trees to Create a Sap Volume Prediction Algorithm
W-MS-EAEV- 282	Batoul Taha	What is the Effect of Outdoor Air Pollution (Fall and Winter) on Air Quality in Different Outdoor Locations (Forest, Train Station, Neighborhood)?

Teacher Excellence Trophy - Dr Kati Kragtorp

Dr. Kati Kragtorp

Breck School

ISEF Alumni Award - Timara Underbakke

\$25 and a certificate

S-MS-ANIM-
394

Michael Beckey

Sneaky Squirrels

Twin Cities Meteorological Society

Weather radio or a Digital Anemometer

W-HS-EAEV-
386

Sanjana Kollipara

Turn Around, Don't Drown! Evaluating deviations from the median in historical climate data and comparing the emergency response and mitigation plans of Hennepin and St. Louis Counties

American Psychological Association (St. Paul)
Certificate & 1 Year Complimentary Student Membership (fill out form)

S-HS-BEHA- Rita Li
138

The effects of music lyrics on memory

American Psychological Association (Twin Cities)
Certificate & 1 Year Complimentary Student Membership (fill out form)

T-HS-BEHA- Sam Bergh
090

Rainbow Classroom

T-HS-BEHA- Alec Erickson
264

How Does the Perception of Time Change with Age?

American Psychological Association (Western Suburbs)
Certificate & 1 Year Complimentary Student Membership (fill out form)

W-HS-BEHA- Sydney McDaniel
012

Pregnancy, Policing, and Unequal Policies: A cross-sectional analysis of police contact and adverse birth outcomes in US-born Black, White, and Foreign-born Black women

W-HS-BEHA- Ayeza Moheet
294

Can subliminal messaging be used to influence the decisions and choices of middle and high school students?

Association of Women Geoscientists (St. Paul) Certificate

S-HS-EGSD- Maggie Banks
325

Wood-n't It Be Nice: Toward a Continuous
Piezoelectric Charge Pump

Association of Women Geoscientists (Twin Cities) Certificate

T-HS-EGSD- Sarah Zamudio
269

Making Natural Gas from Compost

T-HS-EAEV- Lynne Hu
445

A Comparison of Thymus Vulgaris and Origanum
Vulgare in the Adsorption of NO₂ and NO₃ in
Aquaponics Systems

Association of Women Geoscientists (Western Suburbs) Certificate

W-HS-EAEV- Adeenah Fahim
275

Influence of household nutrient waters in
comparison to tap water on the growth and
development of plants.

W-HS-EAEV- Isabela Snow
398

The Effects of Atrazine on Aquatic Environments
and the Functionality of Filters to Reduce Effects

DoD STEM Leadership Prize

Certificate, \$100 (split evenly if team)

T-MS-BMED- Rosa Martin
405

Does Exercise Affect Blood Glucose Levels?

GeniusOlympiad

Certificate, competition opportunity

T-HS-EAEV- Lynne Hu
445

A Comparison of Thymus Vulgaris and Origanum Vulgare in the Adsorption of NO₂ and NO₃ in Aquaponics Systems

W-HS-MATS- Ziyi Qian
423

The role of water hydration states in a bacteria derived biopolymer (EPS)/nanoclay hydrogel

W-HS-PLNT- Finn Emerson
031

Alternatives to Herbicide Treatment of Invasive Buckthorn

W-HS-EAEV- Mina Adabag
019

Lead's Butterfly Effect: Determining the impact of Lead Pollution on Danaus plexippus and Pieris rapae

T-HS-EGSD- Sarah Zamudio
269

Making Natural Gas from Compost

S-HS-CHEM- Aaron Lindeman
053

A Environmentally friendly dry-erase marker composition

T-HS-ANIM- Nadia Wang
353

Don't Be Coy, Decoy!: Determining the minimal length needed for a non-neutralizing antibody to bind to a 'decoy' epitope on the GP5 protein of PRRSV

Lemelson Early Inventor Prize (St. Paul)

\$100 (shared equally if team)

S-MS-BMED- Cecilia Junker
089

What is the Right Amount of Sunscreen to Protect
You from UV Rays

Lemelson Early Inventor Prize (Twin Cities)

\$100 (shared equally if team)

T-MS-CELL- Riddhi Singhvi
239

CRISPR-ing Up the Genes: A Tale of Two
Experiments

Lemelson Early Inventor Prize (Western Suburbs)

\$100 (shared equally if team)

W-MS-ENEV- Shagun Shrivastava
112

100% Biodegradable Plastic. Is it True !!! (Year 3)

NASA Earth System Science Award (St. Paul) **Certificate & Invitation to Webinar**

S-HS-EBED-030 Rishi Bhargava, Humza Murad Project WASP: Watering Atmospheric Self-Irrigating Planters

NASA Earth System Science Award (Twin Cities) **Certificate & Invitation to Webinar**

T-HS-EAEV-445 Lynne Hu A Comparison of Thymus Vulgaris and Origanum Vulgare in the Adsorption of NO₂ and NO₃ in Aquaponics Systems
T-HS-EAEV-358 Samuel Oelschlaeger, Dehlia Woltman, Elizabeth Grove The Effects of Road-Salt Contaminated Water on Plant Growth

NASA Earth System Science Award (Western Suburbs) **Certificate & Invitation to Webinar**

W-HS-EAEV-019 Mina Adabag Lead's Butterfly Effect: Determining the impact of Lead Pollution on Danaus plexippus and Pieris rapae
W-HS-EAEV-398 Isabela Snow The Effects of Atrazine on Aquatic Environments and the Functionality of Filters to Reduce Effects

**National Geographic Society That's Geography! Award
(St. Paul)**

Certificate, \$100 (send in form)

S-HS-BCHM- Yash Kshirsagar
050

The Effect of Varying Concentrations of Titanium
dioxide on the Movement of *Caenorhabditis elegans*

**National Geographic Society That's Geography! Award
(Twin Cities)**

Certificate, \$100 (send in form)

T-HS-EGSD- Sarah Zamudio
269

Making Natural Gas from Compost

**National Geographic Society That's Geography! Award
(Western Suburbs)**

Certificate, \$100 (send in form)

W-HS-MCRO- Dureti Gamada
013

Fungi vs. Bacteria: Using Beneficial Microbes
Naturally Recruited by Corn Crops to Combat Corn
Fungal Pathogens

**National Oceanic and Atmospheric Administration
NOAA Taking the Pulse of the Planet (St. Paul)
Certificate and Letter**

S-HS-EGSD- Maggie Banks
325

Wood-n't It Be Nice: Toward a Continuous
Piezoelectric Charge Pump

**National Oceanic and Atmospheric Administration
NOAA Taking the Pulse of the Planet (Twin Cities)
Certificate and Letter**

T-HS-ENEV- Maddie Olsen
272

Effect of Background Color on Solar Panel
Productivity

T-HS-PLNT- Sriram Sureshkumar
454

Impact of Biochar as soil amendment in increased
produce yield (Year 1)

**National Oceanic and Atmospheric Administration
NOAA Taking the Pulse of the Planet (Western Suburbs)
Certificate and Letter**

W-HS-PHYS- Jada Chen
316

A Series of Time: How does Sidereal Time Change
over the Course of a Year?

W-MS-CHEM- Odessa Kruah
145

Baking Towers

Regeneron Biomedical Science Award
Certificate and \$375 (if you send in the info)

S-HS-CELL-
038

Henry Choi

The Effect of Gefitinib on Cell Proliferation and
Invasion in 2D and 3D Cultures of MDA-MB-231
Cells

Regeneron Biomedical Science Award
Certificate and \$375 (if you send in the info)

T-HS-BCHM-
341

Julia Harms

Unraveling Alzheimer's: An Investigation into
Potential Inhibition of Alzheimer's Tau Aggregation
by Cinnamaldehyde

Regeneron Biomedical Science Award
Certificate and \$375 (if you send in the info)

W-HS-CELL-
422

Steven Yang

Preposterous Proteoglycans! Defining the Role of
CSPG4 in Pancreatic Cell Invasion and Spheroid
Formation to Achieve Effective Immunotherapy
Treatments

Ricoh Sustainable Development Award (St. Paul) Certificate and letter

S-HS-CHEM- Aaron Lindeman
053

A Environmentally friendly dry-erase marker
composition

Ricoh Sustainable Development Award (Twin Cities) Certificate and letter

T-HS-EGSD- Sarah Zamudio
269

Making Natural Gas from Compost

T-HS-EAEV- Lynne Hu
445

A Comparison of Thymus Vulgaris and Origanum
Vulgare in the Adsorption of NO₂ and NO₃ in
Aquaponics Systems

Ricoh Sustainable Development Award (Western Suburbs) Certificate and letter

W-MS-ENEV- Shagun Shrivastava
112

100% Biodegradable Plastic. Is it True !!! (Year 3)

W-HS-PLNT- Finn Emerson
031

Alternatives to Herbicide Treatment of Invasive
Buckthorn

Society for In Vitro Biology (St. Paul)
Certificate and Membership in SIVB

S-HS-CELL- Henry Choi
038

The Effect of Gefitinib on Cell Proliferation and
Invasion in 2D and 3D Cultures of MDA-MB-231
Cells

Society for In Vitro Biology (Twin Cities)
Certificate and Membership in SIVB

T-HS-MCRO- Griffin Anderson
429

Identification of Trends in Oil-Instigated Bacterial
Growth

T-HS-SOFT- Lakshika Nanda Kumar
418 Reddy

Detecting Cataracts From Retinal Fundus Using
Machine Learning: An AI Approach to Identifying
Cataracts Using Convolutional Neural Networks

Society for In Vitro Biology (Western Suburbs)
Certificate and Membership in SIVB

W-HS-MCRO- Ellie Keenan
310

Effects of fluoxetine on the Enhanced Slowing
Response in Caenorhabditis elegans Mutant Strains
ser-7 and mod-1

USAID - US Agency for International Development (St. Paul)

Certificate, Letter, and webinar with USAID's Chief Scientist

S-HS-EBED-030 Rishi Bhargava, Humza Murad Project WASP: Watering Atmospheric Self-Irrigating Planters

USAID - US Agency for International Development (Twin Cities)

Certificate, Letter, and webinar with USAID's Chief Scientist

T-HS-EGSD-269 Sarah Zamudio Making Natural Gas from Compost
T-HS-ENEV-280 John Liu Green Electronics: A Prospective Proof-of-Concept Study

USAID - US Agency for International Development (Western Suburbs)

Certificate, Letter, and webinar with USAID's Chief Scientist

W-HS-PLNT-031 Finn Emerson Alternatives to Herbicide Treatment of Invasive Buckthorn
W-HS-BMED-306 Sahwa Ibrahim Calorie Exertion Accuracy in Males and Females

US Metric Association (St. Paul)

Certificate + 1 Year of Membership

S-HS-EAEV- William Richardson Studying the Impact of Microplastics on Quinoa
039 Growth

US Metric Association (Twin Cities)

Certificate + 1 Year of Membership

T-HS-BMED- Ella O'Hanlon Salty Germs
329
T-HS-EAEV- Samuel Oelschlaeger, The Effects of Road-Salt Contaminated Water on
358 Dehlia Woltman, Plant Growth
Elizabeth Grove

US Metric Association (Western Suburbs)

Certificate + 1 Year of Membership

W-HS-MATS- Ericka Miller Blood Spatter Analysis
453
W-HS-EAEV- Mina Adabag Lead's Butterfly Effect: Determining the impact of
019 Lead Pollution on Danaus plexippus and Pieris rapae

Yale Science and Engineering Association Inc. (St. Paul) Certificate

S-HS-EGSD- Maggie Banks
325

Wood-n't It Be Nice: Toward a Continuous
Piezoelectric Charge Pump

Yale Science and Engineering Association Inc. (Twin Cities) Certificate

T-HS-SOFT- Lakshika Nanda Kumar
418 Reddy

Detecting Cataracts From Retinal Fundus Using
Machine Learning: An AI Approach to Identifying
Cataracts Using Convolutional Neural Networks

Yale Science and Engineering Association Inc. (Western Suburbs) Certificate

W-HS-EBED- Shreshth Shrivastava
111

Wi-C.A.R.E: Wifi Computer-Assisted Remote
Eldercare (Year IV)

Stockholm Junior Water Prize (St. Paul)

Certificate, opportunity for further competition

S-HS-EBED-030	Rishi Bhargava, Humza Murad	Project WASP: Watering Atmospheric Self-Irrigating Planters
S-HS-MCRO-103	Aryun Nemani	The Effect of Varying Solute Concentrations on Quorum Sensing and Bioluminescence within <i>Vibrio fischeri</i>

Stockholm Junior Water Prize (Twin Cities)

Certificate, opportunity for further competition

T-HS-EAEV-445	Lynne Hu	A Comparison of <i>Thymus Vulgaris</i> and <i>Origanum Vulgare</i> in the Adsorption of NO ₂ and NO ₃ in Aquaponics Systems
T-HS-EAEV-358	Samuel Oelschlaeger, Dehlia Woltman, Elizabeth Grove	The Effects of Road-Salt Contaminated Water on Plant Growth
T-HS-MCRO-232	Camila Cabrera Zhagnay, Jordan Flores Lara, Juan Castillo	Effect of Soaps on <i>E. Coli</i>
T-HS-BMED-329	Ella O'Hanlon	Salty Germs

Stockholm Junior Water Prize (Western Suburbs)

Certificate, opportunity for further competition

W-HS-SOFT-136	Nicholas Breitling	Improving 3D fluid simulation performance with ray-marching and a combined grid-particle algorithm
W-HS-ENEV-289	Khadija Kouser	Designing & Testing a Solar-Powered, Eutrophication-prevention (SPEP) Robot for Stagnant Waters
W-HS-BCHM-250	Noah Khemakhem	The effect of pH on the ability of <i>P. porifera</i> to filter nickel from seawater
W-HS-CHEM-099	April Wang	A paper-based colorimetric biosensor to detect ciprofloxacin in water

Research Papers MS First Place Trophy

P-MS-ENVI-356 Isabelle Wegener The Impact of Climate Change on Brine Shrimp

Research Papers MS Second Place Trophy

P-MS-ENGT-399 Miles Ervasti Does Vehicle suspension perform better with more or less weight added to the vehicle ?

Research Papers MS Third Place Trophy

P-MS-MHBE-437 Yulian Montecinos
Sanchez Don't Leave Me Behind!

Research Papers HS First Place Trophy

P-HS-ENVI-018 Mina Adabag

Lead's Butterfly: Effect Determining the impact of Lead Pollution on Danaus plexippus and Pieris rapae

Research Papers HS Second Place Trophy

P-HS-MHBE-383 Kenneth Chen

An Agent-Based Simulation of COVID-19 Transmission and Learning Loss in Schools: Evaluating Mitigation Strategies

Research Papers HS Third Place Trophy

P-HS-BIOM-365 Steven Yang

Preposterous Proteoglycans! Defining the Role of CSPG4 in Pancreatic Cell Invasion and Spheroid Formation to Achieve Effective Immunotherapy Treatments

Thermo Fisher Jr Innovators' Challenge (St. Paul)

S-MS-ANIM- Michael Beckey
394

Sneaky Squirrels

S-MS-ETSD- Iain Rolfes
048

Which Bridge Design is the Strongest: Truss,
Suspension, or Beam

Thermo Fisher Jr Innovators' Challenge (Twin Cities)

T-MS-PHYS- Miles Ervasti
435

Does Vehicle Suspension Perform better with more
or less Weight added to the Vehicle?

T-MS-PLNT- Ethan Finch
328

Analyzing the Influence of Weather on the Sap
Production of Maple Trees to Create a Sap Volume
Prediction Algorithm

Thermo Fisher Jr Innovators' Challenge (Western Suburbs)

W-MS-ENEV- Shagun Shrivastava
112

100% Biodegradable Plastic. Is it True !!! (Year 3)

W-MS-EAEV- Isabelle Wegener
414

The Impact of Climate Change on Brine Shrimp

W-MS-PLNT- Sophia Minakova
242

Growing Seeds in Microgravity

W-MS-CHEM- Leah Benoit
147

Butter's Role in the Science of Baking: Amount of
Butter and Height of a Brownie

W-MS-BCHM- John Trinacty
321

The Benefits of Dairy and Non-Dairy Ice Cream

W-MS-PHYS- Shaina Lowe
151

J.W.S.T. Sunshield

W-MS-ETSD- Zachary Larson
430

The ONLY way to Win a Snowball Fight

W-MS-CHEM- James Griffiths
434

The Conductivity of Common Drinks

W-MS-CHEM- Alice Bender
431

Which Sports Drink is the Most Hydrating

W-MS-BEHA- Muntaz Mohamed,
377 Hodan Hassan, Riyan
Mohamed

Can Peppermint Improve Color Visual Reaction
Times

State Science Fair MS

S-MS-ANIM-394	Michael Beckey	Sneaky Squirrels
S-MS-BEHA-211	Julia Kappenman	Does Testing on Computers vs Paper Change Students' Test Scores
S-MS-BMED-140	Will O'Shaughnessy	Can People Taste the Difference Between Artificial Meat and Real Meat?
S-MS-BMED-142	Lily O'Brien	How the Type of Flour Affects the Quality of a Cupcake
S-MS-CHEM-175	Ellie Nelson	Which Storage Method Keeps Fruit Fresh for the Longest Period of Time?
S-MS-EAEV-044	Olivia Senger	How Does Climate Change Affect Plant Growth?
S-MS-EAEV-045	Lucy Brondum	Does Talking to Plants Affect Their Growth
S-MS-ETSD-048	Iain Rolfes	Which Bridge Design is the Strongest: Truss, Suspension, or Beam
S-MS-ETSD-126	Olin Rahn	Is an Active Wing Better for Braking than a Normal Wing?
S-MS-ETSD-141	Michael Kern	How Does the Aerofoil Shape of a Wing Affect the Amount of Lift In An Aircraft?
S-MS-MCRO-046	Addy Larson	Does the Classroom Affect How Dirty your Hands Are?
T-MS-ANIM-410	Lincoln Kampf	The Nose Knows
T-MS-BEHA-395	Ayla Stock	All Eyes On You
T-MS-BEHA-400	Yulian Montecinos Sanchez	Don't Leave Me Behind!
T-MS-BEHA-406	Zoey Schaffhausen	Does Smell Affect Taste?
T-MS-BEHA-407	Ethan Nguyen	Does Color Affect Productivity?
T-MS-BEHA-408	Joshua Wolf	Does Eating Different Food Affect Reaction Time?
T-MS-BEHA-409	Vivian Elfering	What Your Favorite Color Says About YOU!
T-MS-BMED-405	Rosa Martin	Does Exercise Affect Blood Glucose Levels?
T-MS-CELL-239	Riddhi Singhvi	CRISPR-ing Up the Genes: A Tale of Two Experiments
T-MS-CHEM-401	Jocelyn Guasco	Does Different Liquids Affect the Sublimation of Dry Ice
T-MS-ETSD-370	Mercy Baur	The Night Slipper
T-MS-ETSD-375	Olive Grantham	Yoke Note
T-MS-MATS-404	Adam Liesch	Can Your Plane Fly Under Radar?

T-MS-MCRO- 403	Payton Nguyen	Hidden Dangers
T-MS-PHYS- 435	Miles Ervasti	Does Vehicle Suspension Perform better with more or less Weight added to the Vehicle?
T-MS-PLNT- 328	Ethan Finch	Analyzing the Influence of Weather on the Sap Production of Maple Trees to Create a Sap Volume Prediction Algorithm
W-MS-BCHM- 321	John Trinacty	The Benefits of Dairy and Non-Dairy Ice Cream
W-MS-BCHM- 336	Carissa Manderfeld	Does Cake Really Need Eggs
W-MS-BEHA- 278	Tobias Oostendorp	How Brain Development Affects Creativity
W-MS-BEHA- 327	Mia York	Are Adults Smarter Than 5th Graders?
W-MS-BEHA- 334	Nora Jaster, Kiera Hoven, Gracelyn Kersey-Schutta	Science of Annoyance/ Song Survey
W-MS-BEHA- 377	Muntaz Mohamed, Hodan Hassan, Riyan Mohamed	Can Peppermint Improve Color Visual Reaction Times
W-MS-BEHA- 447	Frankie Scherer	How Do Different Genres of Music Affect Stress Levels
W-MS-BMED- 326	Joey Thompson	The Beat of my Heart
W-MS-BMED- 333	Ethan Hoekman	Electrolytes: The Shocking Truth
W-MS-CHEM- 145	Odessa Kruah	Baking Towers
W-MS-CHEM- 146	Carlee Shenkle	Sugar Vs Sugar: Which is More Dense?
W-MS-CHEM- 147	Leah Benoit	Butter's Role in the Science of Baking: Amount of Butter and Height of a Brownie
W-MS-CHEM- 174	Tenley Fransen	The Impact of Salt on Apples
W-MS-CHEM- 180	Connor Danielson	Water: Making it Clean
W-MS-CHEM- 185	Teagan Zins	parting with pancakes
W-MS-CHEM- 186	Annabel Edson	Frizz Forecast: How Humidity Impacts Hair
W-MS-CHEM- 187	Makena Mbuba	Bubble Trouble 2.0: How Glycerin affects the height, strength, and speed it takes foam to rise.
W-MS-CHEM- 188	Kallie DoBrava	Chips of fire
W-MS-CHEM- 196	Milkahlyne Muriithi	pH Madness- 'How do different makers impact the pH level of water?'
W-MS-CHEM- 252	Annika Schultz	Flour Power
W-MS-CHEM- 311	Noor Alaoua	Counting Calories

W-MS-CHEM- Alice Bender 431	Which Sports Drink is the Most Hydrating
W-MS-CHEM- James Griffiths 434	The Conductivity of Common Drinks
W-MS-EAEV- Mardhav Shriram 178	pHenomenal Filtering: How Different Grades of Sand Impact Potability of Water
W-MS-EAEV- Alexander Ebert 205	Cold Crystals: How Does Environmental Temperature Affect Crystal Growth
W-MS-EAEV- Molly Wesolowski 217	Bottled Erosion - Landscaping Materials Impacting Soil Erosion
W-MS-EAEV- Batoul Taha 282	What is the Effect of Outdoor Air Pollution (Fall and Winter) on Air Quality in Different Outdoor Locations (Forest, Train Station, Neighborhood)?
W-MS-EAEV- Andon Vande Glind 343	Salty Scuds are Duds
W-MS-EAEV- Isabelle Wegener 414	The Impact of Climate Change on Brine Shrimp
W-MS-ENEV- Shagun Shrivastava 112	100% Biodegradable Plastic. Is it True !!! (Year 3)
W-MS-ENEV- Amina Zahid 293	Unlimited Energy
W-MS-ENEV- Emaan Moheet 298	Developing and Testing a Low-Cost Hydraulic Flood Barrier to Protect Rural Communities
W-MS-ENEV- Patrick Grosser 355	Swirling Out Trash: What Hydrodynamic Separator Design Filters Out the Most Pollutants?
W-MS-ETSD- Makena Steinke 148	Just keep rolling
W-MS-ETSD- Logan Samek 150	The Great Graphics Settings Experiment
W-MS-ETSD- Oluwademilade Aroloye 193	EARTHQUAKE
W-MS-ETSD- Logan Ford 256	Electric Cars...Minnesota Winters
W-MS-ETSD- Eeshal Syed 296	Frcition's Factors
W-MS-ETSD- Zachary Larson 430	The ONLY way to Win a Snowball Fight
W-MS-MATS- Nicolas Trujillo 432	How to Finally Descale your Dishes
W-MS-MATS- Kaitlyn Mulle 433	The Battle of the Sandwich Bags
W-MS-MATS- Sadie Hall 448	Keeping The Cool-The Effect That Insulation Plays In Keeping Water Cold
W-MS-MCRO- Olivia Byers 379	The Sweet Side of Fermentation
W-MS-PHYS- Cale Stanley-Wornson 143	Fishing Line Strength
W-MS-PHYS- Shaina Lowe 151	J.W.S.T. Sunshield

W-MS-PHYS- 181	Siri Westberg	Does Money Buy Distance?
W-MS-PHYS- 182	Emma Bacigalupo	Batter Up
W-MS-PHYS- 189	Celten Johnson	The gasses supasses
W-MS-PHYS- 426	Logan Hovanetz	Ramping Up Speed
W-MS-PHYS- 439	Vedant Chetan	Magnets: How Strong are They?
W-MS-PLNT- 242	Sophia Minakova	Growing Seeds in Microgravity
W-MS-PLNT- 247	Fahtima Komara	What the Plant: Water Amount and Height
W-MS-PLNT- 342	Kaelyn Stel	To grow or not to grow: The effect of different fertilizers on plant growth
W-MS-PLNT- 415	Evan Koelewyn	Aquaponics
W-MS-PLNT- 416	Ellie Morris	How Wind Speed Influences the Growth of Plants
W-MS-PLNT- 441	Kaia Mayes	What Substances Make Cut Flowers Last Longest?

State Science Fair HS

S-HS-BCHM-050	Yash Kshirsagar	The Effect of Varying Concentrations of Titanium dioxide on the Movement of <i>Caenorhabditis elegans</i>
S-HS-BCHM-092	Calvin He	An Analysis of Saxophone Pad Degradation and Quality After Exposure to Human Saliva
S-HS-BEHA-138	Rita Li	The effects of music lyrics on memory
S-HS-CELL-038	Henry Choi	The Effect of Gefitinib on Cell Proliferation and Invasion in 2D and 3D Cultures of MDA-MB-231 Cells
S-HS-CHEM-053	Aaron Lindeman	A Environmentally friendly dry-erase marker composition
S-HS-CHEM-109	Julia Colbert	Teeth Cleaning Chewing Gum
S-HS-EAEV-039	William Richardson	Studying the Impact of Microplastics on Quinoa Growth
S-HS-EBED-030	Rishi Bhargava, Humza Murad	Project WASP: Watering Atmospheric Self-Irrigating Planters
S-HS-EGSD-325	Maggie Banks	Wood-n't It Be Nice: Toward a Continuous Piezoelectric Charge Pump
S-HS-PLNT-058	Gabriel Bangoura	Effect of Electricity and Oxidation on Plant Growth
S-HS-PLNT-123	Becca Richman	The Impact of Light Color on Variegation Quantity of <i>Euphorbia pulcherrima</i>
T-HS-ANIM-324	Norah Dillner, Linnaea Dillner	Atta and <i>Acromyrmex</i> Waste Deters Tropical Agricultural Pests
T-HS-ANIM-353	Nadia Wang	Don't Be Coy, Decoy!: Determining the minimal length needed for a non-neutralizing antibody to bind to a 'decoy' epitope on the GP5 protein of PRRSV
T-HS-ANIM-421	Shreya Sekar	Beeping Blanding's! Using radiotelemetry data and ArcGIS to correlate turtle sightings with habitat features to focus conservation and protection efforts
T-HS-BCHM-341	Julia Harms	Unraveling Alzheimer's: An Investigation into Potential Inhibition of Alzheimer's Tau Aggregation by Cinnamaldehyde
T-HS-BMED-263	Ajmal Abdirahman	Drug Solubility
T-HS-EAEV-445	Lynne Hu	A Comparison of <i>Thymus Vulgaris</i> and <i>Origanum Vulgare</i> in the Adsorption of NO ₂ and NO ₃ in Aquaponics Systems
T-HS-EGSD-269	Sarah Zamudio	Making Natural Gas from Compost
T-HS-ENBM-397	Karen Nakamura	Personalization of Deep Brain Stimulation Surgery Pre-Operational Planning: Integration of 7-Tesla MRI Segmentations into 3-D Brain Visualization Platform
T-HS-ENEV-280	John Liu	Green Electronics: A Prospective Proof-of-Concept Study

T-HS-MCRO-429	Griffin Anderson	Identification of Trends in Oil-Instigated Bacterial Growth
T-HS-PLNT-454	Sriram Sureshkumar	Impact of Biochar as soil amendment in increased produce yield (Year 1)
T-HS-SOFT-418	Lakshika Nanda Kumar Reddy	Detecting Cataracts From Retinal Fundus Using Machine Learning: An AI Approach to Identifying Cataracts Using Convolutional Neural Networks
W-HS-ANIM-008	Chloe Chu	Lighting the Way to Healthy Snakes: The Effect of Artificial UVB Light on Vitamin D Levels in Boa imperators
W-HS-BCHM-250	Noah Khemakhem	The effect of pH on the ability of P. porifera to filter nickel from seawater
W-HS-BEHA-009	Noah DeMichaelis	Music and the Mind: the Interection of Reading Readiness and Musical Proficiency
W-HS-BEHA-012	Sydney McDaniel	Pregnancy, Policing, and Unequal Policies: A cross-sectional analysis of police contact and adverse birth outcomes in US-born Black, White, and Foreign-born Black women
W-HS-BEHA-020	Ava Jaffe, Romy Peterson	Face Your Fears: Creating a system to study how mice over come their fears
W-HS-BEHA-049	Shreya Ramraj	How does divorce affect sleep patterns in young adults?
W-HS-BEHA-212	Caleb Li, Selena Qiao	Grogginess Begone: A Study of the Effects of Alarm Sounds on Sleep Inertia
W-HS-BEHA-222	Jack Hickey	Measuring the Effect of Physical Exercise and Working Memory Tasks on Statistical Learning in Adolescents
W-HS-BEHA-237	Kareena Israni	Bringing meaning to numbers: Randomized controlled trials that inform candidates about which centers transplant patients like them.
W-HS-BEHA-270	Alexander Bartholomew	Effects of Visual Conditioning on Exercise Performance and Perception
W-HS-BEHA-294	Ayeza Moheet	Can subliminal messaging be used to influence the decisions and choices of middle and high school students?
W-HS-BEHA-307	Austin Wang	Behavioral Determinants of COVID-19 Vaccine Hesitancy
W-HS-BMED-016	Ivy Miller, Corinne Moran	Deciphering DUX4: Is transient expression of DUX4 sufficient to cause muscular dystrophy?
W-HS-BMED-025	Kendall White	The Perfect Solution: Optimizing an enzyme-linked immunosorbent assay to determine antibody concentrations in glioblastoma patients
W-HS-BMED-100	Saloni Somia	The Effect of Calcium Signaling on Cell-Cell Fusion
W-HS-BMED-105	Carly Pfeffer	The impact of myoelectric stimulation on ability for peroneal muscle to resist simulated ankle sprain motion
W-HS-BMED-169	Darren Ma	Effect of soccer cleat design on ground resistance forces during movements in soccer
W-HS-BMED-306	Sahwa Ibrahim	Calorie Exertion Accuracy in Males and Females

W-HS-BMED-317	Fahima Rashid	The effect of potassium, magnesium and calcium on heart rate
W-HS-CBIO-172	Emily McNeil	Evaluating the extent to which ML could be a viable option in ASD diagnosis.
W-HS-CBIO-364	Chloe McLaren	Using GIS to Map Aquatic Abiotic Indicators for Lake Sturgeon in Minnesota
W-HS-CBIO-373	Chetan Boddeti	The clash between researchers: Conquering the interactions of the cell within a database to facilitate research collaboration and scientific advancement
W-HS-CELL-004	William McNally, Samuel Bae	The Pleiotrophin Puzzle: Investigating the expression of pleiotrophin in post-injury adult cardiac mouse hearts
W-HS-CELL-219	Lydia Kahsay	Examining the Effect of the Interleukin 10 Cytokine on Induced Inflammation Markers within the A549 Lung Adenocarcinoma and MCF-7 Breast Cancer Cell Lines
W-HS-CELL-312	Samuel Thibodeau	Inhibitory effects of curcumin on HEK cell growth
W-HS-CELL-347	Arreh Jain	Neurological Nuances: Quantifying and measuring the length and spacing of arterioles in the visual cortex using scans from two-photon imaging in vivo
W-HS-CELL-422	Steven Yang	Preposterous Proteoglycans! Defining the Role of CSPG4 in Pancreatic Cell Invasion and Spheroid Formation to Achieve Effective Immunotherapy Treatments
W-HS-CHEM-099	April Wang	A paper-based colorimetric biosensor to detect ciprofloxacin in water
W-HS-EAEV-019	Mina Adabag	Lead's Butterfly Effect: Determining the impact of Lead Pollution on Danaus plexippus and Pieris rapae
W-HS-EAEV-026	Sarah Peterson	Protecting Plants: Investigating the relationship between fertilizers and insect damage in an urban garden
W-HS-EAEV-361	Maryam Syeda, Fatima Syeda	Zebra Mussel Repellent
W-HS-EAEV-386	Sanjana Kollipara	Turn Around, Don't Drown! Evaluating deviations from the median in historical climate data and comparing the emergency response and mitigation plans of Hennepin and St. Louis Counties
W-HS-EAEV-398	Isabela Snow	The Effects of Atrazine on Aquatic Environments and the Functionality of Filters to Reduce Effects
W-HS-EBED-111	Shreshth Shrivastava	Wi-C.A.R.E: Wifi Computer-Assisted Remote Eldercare (Year IV)
W-HS-EGSD-424	Yash Dagade	WATT from VAWT : Design of A Novel Vertical Airborne Wind Turbine (VAWT) Clean Energy Farm
W-HS-ENBM-132	Lukas Murdych	Study of the effects of various classical guitar supports on muscular tension
W-HS-ENEV-220	Ana Stewart	The Application of Mushroom Mycelium as a Biomaterial and Leather Alternative

W-HS-ENEV-253	Jasmine Goldsmith	A comparison of bamboo, conifers, and cacti species' efficiency at removing contamination from water similar to that of SouthEast Asia
W-HS-ENEV-254	Anika Lang	Valorization of winery wastewater to grow <i>Chlorella vulgaris</i>
W-HS-ENEV-289	Khadija Kouser	Designing & Testing a Solar-Powered, Eutrophication-prevention (SPEP) Robot for Stagnant Waters
W-HS-ETSD-021	Noah Getnick	Following the Flow: Expanding the Capabilities of a 2D Fluid Simulation to Study Biomimetic Bodies
W-HS-ETSD-028	Trisha Samba, Amira Sinclair	Your Training H.I.R.O.: Developing a "Haptic Interface for Real-time Optimization" of Out-of-water Swimming Form
W-HS-ETSD-127	Lily Salyards	Aerodynamic optimization of proposing and ground-force in Formula 1 vehicles
W-HS-ETSD-350	Muminah Nihaar Mohammed	Unbind the Blind
W-HS-MATH-286	Andrew Zhang	Extremal values for the Steiner k-distance and the Steiner k-Wiener index
W-HS-MATS-096	Julia Vladimirov	Testing the toxicity of a composite cassava starch/chitosan/PALF/ZnO bioplastic
W-HS-MATS-133	Carmen McLaren	Earthen construction: creation of an earthen dual-wall system as a high-performing alternative to a conventional wall
W-HS-MATS-230	Noah Measells	Development of dual material glove protectors for skiing and snowboarding
W-HS-MATS-423	Ziyi Qian	The role of water hydration states in a bacteria derived biopolymer (EPS)/nanoclay hydrogel
W-HS-MATS-453	Ericka Miller	Blood Spatter Analysis
W-HS-MCRO-013	Dureti Gamada	Fungi vs. Bacteria: Using Beneficial Microbes Naturally Recruited by Corn Crops to Combat Corn Fungal Pathogens
W-HS-MCRO-177	Shelby Molina Larson	The Quantification and Persistence of <i>Fusarium moniliforme</i> on Maize Kernels Stored with the Intent of Producing Ethanol and its Potential Relationship with Increasing Cancer Rates in Minnesota
W-HS-MCRO-315	Andrew Moline	Mastering Microbes: Exploring the Effect of Temperature on Yeast Metabolism
W-HS-PLNT-031	Finn Emerson	Alternatives to Herbicide Treatment of Invasive Buckthorn
W-HS-PLNT-056	Quinn Hughes, Tyler Clair	Using Monte Carlo Simulation to Optimize Vitamin C Production in <i>Lactuca sativa</i> by Varying Light Intensity and Wavelength, Year II
W-HS-PLNT-170	Jordi Malaret	Resistance to abiotic stress due to overexpression of SUPA gene in <i>Arabidopsis thaliana</i>
W-HS-PLNT-304	Aisha Abdulwali	Effect of UVB irradiation on the vitamin D concentration in <i>Lolium Perenne</i> and <i>Lentinula Edodes</i>
W-HS-ROBO-130	Meiling Mathur	Machine learning for detecting warning signs of carpal tunnel syndrome in violinists

W-HS-ROBO- 137	Valerie Nelson	Spectroscopy and Machine Learning for the Prediction of Impurities in Recycled Plastics
W-HS-ROBO- 179	Krish Inba Rajashankar	A machine learning based identification and analysis of early call terminations in contact centers
W-HS-ROBO- 266	Parker Hitchcock	Analyzing AI Algorithms in Splendor Gameplay
W-HS-SOFT- 106	Antonis Pappas	Predicting the impact of rent-control policies in the Twin Cities on intergenerational social mobility
W-HS-SOFT- 136	Nicholas Breitling	Improving 3D fluid simulation performance with ray-marching and a combined grid-particle algorithm
W-HS-TMED- 319	Adam Bravo	Lipid Nanoparticle PEGylation for Optimized in Vitro Transfection

Schools Participating in 2023

Al-Amal School	Math and Science Academy
Avail Academy (Blaine)	Minnehaha Academy North
Avail Academy (Edina)	Campus
Blaine High School – Center for Engineering, Mathematics, and Science	Minnesota Connections Academy
Blessed Trinity Catholic School	Minnetonka East Middle School
Breck School	Minnetonka High School
Burnsville High School	Minnetonka Middle School West
Carondelet Catholic School	Mounds Park Academy
Concordia Academy--Roseville	Mounds View High School
Convent of the Visitation School	Nativity of Our Lord
DaVinci Academy of Arts & Science	New Life Academy
East Ridge High School	Rosemount Middle School
Eden Prairie Central Middle School	Salk Middle School
Eden Prairie High School	St. Croix Preparatory Academy
Lakeville North High	St. Paul Academy & Summit School
Mahtomedi Senior High	St. Thomas More Catholic School
Maranatha Christian Academy	Stillwater Middle School
	Wayzata High School

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