

WELCOME TO THE

85th Annual Twin Cities Regional Science Fair
31st Annual St. Paul Science Fair
29th Annual Western Suburbs Science Fair

Twin Cities Regional Science Fairs



**Now serving Ramsey, Hennepin, Washington, Dakota, Anoka,
Chisago, Isanti, Sherburne, and Wright Counties**

2023

March 3 – 5

Research Papers February 3-16



**Affiliated with the International Science & Engineering Fair and the
Minnesota Academy of Science Minnesota State Science & Engineering Fair**

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**WELCOME TO THE 85th ANNUAL TWIN CITIES REGIONAL SCIENCE FAIR,
THE 31st ANNUAL ST. PAUL REGIONAL SCIENCE FAIR,
THE 29th ANNUAL WESTERN SUBURBS REGIONAL SCIENCE FAIR.**

Our Host this year is the Minnesota State Fairgrounds – Warner Coliseum
Our host for our research competition is tcrsf.zfairs.com.

Students: YOUR NAME BADGE is required both Friday and Sunday.

All projects *must* have a **vertically displayed abstract** at their exhibit. All projects who required a **Form 1C** (for work done in any site other than home, school or field) and/or **Form 7** (for projects that are a continuation from a previous year) must post these vertically on the project exhibit. Save all your project forms after the fair. TCRSF will send project forms to state for those projects advancing to state, but you will still need a copy at your project exhibit during state. Alternates to state: you may be promoted to become a state presenter. Save your forms!

1. The show floor is divided into Middle School (MS, grades 6-8) and High School (HS, grades 9-12). Next projects are set up by category, then number. When you find your place, set up your project. If you ordered electricity, find your place in “Electricity Row.”
2. After your project is completely set up, self-check your display to make sure it meets all the requirements on the green Display & Safety checklist. If you need help, ask. This year, put the green Display & Safety page that you checked on your exhibit table top and WAIT. Our Display & Safety team members will walk up and down the aisles. Wait for them to check your display. If you have any videos or photos to show judges, please be ready to show them to the Display & Safety team. You will need to correct any violations before competition.
3. **There is no food or beverage allowed anywhere in the competition area.** A closed bottle of drinking water is the only exception. (Food may be eaten in the lobby area by the concessions food, or very carefully in the seats around the coliseum. Keep the building clean!) All trash must be thrown out!
4. **Wear your TCRSF name badge in a clearly visible place, BOTH Friday and Sunday. Do NOT forget. You need your badge for the awards program!**

TCRSF requires that ALL TEAM members of team projects must be present at judging on Friday night and that all ISEF winners must be at the Sunday Awards Ceremony (unless cleared by the fair director and the SRC chair). Winners of **sponsor’s awards must be present** at the Sunday Awards Ceremony to win, have their photo taken with their award and the sponsor. An alternate will become the winner if the student winner is not present.

All ISEF winners and all persons interested in traveling with the group to ISEF **MUST** attend the **Monday 6:00 p.m.** ISEF meeting. (This meeting is *only* for ISEF winners, ISEF alternates, & their teachers/mentors/and family members.) The location and time of this meeting will be confirmed with the ISEF winners immediately following the Awards Ceremony.

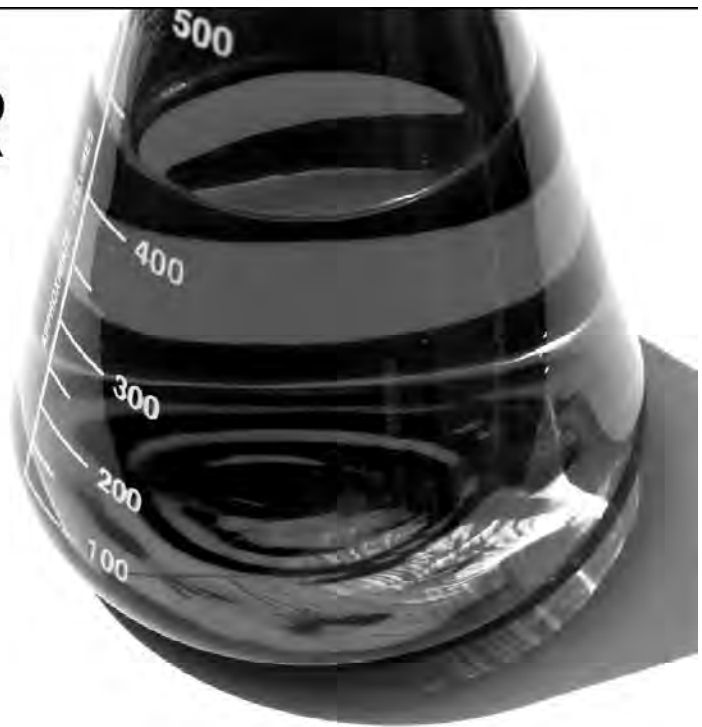
Green, Red, and Blue ribbon winners are all eligible to win special awards. Some special awards are specifically for certain fields of science or other criteria that are separate from the ribbon earned. All students: please listen carefully for your name during the awards program on Saturday. In order to shorten the awards program, the large groups of winners will be posted on a bulletin board Saturday morning in lieu of the students being all called up to the podium. The winners and alternates will receive instructions and/or a purple ribbon or a certificate in their project or paper envelope. **Alternates have an excellent chance of being advanced, so keep your boards and your paperwork ready! Many of those not advancing to state still win awards.**

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wishes all science fair students the best in
the competition! Remember us for your
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Volunteering to make a difference.

Project Competition Schedule:

Location Lee & Rose Warner Coliseum, Minnesota State Fairgrounds

Friday, March 3, 2023 – Students, Judges, Volunteers, Teachers

1:00-3:30 pm Student check-in & set up project exhibits; Clear Display & Safety;

4:00-9:00 pm Judging (grades 6-8 likely done by 8pm); **students stay at your exhibits for judges & our photographer's official photo** at your exhibit.

No parents, advisors, teachers, or other non-participants are to be in the exhibit area during judging times, 4:00 PM – close Friday.

Saturday, March 4, 2023 – No Students, No Judges; Volunteers only for awards prep.

Sunday, March 5, 2023 – Students, Parents, Teachers, Volunteers, General Public

9:00 am Doors open, students pick up ribbon envelopes for projects & research papers

11:00 am- 12:30pm Open to the Public

1:00 pm Awards program. Immediately following the Awards program, **PLEASE** help clean up. Throw all trash including plastic table covers. Exhibits **MUST** be removed.

If you are picking up awards for a student not present, please pick up their project and/or research paper envelope before the awards **AND** pick up other announced awards at the Awards Podium right **AFTER** the awards ceremony. **Remember to be sure their project exhibit is removed and returned to them.**

All ISEF winners must be at both the Sunday Awards Ceremony **AND** the Monday ISEF meeting to be eligible to be named finalist to travel to and compete in ISEF, or they will forfeit their finalist status to an alternate (unless cleared by the Fair Director and the SRC chair). Details will be handed out at the end of the awards program.

Our research paper competition is hosted on tcrsf.zfairs.com. This is open to students in grades 6-12. Research papers were judged from February 3-16. The high school winners (grades 9-12) advance to the North Central Regional Tri-State Symposium for Minnesota, North Dakota, and South Dakota. This year, the North Central Regional will enter the Virtual Regional JSHS. Winners from JSHS advance to the National JSHS (jshs.org).

What about the awards?

We have two kinds of judges.

1. **Ribbon Judges:** All projects will have judges that are scoring their project according to our scoring rubric which is available on our website (Judging Criteria). This is the same rubric as is used at international science fair.

2. **Special Awards Judges:** There are special awards judges who are selecting projects based on the criteria for the award. Any project may win a special award regardless of their ribbon score, if they happen to best match the award criteria. These special awards come from 3 areas:

- a. **Regional affiliated awards** from our affiliations with international
- b. **Sponsor awards** which are in honor of the annual financial donations that pay for 80% of the costs of running Twin Cities Regional Science Fairs (registration fees cover only about 17% of our annual budget). **Remember, we are an ALL-volunteer 501c3 educational nonprofit, so our sponsors are donating directly into the costs of this youth program!**
- c. **Awards from Individuals/Groups.** Some corporations, academic societies or other groups or individuals give special awards according to their own criteria.



DuPont Water Solutions congratulates your achievements in competing at the Twin Cities Regional Science Fair.

Water Solutions

We thank DuPont Water Solutions for their sponsorship of this event!

The quality and scarcity of freshwater has become a critical issue worldwide. More than one billion people lack access to safe drinking water today, and experts estimate that by 2025, five billion people will live in areas of significant water stress. While water conservation is one of the most cost-efficient answers, technology, in combination with sound management practices, can help effectively solve the world's worsening water crisis.

DuPont Water Solutions, a subsidiary of DuPont, is committed to advancing water treatment technologies and ensuring availability of clean water to those who need it-through advanced research and industry-leading application expertise.



Northrop Grumman is a long-time sponsor of STEM in the community and this Science Fair. The hands-on event is inspiring to not only the students, but those from our company who participate as volunteers and judges. We feel that by inspiring curiosity and interest today, we develop our future scientists, engineers and astronauts. Good Luck To All Our Participants – today and for the future.

Northrop Grumman's Plymouth facility has been a sponsor for 30+ years, dating back to the organizations roots as divisions of Honeywell, ATK and Orbital ATK.



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Explanation of this year's project numbers:

The first letter indicates which affiliation your school is in.

T = Twin Cities; S = St. Paul; W = Western Suburbs

P = all research papers in our 9 county area

Next is your division: HS or MS

HS =grades 9-12 and MS = grades 6-8

Next is a 4 letter abbreviation to your science category.

Last is a 3 digit number – assigned in order of registration.

Note: Research papers start with a P, then next is the division HS or MS, then research paper category, then 3 digit number.

Project Science Categories:

(ANIM)	Animal Sciences
(BEHA)	Behavioral and Social Sciences
(BCHM)	Biochemistry
(BMED)	Biomedical and Health Sciences
(ENBM)	Biomedical Engineering
(CELL)	Cellular and Molecular Biology
(CHEM)	Chemistry
(CBIO)	Computational Biology and Bioinformatics
(EAEV)	Earth and Environmental Sciences
(EBED)	Embedded Systems
(EGSD)	Energy: Sustainable Materials and Design
(ETSD)	Engineering Technology: Statics and Dynamics
(ENEV)	Environmental Engineering
(MATS)	Materials Science
(MATH)	Mathematics
(MCRO)	Microbiology
(PHYS)	Physics and Astronomy
(PLNT)	Plant Sciences
(ROBO)	Robotics and Intelligent Machines
(SOFT)	Systems Software
(TMED)	Translational Medical Science

What do the colored ribbons mean?

Congratulations in competing at the regional science fair! Great job! Both projects and research papers entered in TCRSF receive a Twin Cities regional ribbon based on a statistical analysis of the judges' scores.

All projects and papers will earn a **green ribbon, red ribbon, or a blue ribbon**. Each student in a team will receive their own ribbon.

Green ribbon: You competed at regions! Great job!!!

Red ribbon: This is like a second place. There are multiple second places.

Blue ribbon: This is a first place. There are multiple first places and these projects and research papers are in the top portion of the fair.

Purple ribbon: This signifies Advancement! The top of the blue ribbons to move on to state science fair or research paper competition. Congratulations!



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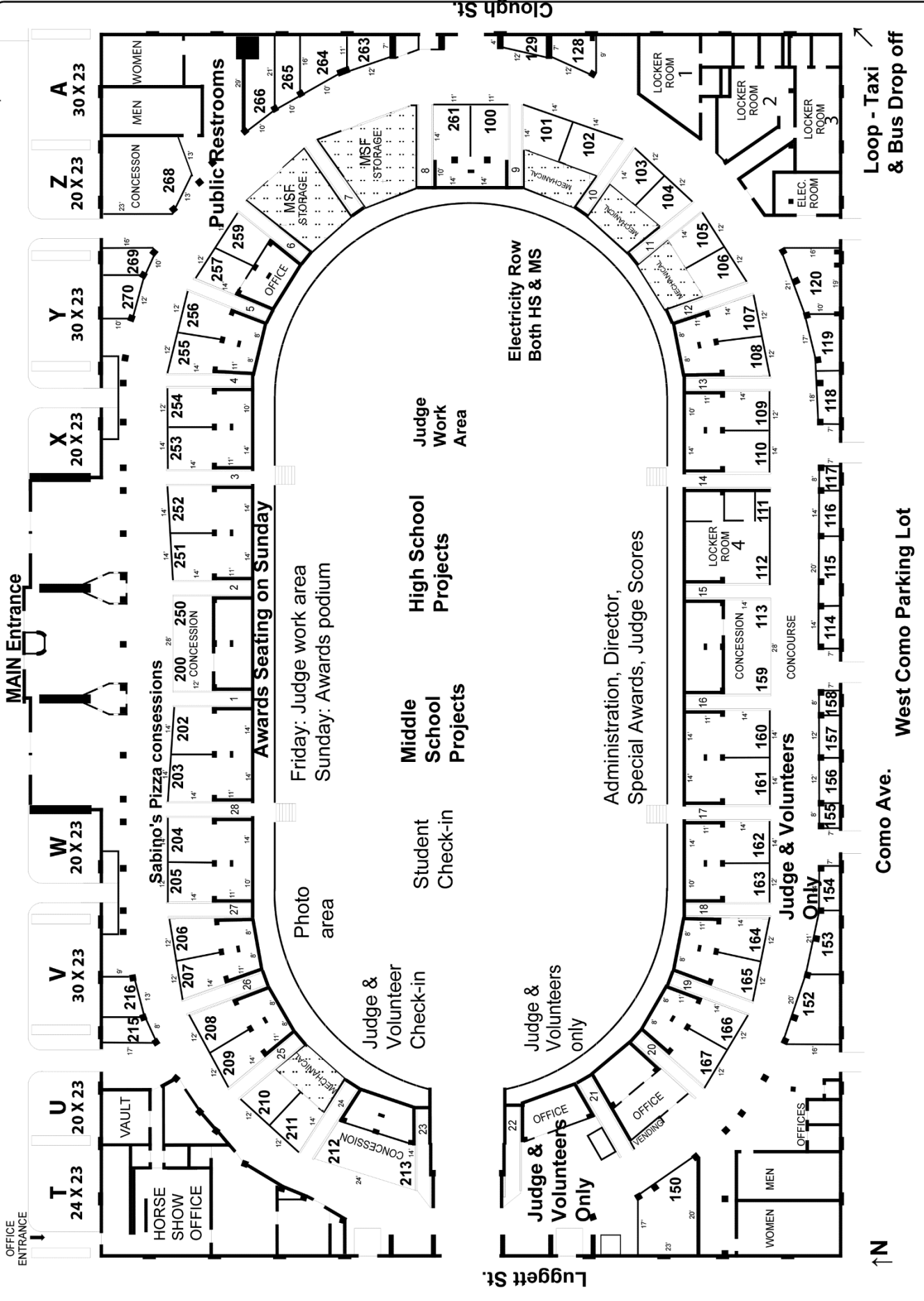
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Midway Parking Lot (Luggett & West Dan Patch)

Handicapped Parking on Judson across street Judson Ave.

N



Loop - Taxi & Bus Drop off

West Como Parking Lot

Como Ave.

N

Middle School

Animal Sciences (ANIM)

S-MS- **Michael Beckey**
ANIM- Grade 7 - Sneaky Squirrels
394

T-MS- **Lincoln Kampf**
ANIM- Grade 7 - The Nose Knows
410

Behavioral and Social Sciences (BEHA)

S-MS- **Julia Kappenman**
BEHA- Grade 8 - Does Testing on Computers vs Paper
211 Change Students' Test Scores

W-MS- **Tobias Oostendorp**
BEHA- Grade 6 - How Brain Development Affects
278 Creativity

W-MS- **Mia York**
BEHA- Grade 8 - Are Adults Smarter Than 5th Graders?
327

W-MS- **Nora Jaster, Kiera Hoven, Gracelyn Kersey-**
BEHA- **Schutta**
334 Grade 8,8,8 - **Team** - Science of Annoyance/ Song
Survey

W-MS- **Muntaz Mohamed, Hodan Hassan, Riyan**
BEHA- **Mohamed**
377 Grade 7,7,7 - **Team** - Can Peppermint Improve
Color Visual Reaction Times

T-MS- **Ayla Stock**
BEHA- Grade 7 - All Eyes On You
395

T-MS- **Yulian Montecinos Sanchez**
BEHA- Grade 7 - Don't Leave Me Behind!
400

T-MS- **Klara Rosell**
BEHA- Grade 7 - What Is The Stroop Effect?
402

T-MS- **Zoey Schaffhausen**
BEHA- Grade 7 - Does Smell Affect Taste?
406

T-MS- **Ethan Nguyen**
BEHA- Grade 7 - Does Color Affect Productivity?
407

T-MS- **Joshua Wolf**
BEHA- Grade 7 - Does Eating Different Food Affect
408 Reaction Time?

T-MS- **Vivian Elfering**
BEHA- Grade 7 - What Your Favorite Color Says About
409 YOU!

W-MS- **Zachary Goffin**
BEHA- Grade 8 - The effects of social media and students'
413 attention spans.

W-MS- **Frankie Scherer**
BEHA- Grade 6 - How Do Different Genres of Music
447 Affect Stress Levels

Biochemistry (BCHM)

W-MS- **John Trinacty**
BCHM- Grade 6 - The Benefits of Dairy and Non-Dairy Ice
321 Cream

W-MS- **Leo Stevens**
BCHM- Grade 6 - Build a Better Cookie
323

W-MS- **Carissa Manderfeld**
BCHM- Grade 6 - Does Cake Really Need Eggs
336

T-MS- **Jacob Bischof**
BCHM- Grade 7 - Five Second Rule: Does It Work?
436

Biomedical and Health Sciences (BMED)

S-MS- **Cecilia Junker**
BMED- Grade 8 - What is the Right Amount of Sunscreen
089 to Protect You from UV Rays

S-MS- **Will O'Shaughnessy**
BMED- Grade 8 - Can People Taste the Difference Between
140 Artificial Meat and Real Meat?

S-MS- **Lily O'Brien**
BMED- Grade 8 - How the Type of Flour Affects the
142 Quality of a Cupcake

W-MS- **Isha Secka**
BMED- Grade 7 - How Does the Cleaning Liquid Impact
249 the Surface Area of Glo-Germ

W-MS- **Joey Thompson**
BMED- Grade 6 - The Beat of my Heart
326

W-MS- **Ethan Hoekman**
BMED- Grade 7 - Electrolytes: The Shocking Truth
333

T-MS- **Rosa Martin**
BMED- Grade 7 - Does Exercise Affect Blood Glucose
405 Levels?

Cellular and Molecular Biology (CELL)

W-MS- **Mawata Komara**
CELL- Grade 8 - Look into the Life of a Strawberry DNA
184

T-MS- **Riddhi Singhvi**
CELL- Grade 8 - CRISPR-ing Up the Genes: A Tale of
239 Two Experiments

Chemistry (CHEM)

- S-MS- **Brady Kane**
CHEM- Grade 8 - How do Different Cooking Methods
043 Affect the Calorie Count in Food
- W-MS- **Kylie Darlene Fru-Mambo**
CHEM- Grade 8 - how does different types of flour impact
144 the density of a cookie
- W-MS- **Odessa Kruah**
CHEM- Grade 8 - Baking Towers
145
- W-MS- **Carlee Shenkle**
CHEM- Grade 8 - Sugar Vs Sugar: Which is More Dense?
146
- W-MS- **Leah Benoit**
CHEM- Grade 7 - Butter's Role in the Science of Baking:
147 Amount of Butter and Height of a Brownie
- W-MS- **Hafsa Hilowle**
CHEM- Grade 7 - Bombs Away: Citric Acid and Reaction
158 Time
- W-MS- **Sadie Beachem, Amelia Severson**
CHEM- Grade 7,7 - **Team** - Spherification: Sodium
161 Alginate, Liquid Type and Time
- W-MS- **Tenley Fransen**
CHEM- Grade 7 - The Impact of Salt on Apples
174
- S-MS- **Ellie Nelson**
CHEM- Grade 8 - Which Storage Method Keeps Fruit Fresh
175 for the Longest Period of Time?
- W-MS- **Edwin Lam**
CHEM- Grade 8 - Super Solubility
176
- W-MS- **Connor Danielson**
CHEM- Grade 8 - Water: Making it Clean
180
- W-MS- **Lyla Wilson**
CHEM- Grade 8 - The Strength of Spaghetti Noodles
183
- W-MS- **Teagan Zins**
CHEM- Grade 7 - parting with pancakes
185
- W-MS- **Annabel Edson**
CHEM- Grade 7 - Frizz Forecast: How Humidity Impacts
186 Hair
- W-MS- **Makena Mbuba**
CHEM- Grade 8 - Bubble Trouble 2.0: How Glycerin
187 affects the height, strength, and speed it takes foam
to rise.

- W-MS- **Kallie DoBrava**
CHEM- Grade 8 - Chips of fire
188
- W-MS- **Aliyah Abdulle**
CHEM- Grade 8 - sour power
195
- W-MS- **Milkahlyne Muriithi**
CHEM- Grade 8 - pH Madness- 'How do different makers
196 impact the pH level of water?'
- W-MS- **Annika Schultz**
CHEM- Grade 8 - Flour Power
252
- W-MS- **Noor Alaoua**
CHEM- Grade 8 - Counting Calories
311
- T-MS- **Jocelyn Guasco**
CHEM- Grade 7 - Does Different Liquids Affect the
401 Sublimation of Dry Ice
- W-MS- **Alice Bender**
CHEM- Grade 6 - Which Sports Drink is the Most
431 Hydrating
- W-MS- **James Griffiths**
CHEM- Grade 6 - The Conductivity of Common Drinks
434

Earth and Environmental Sciences (EAEV)

- S-MS- **Olivia Senger**
EAEV- Grade 8 - How Does Climate Change Affect Plant
044 Growth?
- S-MS- **Lucy Brondum**
EAEV- Grade 8 - Does Talking to Plants Affect Their
045 Growth
- W-MS- **Milkanna Ondicho**
EAEV- Grade 8 - How does the type of water affect plant
149 growth
- W-MS- **Mardhav Shriram**
EAEV- Grade 8 - pHenomenal Filtering: How Different
178 Grades of Sand Impact Potability of Water
- W-MS- **Alexander Ebert**
EAEV- Grade 8 - Cold Crystals: How Does Environmental
205 Temperature Affect Crystal Growth
- W-MS- **Molly Wesolowski**
EAEV- Grade 8 - Bottled Erosion - Landscaping Materials
217 Impacting Soil Erosion
- W-MS- **Avery Mros**
EAEV- Grade 8 - How Does Fertilizer Impact Natural
251 Waters?

W-MS- **Batoul Taha**
EAEV- Grade 7 - What is the Effect of Outdoor Air
282 Pollution (Fall and Winter) on Air Quality in
Different Outdoor Locations (Forest, Train Station,
Neighborhood)?

W-MS- **Andon Vande Glind**
EAEV- Grade 7 - Salty Scuds are Duds
343

W-MS- **Isabelle Wegener**
EAEV- Grade 8 - The Impact of Climate Change on Brine
414 Shrimp

Engineering Technology: Statics and Dynamics (ETSD)

S-MS- **Iain Rolfes**
ETSD- Grade 8 - Which Bridge Design is the Strongest:
048 Truss, Suspension, or Beam

S-MS- **Olin Rahn**
ETSD- Grade 8 - Is an Active Wing Better for Braking
126 than a Normal Wing?

S-MS- **Michael Kern**
ETSD- Grade 8 - How Does the Aerofoil Shape of a Wing
141 Affect the Amount of Lift In An Aircraft?

W-MS- **Makena Steinke**
ETSD- Grade 8 - Just keep rolling
148

W-MS- **Logan Samek**
ETSD- Grade 8 - The Great Graphics Settings Experiment
150

W-MS- **Oluwademilade Aroloye**
ETSD- Grade 8 - EARTHQUAKE
193

W-MS- **Travis Coudron**
ETSD- Grade 7 - Strongest Bridge Designs
214

W-MS- **Sam Kessler**
ETSD- Grade 7 - 3D Printing Power Wheel Sizes and
246 Velocity

W-MS- **Logan Ford**
ETSD- Grade 7 - Electric Cars...Minnesota Winters
256

W-MS- **Eeshal Syed**
ETSD- Grade 8 - Friction's Factors
296

T-MS- **Mercy Baur**
ETSD- Grade 8 - The Night Slipper
370

T-MS- **Olive Grantham**
ETSD- Grade 8 - Yoke Note
375

W-MS- **Zachary Larson**
ETSD- Grade 6 - The ONLY way to Win a Snowball Fight
430

Environmental Engineering (ENEV)

W-MS- **Shagun Shrivastava**
ENEV- Grade 7 - 100% Biodegradable Plastic. Is it True !!!
112 (Year 3)
Project At Electricity Wall

W-MS- **Amina Zahid**
ENEV- Grade 8 - Unlimited Energy
293

W-MS- **Emaan Moheet**
ENEV- Grade 7 - Developing and Testing a Low-Cost
298 Hydraulic Flood Barrier to Protect Rural
Communities

W-MS- **Sophie Abbey**
ENEV- Grade 8 - The Importance of Water Purity
335

W-MS- **Patrick Grosser**
ENEV- Grade 7 - Swirling Out Trash: What Hydrodynamic
355 Separator Design Filters Out the Most Pollutants?

Materials Science (MATS)

S-MS- **Cora Moore**
MATS- Grade 8 - How the Type of Arrow Affects How Far
047 it Shoots

W-MS- **Jackson Carlson**
MATS- Grade 8 - Toilet Paper Durability
194

W-MS- **Nathan Rahn**
MATS- Grade 8 - The Bounce Factor
248

T-MS- **Adam Liesch**
MATS- Grade 7 - Can Your Plane Fly Under Radar?
404

W-MS- **Nicolas Trujillo**
MATS- Grade 6 - How to Finally Descale your Dishes
432

W-MS- **Kaitlyn Mulle**
MATS- Grade 6 - The Battle of the Sandwich Bags
433

W-MS- **Sadie Hall**
MATS- Grade 7 - Keeping The Cool-The Effect That
448 Insulation Plays In Keeping Water Cold

Mathematics (MATH)

T-MS- **Aniket Yeleswarapu**
MATH- Grade 7 - Unavoidable Induced Subgraphs of Large
238 Rooted Trees

Microbiology (MCRO)

S-MS- **Addy Larson**
MCRO- Grade 8 - Does the Classroom Affect How Dirty
046 your Hands Are?

W-MS- **Olivia Byers**
MCRO- Grade 7 - The Sweet Side of Fermentation
379

T-MS- **Payton Nguyen**
MCRO- Grade 7 - Hidden Dangers
403

Physics and Astronomy (PHYS)

W-MS- **Cale Stanley-Wornson**
PHYS- Grade 8 - Fishing Line Strength
143

W-MS- **Shaina Lowe**
PHYS- Grade 8 - J.W.S.T. Sunshield
151

W-MS- **Siri Westberg**
PHYS- Grade 7 - Does Money Buy Distance?
181

W-MS- **Emma Bacigalupo**
PHYS- Grade 7 - Batter Up
182

W-MS- **Celten Johnson**
PHYS- Grade 7 - The gasses supasses
189

W-MS- **Calvin Petersen, Solomon Mang Sian Sang**
PHYS- Grade 7,7 - **Team** - Ball drop
190

W-MS- **Logan Hovanetz**
PHYS- Grade 7 - Ramping Up Speed
426

T-MS- **Miles Ervasti**
PHYS- Grade 7 - Does Vehicle Suspension Perform better
435 with more or less Weight added to the Vehicle?

W-MS- **Vedant Chetan**
PHYS- Grade 6 - Magnets: How Strong are They?
439

Plant Sciences (PLNT)

W-MS- **Sophia Minakova**
PLNT- Grade 8 - Growing Seeds in Microgravity
242

W-MS- **Fahtima Komara**
PLNT- Grade 7 - What the Plant: Water Amount and
247 Height

T-MS- **Ethan Finch**
PLNT- Grade 8 - Analyzing the Influence of Weather on
328 the Sap Production of Maple Trees to Create a Sap
Volume Prediction Algorithm

W-MS- **Kaelyn Stel**
PLNT- Grade 7 - To grow or not to grow: The effect of
342 different fertilizers on plant growth

W-MS- **Evan Koelewyn**
PLNT- Grade 7 - Aquaponics
415

W-MS- **Ellie Morris**
PLNT- Grade 6 - How Wind Speed Influences the Growth
416 of Plants

W-MS- **Kaia Mayes**
PLNT- Grade 6 - What Substances Make Cut Flowers Last
441 Longest?

W-MS- **Claire Carlson**
PLNT- Grade 6 - How do Plants Behave when Presented
450 with Different Wavelengths of Light?
Project At Electricity Wall

Robotics and Intelligent Machines (ROBO)

W-MS- **William Spaulding**
ROBO- Grade 7 - Smart Watering System
451 **Project At Electricity Wall**

High School

Animal Sciences (ANIM)

W-HS- **Chloe Chu**
ANIM- Grade 12 - Lighting the Way to Healthy Snakes:
008 The Effect of Artificial UVB Light on Vitamin D
Levels in Boa imperators

T-HS- **Norah Dillner, Linnaea Dillner**
ANIM- Grade 12,12 - **Team** - Atta and Acromyrmex Waste
324 Deters Tropical Agricultural Pests

W-HS- **Prathul Rao**
ANIM- Grade 12 - The Interactions between Freshwater
337 Rotifers and Cyanobacteria and its Repercussions
on the Evolution of Minnesota Wildlife

T-HS- **Nadia Wang**
ANIM- Grade 12 - Don't Be Coy, Decoy!: Determining the
353 minimal length needed for a non-neutralizing
antibody to bind to a 'decoy' epitope on the GP5
protein of PRRSV
Project At Electricity Wall

T-HS- **Shreya Sekar**
ANIM- Grade 9 - Beeping Blanding's! Using
421 radiotelemetry data and ArcGIS to correlate turtle
sightings with habitat features to focus conservation
and protection efforts

S-HS- **Ella Ehlers**
ANIM- Grade 9 - Endangered
452

Behavioral and Social Sciences (BEHA)

W-HS- **Noah DeMichaelis**
BEHA- Grade 11 - Music and the Mind: the Intersection of
009 Reading Readiness and Musical Proficiency

W-HS- **Sydney McDaniel**
BEHA- Grade 12 - Pregnancy, Policing, and Unequal
012 Policies: A cross-sectional analysis of police
contact and adverse birth outcomes in US-born
Black, White, and Foreign-born Black women

W-HS- **Ava Jaffe, Romy Peterson**
BEHA- Grade 12,12 - **Team** - Face Your Fears: Creating a
020 system to study how mice overcome their fears

W-HS- **Julia Srnec**
BEHA- Grade 12 - How speaking gendered languages
032 impacts comprehension, application, and
acceptance of gender-fair language

W-HS- **Shreya Ramraj**
BEHA- Grade 12 - How does divorce affect sleep patterns
049 in young adults?

S-HS- **Cassandra Zirps**
BEHA- Grade 12 - The Effects of Education on Perception
052 of Advertising

T-HS- **Sam Bergh**
BEHA- Grade 10 - Rainbow Classroom
090

S-HS- **Rita Li**
BEHA- Grade 11 - The effects of music lyrics on memory
138

W-HS- **Caleb Li, Selena Qiao**
BEHA- Grade 9,9 - **Team** - Grogginess Begone: A Study of
212 the Effects of Alarm Sounds on Sleep Inertia

W-HS- **Jack Hickey**
BEHA- Grade 12 - Measuring the Effect of Physical
222 Exercise and Working Memory Tasks on Statistical
Learning in Adolescents

W-HS- **Kareena Israni**
BEHA- Grade 11 - Bringing meaning to numbers:
237 Randomized controlled trials that inform candidates
about which centers transplant patients like them.
Project At Electricity Wall

T-HS- **Alec Erickson**
BEHA- Grade 10 - How Does the Perception of Time
264 Change with Age?

T-HS- **Amran Hussein**
BEHA- Grade 10 - How Do Different Scents Affect
267 Peoples' Ability to Learn?

W-HS- **Alexander Bartholomew**
BEHA- Grade 11 - Effects of Visual Conditioning on
270 Exercise Performance and Perception

W-HS- **Daniel Untiedt**
BEHA- Grade 11 - Title of Project: What's So Funny? -
273 Analyzing General Trends In Humor Preference
Across Ages, Genders, and Political Spectrum

W-HS- **Ayeza Moheet**
BEHA- Grade 9 - Can subliminal messaging be used to
294 influence the decisions and choices of middle and
high school students?

W-HS- **Austin Wang**
BEHA- Grade 12 - Behavioral Determinants of COVID-19
307 Vaccine Hesitancy

Biochemistry (BCHM)

S-HS- **Yash Kshirsagar**
BCHM- Grade 12 - The Effect of Varying Concentrations of
050 Titanium dioxide on the Movement of
Caenorhabditis elegans

S-HS- **Calvin He**
BCHM- Grade 12 - An Analysis of Saxophone Pad
092 Degradation and Quality After Exposure to Human
Saliva

W-HS- **Noah Khemakhem**
BCHM- Grade 11 - The effect of pH on the ability of P.
250 porifera to filter nickel from seawater

W-HS- **Gautam Venkatesh**
BCHM- Grade 11 - Development of an organic treatment to
330 inhibit the secretion of isothiocyanates by A.
Petiolata (garlic mustard)

T-HS- **Julia Harms**
BCHM- Grade 12 - Unraveling Alzheimer's: An
341 Investigation into Potential Inhibition of
Alzheimer's Tau Aggregation by Cinnamaldehyde

W-HS- **Halie Kaufmann**
BCHM- Grade 9 - Decomposition
382

W-HS- **Varun V. Viswanathan**
BCHM- Grade 12 - Making paneer faster; will enzymes
392 reduce the time?

Biomedical and Health Sciences (BMED)

W-HS- **Ivy Miller, Corinne Moran**
BMED- Grade 11,11 - **Team** - Deciphering DUX4: Is
016 transient expression of DUX4 sufficient to cause
muscular dystrophy?

W-HS- **Kendall White**
BMED- Grade 12 - The Perfect Solution: Optimizing an
025 enzyme-linked immunosorbent assay to determine
antibody concentrations in glioblastoma patients

- W-HS- **Saloni Somia**
BMED- Grade 12 - The Effect of Calcium Signaling on
100 Cell-Cell Fusion
- W-HS- **Carly Pfeffer**
BMED- Grade 12 - The impact of myoelectric stimulation
105 on ability for peroneal muscle to resist simulated
ankle sprain motion
- W-HS- **Kate Feist**
BMED- Grade 12 - The influence of CCN5 on the
164 proliferation of MCF-7 cells
- W-HS- **Darren Ma**
BMED- Grade 12 - Effect of soccer cleat design on ground
169 resistance forces during movements in soccer
- W-HS- **Aleen Jude**
BMED- Grade 12 - Patient experiences with mental health
235 care quality and mental health stigma in the U.S.
- T-HS- **Ashley Olea Lopez**
BMED- Grade 11 - Measuring Calories in Snack Foods
255
- T-HS- **Ajmal Abdirahman**
BMED- Grade 10 - Drug Solubility
263
- W-HS- **Sahwa Ibrahim**
BMED- Grade 9 - Calorie Exertion Accuracy in Males and
306 Females
- W-HS- **Fahima Rashid**
BMED- Grade 9 - The effect of potassium, magnesium and
317 calcium on heart rate
- T-HS- **Ella O'Hanlon**
BMED- Grade 10 - Salty Germs
329
- T-HS- **Lillie Hanto**
BMED- Grade 10 - The effectiveness of different kinds of
331 antibiotics in killing bacteria
- W-HS- **Jack Frame**
BMED- Grade 12 - The Effects of Senescent Cell Clearance
412 on Age Related Cognitive Inhibition in L. Stagnalis
(Great Pond Snail)

Biomedical Engineering (ENBM)

- W-HS- **Lukas Murdych**
ENBM- Grade 11 - Study of the effects of various classical
132 guitar supports on muscular tension
- T-HS- **Karen Nakamura**
ENBM- Grade 12 - Personalization of Deep Brain
397 Stimulation Surgery Pre-Operational Planning:
Integration of 7-Tesla MRI Segmentations into 3-D
Brain Visualization Platform
Project At Electricity Wall

Cellular and Molecular Biology (CELL)

- W-HS- **William McNally, Samuel Bae**
CELL- Grade 11,11 - **Team** - The Pleiotrophin Puzzle:
004 Investigating the expression of pleiotrophin in post-
injury adult cardiac mouse hearts
- S-HS- **Henry Choi**
CELL- Grade 11 - The Effect of Gefitinib on Cell
038 Proliferation and Invasion in 2D and 3D Cultures of
MDA-MB-231 Cells
- W-HS- **Lauren Fligge**
CELL- Grade 12 - Effect of NRG1 protein on EMT in
131 MCF-7 breast cancer cells
- W-HS- **Annie Zhao**
CELL- Grade 12 - The effects of unnatural light conditions
157 on serotonin and octopamine levels in Drosophila
melanogaster
- W-HS- **Katriana Trinh**
CELL- Grade 12 - Utilizing various transcription factors to
168 reprogram a fibroblast cell into a neural cell
- W-HS- **Lydia Kahsay**
CELL- Grade 12 - Examining the Effect of the Interleukin
219 10 Cytokine on Induced Inflammation Markers
within the A549 Lung Adenocarcinoma and MCF-7
Breast Cancer Cell Lines
- W-HS- **Samuel Thibodeau**
CELL- Grade 12 - Inhibitory effects of curcumin on HEK
312 cell growth
- W-HS- **Arreh Jain**
CELL- Grade 12 - Neurological Nuances: Quantifying and
347 measuring the length and spacing of arterioles in
the visual cortex using scans from two-photon
imaging in vivo
- W-HS- **Steven Yang**
CELL- Grade 12 - Preposterous Proteoglycans! Defining
422 the Role of CSPG4 in Pancreatic Cell Invasion and
Spheroid Formation to Achieve Effective
Immunotherapy Treatments

Chemistry (CHEM)

- S-HS- **Maryeva Gonzalez**
CHEM- Grade 12 - Effect of Temperature on the Accuracy
037 of Caffeine Extraction
- S-HS- **Aaron Lindeman**
CHEM- Grade 12 - A Environmentally friendly dry-erase
053 marker composition
- W-HS- **Nola Willenzik**
CHEM- Grade 12 - Examination of gamma frequency
098 entrainment in reducing the prevalence of amyloid
plaques in the sensory cortices of the brain
- W-HS- **April Wang**
CHEM- Grade 12 - A paper-based colorimetric biosensor to
099 detect ciprofloxacin in water

S-HS- **Julia Colbert**
CHEM- Grade 12 - Teeth Cleaning Chewing Gum
109

W-HS- **Erik DuBoulay**
CHEM- Grade 12 - The Maillard Reaction in steaks seared
245 with different lipids

W-HS- **Gwendolynn Halsey**
CHEM- Grade 9 - Natural Preservatives
419

W-HS- **Dureti Petros**
CHEM- Grade 9 - The Effect of Volume on the Pressure of
440 a Gas

Computational Biology and Bioinformatics (CBIO)

W-HS- **Luke Rowen**
CBIO- Grade 12 - How does fluid flow effect the evolution
159 of the skeletal structure of Chondrocaldia Lyra

W-HS- **Emily McNeil**
CBIO- Grade 12 - Evaluating the extent to which ML
172 could be a viable option in ASD diagnosis.

W-HS- **Calais Michaelsson**
CBIO- Grade 12 - Using DeepPurpose AI to repurpose
231 existing drugs for treatment of Alzheimer's disease

W-HS- **Chloe McLaren**
CBIO- Grade 12 - Using GIS to Map Aquatic Abiotic
364 Indicators for Lake Sturgeon in Minnesota

W-HS- **Chetan Boddeti**
CBIO- Grade 12 - The clash between researchers:
373 Conquering the interactions of the cell within a
database to facilitate research collaboration and
scientific advancement

Earth and Environmental Sciences (EAEV)

W-HS- **Mina Adabag**
EAEV- Grade 12 - Lead's Butterfly Effect: Determining the
019 impact of Lead Pollution on Danaus plexippus and
Pieris rapae

W-HS- **Sarah Peterson**
EAEV- Grade 12 - Protecting Plants: Investigating the
026 relationship between fertilizers and insect damage
in an urban garden

S-HS- **William Richardson**
EAEV- Grade 11 - Studying the Impact of Microplastics on
039 Quinoa Growth

W-HS- **Sam Louwagie**
EAEV- Grade 12 - The effect of barley extract on the
135 growth rate of various algae species in eutrophic
water

W-HS- **Abby Endres, Vivian Kinney**
EAEV- Grade 10,10 - **Team** - Seeking Super Salts:
261 Comparing the effectiveness and impact on aquatic
plant health of four road salt formulations.

W-HS- **Adeenah Fahim**
EAEV- Grade 9 - Influence of household nutrient waters in
275 comparison to tap water on the growth and
development of plants.

W-HS- **Swati Menon**
EAEV- Grade 10 - Maniple Water Vs. Well Water
284 Contamination in Snow

T-HS- **Samuel Oelschlaeger, Dehlia Woltman,**
EAEV- **Elizabeth Grove**
358 Grade 11,12,12 - **Team** - The Effects of Road-Salt
Contaminated Water on Plant Growth

W-HS- **Maryam Syeda, Fatima Syeda**
EAEV- Grade 9,9 - **Team** - Zebra Mussel Repellent
361

W-HS- **Sanjana Kollipara**
EAEV- Grade 9 - Turn Around, Don't Drown! Evaluating
386 deviations from the median in historical climate
data and comparing the emergency response and
mitigation plans of Hennepin and St. Louis
Counties

W-HS- **Isabela Snow**
EAEV- Grade 12 - The Effects of Atrazine on Aquatic
398 Environments and the Functionality of Filters to
Reduce Effects

W-HS- **Adithi Rupireddy**
EAEV- Grade 11 - Mimicking Mother Nature: Evaluating
420 fire frequency and applying prescribed burn
techniques to support landscape health,
biodiversity, and succession
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T-HS- **Lynne Hu**
EAEV- Grade 9 - A Comparison of Thymus Vulgaris and
445 Origanum Vulgare in the Adsorption of NO₂ and
NO₃ in Aquaponics Systems

Embedded Systems (EBED)

S-HS- **Rishi Bhargava, Humza Murad**
EBED- Grade 11,11 - **Team** - Project WASP: Watering
030 Atmospheric Self-Irrigating Planters
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W-HS- **Shreshth Shrivastava**
EBED- Grade 11 - Wi-C.A.R.E: Wifi Computer-Assisted
111 Remote Eldercare (Year IV)
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Energy: Sustainable Materials and Design (EGSD)

T-HS- **Sarah Zamudio**
EGSD- Grade 10 - Making Natural Gas from Compost
269

S-HS- **Maggie Banks**
EGSD- Grade 11 - Wood-n't It Be Nice: Toward a
325 Continuous Piezoelectric Charge Pump

W-HS- **Yash Dagade**
EGSD- Grade 11 - WATT from VAWT : Design of A
424 Novel Vertical Airborne Wind Turbine (VAWT)
Clean Energy Farm
Project At Electricity Wall

Engineering Technology: Statics and Dynamics (ETSD)

W-HS- **Noah Getnick**
ETSD- Grade 11 - Following the Flow: Expanding the
021 Capabilities of a 2D Fluid Simulation to Study
Biomimetic Bodies
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W-HS- **Trisha Samba, Amira Sinclair**
ETSD- Grade 12,12 - **Team** - Your Training H.I.R.O.:
028 Developing a "Haptic Interface for Real-time
Optimization" of Out-of-water Swimming Form

W-HS- **Lily Salyards**
ETSD- Grade 12 - Aerodynamic optimization of proposing
127 and ground-force in Formula 1 vehicles

W-HS- **John Armstrong**
ETSD- Grade 11 - Design of an unmanned aerial delivery
171 system

W-HS- **Muminah Nihaar Mohammed**
ETSD- Grade 11 - Unbind the Blind
350

Environmental Engineering (ENEV)

W-HS- **Deepti Pillai**
ENEV- Grade 11 - Activated carbon filtration system for
134 PFAs contaminated water

W-HS- **Ana Stewart**
ENEV- Grade 12 - The Application of Mushroom
220 Mycelium as a Biomaterial and Leather Alternative

W-HS- **Jasmine Goldsmith**
ENEV- Grade 11 - A comparison of bamboo, conifers, and
253 cacti species' efficiency at removing contamination
from water similar to that of SouthEast Asia

W-HS- **Anika Lang**
ENEV- Grade 12 - Valorization of winery wastewater to
254 grow Chlorella vulgaris

T-HS- **Maddie Olsen**
ENEV- Grade 11 - Effect of Background Color on Solar
272 Panel Productivity

T-HS- **John Liu**
ENEV- Grade 9 - Green Electronics: A Prospective Proof-
280 of-Concept Study

W-HS- **Khadija Kouser**
ENEV- Grade 10 - Designing & Testing a Solar-Powered,
289 Eutrophication-prevention (SPEP) Robot for
Stagnant Waters

W-HS- **Kevin Armstrong II**
ENEV- Grade 11 - Image Recognition for Recycling
348 Assistance using Xcode

T-HS- **Grant Pilgrim**
ENEV- Grade 10 - CO2 to O2
368

W-HS- **Kaylee Dean**
ENEV- Grade 9 - Range Of Projectiles
425

Materials Science (MATS)

W-HS- **Julia Vladimirov**
MATS- Grade 12 - Testing the toxicity of a composite
096 cassava starch/chitosan/PALF/ZnO bioplastic

W-HS- **Carmen McLaren**
MATS- Grade 12 - Earthen construction: creation of an
133 earthen dual-wall system as a high-performing
alternative to a conventional wall

W-HS- **William Zhong**
MATS- Grade 11 - Incorporation of Varying Amounts of
166 Cellulose Nanofibers Extracted from Banana Peels
in Bioplastic Films

W-HS- **Noah Measells**
MATS- Grade 11 - Development of dual material glove
230 protectors for skiing and snowboarding

W-HS- **Ziyi Qian**
MATS- Grade 12 - The role of water hydration states in a
423 bacteria derived biopolymer (EPS)/nanoclay
hydrogel

W-HS- **Ericka Miller**
MATS- Grade 9 - Blood Spatter Analysis
453

Mathematics (MATH)

W-HS- **Andrew Zhang**
MATH- Grade 12 - Extremal values for the Steiner k-
286 distance and the Steiner k-Wiener index

W-HS- **Keira Follette**
MATH- Grade 9 - Arc of Lens
366

Microbiology (MCRO)

W-HS- **Dureti Gamada**
MCRO- Grade 12 - Fungi vs. Bacteria: Using Beneficial
013 Microbes Naturally Recruited by Corn Crops to
Combat Corn Fungal Pathogens

- W-HS- **Ethan Chen**
MCRO- Grade 12 - Effects of natural remedies on
101 Escherichia coli growth as indicator of potential to
treat allergic rhinitis
- S-HS- **Aryun Nemani**
MCRO- Grade 12 - The Effect of Varying Solute
103 Concentrations on Quorum Sensing and
Bioluminescence within Vibrio fischeri
- W-HS- **Isaac Jasper**
MCRO- Grade 11 - The effects polyethylene terephthalate
165 exposure has on Lactobacillus rhamnosus
- W-HS- **Shelby Molina Larson**
MCRO- Grade 12 - The Quantification and Persistence of
177 Fusarium moniliforme on Maize Kernels Stored
with the Intent of Producing Ethanol and its
Potential Relationship with Increasing Cancer Rates
in Minnesota
- T-HS- **Camila Cabrera Zhagnay, Jordan Flores Lara,**
MCRO- **Juan Castillo**
232 Grade 10,11,10 - **Team** - Effect of Soaps on E. Coli
- W-HS- **Ellie Keenan**
MCRO- Grade 12 - Effects of fluoxetine on the Enhanced
310 Slowing Response in Caenorhabditis elegans
Mutant Strains ser-7 and mod-1
- W-HS- **Andrew Moline**
MCRO- Grade 9 - Mastering Microbes: Exploring the Effect
315 of Temperature on Yeast Metabolism
- W-HS- **Samantha McCorkle**
MCRO- Grade 9 - What Kind Of Soap Kills The Most
380 Bacteria
- T-HS- **Griffin Anderson**
MCRO- Grade 11 - Identification of Trends in Oil-Instigated
429 Bacterial Growth

Physics and Astronomy (PHYS)

- W-HS- **Jada Chen**
PHYS- Grade 9 - A Series of Time: How does Sidereal
316 Time Change over the Course of a Year?
- W-HS- **Aman Goud**
PHYS- Grade 9 - Sneaky Particle! true yield measurement
444 of a Dark Matter particle without compromises

Plant Sciences (PLNT)

- W-HS- **Finn Emerson**
PLNT- Grade 10 - Alternatives to Herbicide Treatment of
031 Invasive Buckthorn
- W-HS- **Quinn Hughes, Tyler Clair**
PLNT- Grade 10,10 - **Team** - Using Monte Carlo
056 Simulation to Optimize Vitamin C Production in
Lactuca sativa by Varying Light Intensity and
Wavelength, Year II

- S-HS- **Gabriel Bangoura**
PLNT- Grade 12 - Effect of Electricity and Oxidation on
058 Plant Growth

- S-HS- **Becca Richman**
PLNT- Grade 12 - The Impact of Light Color on
123 Variegation Quantity of Eriopremnum Aureum

- W-HS- **Amanda Rolseth**
PLNT- Grade 12 - Silencing the Phloem Modulator Gene
129 in Chia Plants via Lipofectamine RNAiMAX
Reagent

- W-HS- **Mia Copeland**
PLNT- Grade 12 - Flavonoid Production in White Dutch
156 Clover in Relation to Temperature

- W-HS- **Jordi Malaret**
PLNT- Grade 12 - Resistance to abiotic stress due to
170 overexpression of SUPA gene in Arabidopsis
thaliana

- W-HS- **Aisha Abdulwali**
PLNT- Grade 12 - Effect of UVB irradiation on the vitamin
304 D concentration in Lolium Perenne and Lentinula
Edodes

- W-HS- **Jack Zellmer**
PLNT- Grade 9 - Magnesiums Effect on Germination
318

- W-HS- **Harini Senthilkumar**
PLNT- Grade 12 - Belching Cows: Reducing enteric
388 Methane production by cattle through medicinal
(bioactive) plant feed
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- T-HS- **Sriram Sureshkumar**
PLNT- Grade 10 - Impact of Biochar as soil amendment in
454 increased produce yield (Year 1)

Robotics and Intelligent Machines (ROBO)

- W-HS- **Meiling Mathur**
ROBO- Grade 12 - Machine learning for detecting warning
130 signs of carpal tunnel syndrome in violinists

- W-HS- **Valerie Nelson**
ROBO- Grade 11 - Spectroscopy and Machine Learning for
137 the Prediction of Impurities in Recycled Plastics

- W-HS- **Krish Inba Rajashankar**
ROBO- Grade 12 - A machine learning based identification
179 and analysis of early call terminations in contact
centers

- W-HS- **Parker Hitchcock**
ROBO- Grade 12 - Analyzing AI Algorithms in Splendor
266 Gameplay

- W-HS- **Jack Allenburg**
ROBO- Grade 12 - A Predictive Machine Learning Model
303 to Assess Horse Betting Profitability

W-HS- **Bryce Alexander**
ROBO- Grade 12 - Radio frequencies as alternate data
309 transmission technology for vehicle to vehicle
communication

W-HS- **Christopher Belhouse**
ROBO- Grade 12 - Creating and demonstrating simple and
313 reliable autonomous flight using a small, radio-
controlled aircraft prototypes

Systems Software (SOFT)

W-HS- **Brady Schlapkohl**
SOFT- Grade 12 - Correlation between cryptocurrency
104 prices and social media

W-HS- **Antonis Pappas**
SOFT- Grade 12 - Predicting the impact of rent-control
106 policies in the Twin Cities on intergenerational
social mobility

W-HS- **Nicholas Breitling**
SOFT- Grade 12 - Improving 3D fluid simulation
136 performance with ray-marching and a combined
grid-particle algorithm

W-HS- **Sonia Pillai**
SOFT- Grade 11 - Modeling Minnetonka High School
389 Parking Lot Traffic Congestion

T-HS- **Lakshika Nanda Kumar Reddy**
SOFT- Grade 11 - Detecting Cataracts From Retinal
418 Fundus Using Machine Learning: An AI Approach
to Identifying Cataracts Using Convolutional
Neural Networks

Translational Medical Science (TMED)

W-HS- **Asma Yaseen**
TMED- Grade 9 - Rheumatoid Arthritis
288 **Project At Electricity Wall**

W-HS- **Adam Bravo**
TMED- Grade 12 - Lipid Nanoparticle PEGylation for
319 Optimized in Vitro Transfection



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Middle School

Abbey, Sophie	W-MS-ENEV-335	Larson, Addy	S-MS-MCRO-046
Abdulle, Aliyah	W-MS-CHEM-195	Larson, Zachary	W-MS-ETSD-430
Alaoua, Noor	W-MS-CHEM-311	Liesch, Adam	T-MS-MATS-404
Aroloye, Oluwademilade	W-MS-ETSD-193	Lowe, Shaina	W-MS-PHYS-151
Bacigalupo, Emma	W-MS-PHYS-182	Manderfeld, Carissa	W-MS-BCHM-336
Baur, Mercy	T-MS-ETSD-370	Mang Sian Sang, Solomon	W-MS-PHYS-190
Beachem, Sadie	W-MS-CHEM-161	Martin, Rosa	T-MS-BMED-405
Beckey, Michael	S-MS-ANIM-394	Mayes, Kaia	W-MS-PLNT-441
Bender, Alice	W-MS-CHEM-431	Mbuba, Makena	W-MS-CHEM-187
Benoit, Leah	W-MS-CHEM-147	Minakova, Sophia	W-MS-PLNT-242
Bischof, Jacob	T-MS-BCHM-436	Mohamed, Riyan	W-MS-BEHA-377
Brondum, Lucy	S-MS-EAEV-045	Mohamed, Muntaz	W-MS-BEHA-377
Byers, Olivia	W-MS-MCRO-379	Moheet, Emaan	W-MS-ENEV-298
Carlson, Claire	W-MS-PLNT-450	Montecinos Sanchez, Yulian	T-MS-BEHA-400
Carlson, Jackson	W-MS-MATS-194	Moore, Cora	S-MS-MATS-047
Chetan, Vedant	W-MS-PHYS-439	Morris, Ellie	W-MS-PLNT-416
Coudron, Travis	W-MS-ETSD-214	Mros, Avery	W-MS-EAEV-251
Danielson, Connor	W-MS-CHEM-180	Mulle, Kaitlyn	W-MS-MATS-433
DoBrava, Kallie	W-MS-CHEM-188	Muriithi, Milkahlyne	W-MS-CHEM-196
Ebert, Alexander	W-MS-EAEV-205	Nelson, Ellie	S-MS-CHEM-175
Edson, Annabel	W-MS-CHEM-186	Nguyen, Ethan	T-MS-BEHA-407
Elfering, Vivian	T-MS-BEHA-409	Nguyen, Payton	T-MS-MCRO-403
Ervasti, Miles	T-MS-PHYS-435	O'Brien, Lily	S-MS-BMED-142
Finch, Ethan	T-MS-PLNT-328	O'Shaughnessy, Will	S-MS-BMED-140
Ford, Logan	W-MS-ETSD-256	Ondicho, Milkanna	W-MS-EAEV-149
Fransen, Tenley	W-MS-CHEM-174	Oostendorp, Tobias	W-MS-BEHA-278
Fru-Mambo, Kylie Darlene	W-MS-CHEM-144	Petersen, Calvin	W-MS-PHYS-190
Goffin, Zachary	W-MS-BEHA-413	Rahn, Nathan	W-MS-MATS-248
Grantham, Olive	T-MS-ETSD-375	Rahn, Olin	S-MS-ETSD-126
Griffiths, James	W-MS-CHEM-434	Rolfes, Iain	S-MS-ETSD-048
Grosser, Patrick	W-MS-ENEV-355	Rosell, Klara	T-MS-BEHA-402
Guasco, Jocelyn	T-MS-CHEM-401	Samek, Logan	W-MS-ETSD-150
Hall, Sadie	W-MS-MATS-448	Schaffhausen, Zoey	T-MS-BEHA-406
Hassan, Hodan	W-MS-BEHA-377	Scherer, Frankie	W-MS-BEHA-447
Hilowle, Hafsa	W-MS-CHEM-158	Schultz, Annika	W-MS-CHEM-252
Hoekman, Ethan	W-MS-BMED-333	Secka, Isha	W-MS-BMED-249
Hovanetz, Logan	W-MS-PHYS-426	Senger, Olivia	S-MS-EAEV-044
Hoven, Kiera	W-MS-BEHA-334	Severson, Amelia	W-MS-CHEM-161
Jaster, Nora	W-MS-BEHA-334	Shenkle, Carlee	W-MS-CHEM-146
Johnson, Celten	W-MS-PHYS-189	Shriram, Mardhav	W-MS-EAEV-178
Junker, Cecilia	S-MS-BMED-089	Shrivastava, Shagun	W-MS-ENEV-112
Kampf, Lincoln	T-MS-ANIM-410	Singhvi, Riddhi	T-MS-CELL-239
Kane, Brady	S-MS-CHEM-043	Spaulding, William	W-MS-ROBO-451
Kappenman, Julia	S-MS-BEHA-211	Stanley-Wornson, Cale	W-MS-PHYS-143
Kern, Michael	S-MS-ETSD-141	Steinke, Makena	W-MS-ETSD-148
Kersey-Schutta, Gracelyn	W-MS-BEHA-334	Stel, Kaelyn	W-MS-PLNT-342
Kessler, Sam	W-MS-ETSD-246	Stevens, Leo	W-MS-BCHM-323
Koelewyn, Evan	W-MS-PLNT-415	Stock, Ayla	T-MS-BEHA-395
Komara, Fahtima	W-MS-PLNT-247	Syed, Eeshal	W-MS-ETSD-296
Komara, Mawata	W-MS-CELL-184	Taha, Batoul	W-MS-EAEV-282
Kruah, Odessa	W-MS-CHEM-145	Thompson, Joey	W-MS-BMED-326
Lam, Edwin	W-MS-CHEM-176	Trinacty, John	W-MS-BCHM-321
		Trujillo, Nicolas	W-MS-MATS-432
		Vande Glind, Andon	W-MS-EAEV-343
		Wegener, Isabelle	W-MS-EAEV-414

Wesolowski, Molly
Westberg, Siri
Wilson, Lyla
Wolf, Joshua
Yeleswarapu, Aniket
York, Mia
Zahid, Amina
Zins, Teagan

W-MS-EAEV-217
W-MS-PHYS-181
W-MS-CHEM-183
T-MS-BEHA-408
T-MS-MATH-238
W-MS-BEHA-327
W-MS-ENEV-293
W-MS-CHEM-185

Getnick, Noah
Goldsmith, Jasmine
Gonzalez, Maryeva
Goud, Aman
Grove, Elizabeth
Halsey, Gwendolynn
Hanto, Lillie
Harms, Julia
He, Calvin

W-HS-ETSD-021
W-HS-ENEV-253
S-HS-CHEM-037
W-HS-PHYS-444
T-HS-EAEV-358
W-HS-CHEM-419
T-HS-BMED-331
T-HS-BCHM-341
S-HS-BCHM-092

High School

Abdirahman, Ajmal
Abdulwali, Aisha
Adabag, Mina
Alexander, Bryce
Allenburg, Jack
Anderson, Griffin
Armstrong, John
Armstrong II, Kevin
Bae, Samuel
Bangoura, Gabriel
Banks, Maggie
Bartholomew, Alexander
Belhouse, Christopher
Bergh, Sam
Bhargava, Rishi
Boddeti, Chetan
Bravo, Adam
Breitling, Nicholas
Cabrera Zhagnay, Camila
Castillo, Juan
Chen, Ethan
Chen, Jada
Choi, Henry
Chu, Chloe
Clair, Tyler
Colbert, Julia
Copeland, Mia
Dagade, Yash
Dean, Kaylee
DeMichaelis, Noah
Dillner, Norah
Dillner, Linnaea
DuBoulay, Erik
Ehlers, Ella
Emerson, Finn
Endres, Abby
Erickson, Alec
Fahim, Adeenah
Feist, Kate
Fligge, Lauren
Flores Lara, Jordan
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Jaffe, Ava
Jain, Arreh
Jasper, Isaac
Jude, Aleen
Kahsay, Lydia
Kaufmann, Halie
Keenan, Ellie
Khemakhem, Noah
Kinney, Vivian
Kollipara, Sanjana
Kouser, Khadija
Kshirsagar, Yash
Lang, Anika
Li, Rita
Li, Caleb
Lindeman, Aaron
Liu, John
Louwagie, Sam
Ma, Darren
Malaret, Jordi
Mathur, Meiling
McCorkle, Samantha
McDaniel, Sydney
McLaren, Carmen
McLaren, Chloe
McNally, William
McNeil, Emily
Measells, Noah
Menon, Swati
Michaelsson, Calais
Miller, Ivy
Miller, Ericka
Mohammed, Muminah Nihaar
Moheet, Ayeza
Molina Larson, Shelby
Moline, Andrew
Moran, Corinne
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Olea Lopez, Ashley
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Pappas, Antonis
Peterson, Romy
Peterson, Sarah
Petros, Dureti
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Pilgrim, Grant
Pillai, Sonia
Pillai, Deepti
Qian, Ziyi
Qiao, Selena
Rajashankar, Krish Inba
Ramraj, Shreya
Rao, Prathul
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Richardson, William
Richman, Becca
Rolseth, Amanda
Rowen, Luke
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Samba, Trisha
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Senthilkumar, Harini
Shrivastava, Shreshth
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Somia, Saloni
Srnc, Julia
Stewart, Ana
Sureshkumar, Sriram
Syeda, Maryam
Syeda, Fatima
Thibodeau, Samuel
Trinh, Katriana
Untiedt, Daniel
Venkatesh, Gautam
Viswanathan, Varun V.
Vladimirov, Julia
Wang, Nadia
Wang, Austin
Wang, April
White, Kendall
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Woltman, Dehlia
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Yaseen, Asma

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2023 Research Papers

Name	Grade	Title
Jacob Bischof	7	Five Second Rule: Does It Work
Miles Ervasti	7	Does Vehicle suspension perform better with more or less weight added to the vehicle ?
Sadie Hall	7	Keeping The Cool: The Effect That Insulation Plays in Keeping Water Cold
Adam Liesch	7	Can Your Plane Fly Under Radar?
Rosa Martin	7	Does Exercise Affect Blood Glucose Levels?
Muntaz Mohamed, Hodan Hassan, Riyan Mohamed	7,7,7	Can Peppermint Improve Color Visual Reaction times
Emaan Moheet	7	Developing and Testing a Low-Cost Hydraulic Flood Barrier to Protect Rural Communities
Yulian Montecinos Sanchez	7	Don't Leave Me Behind!
Payton Nguyen	7	Hidden Dangers
Shagun Shrivastava	7	100% Biodegradable , Is it TRUE !!! Year 3
Ayla Stock	7	All Eyes On You
Batoul Taha	7	What is the Effect of Outdoor Air Pollution (Fall and Winter) on Air Quality in Different Outdoor Locations (Forest, Train Station, Neighborhood)?
Noor Alaoua	8	Counting Calories
Ethan Finch	8	Analyzing the Influence of Weather on the Sap Production of Maple Trees to Create a Sap Volume Prediction Algorithm
Sophia Minakova	8	Growing Seeds in Microgravity
Eeshal Syed	8	Friction's Factors
Isabelle Wegener	8	The Impact of Climate Change on Brine Shrimp
Amina Zahid	8	Unlimited Green Energy
Lucas Croatt	9	Does Reflected Light Grow Grass the Same Way Direct Light Does?
Adeenah Fahim	9	Influence of household nutrient waters (Potato water, egg water, pasta water and sugar water) in comparison to tap water on the growth and development of plants.
Sahwa Ibrahim	9	Calorie Exertion Accuracy in Males and Females
Sanjana Kollipara	9	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
John Liu	9	Green Electronics: A Prospective Proof-of-Concept Study
Ayeza Moheet	9	Can subliminal messaging be used to influence the decisions and choices of middle and high school students?
Maryam Syeda, Fatima Syeda	9,9	Zebra Mussel Repellent
Asma Yaseen	9	Rheumatoid Arthritis Diet Plan Application
Ajmal Abdirahman	10	Drug solubility
Lauren Bachmeier	10	The Effect of Clay Soil on the Rate of Growth of Common Midwest Grasses
Ikram Belqas	10	DNA Retrieval in Frozen Strawberries
Sam Bergh	10	Myers-Briggs Personality Type Correlation With Color Associated With School Subjects
Saron Bogale	10	Amount of Energy in Different Food Items
Maryam Bradai	10	Effects of distance on the strength of EMF
Adam Briese	10	Effectiveness of Snowboard Wax

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McKenzie Bunnell	10	The Correlation between The Enneagram Personality Test and The Birth Order Theory
Anais Calva-Navarro	10	How Color Affects a Persons Memory
Kaylee Crampton	10	How fire-resistant are different fabrics
Anthony Cubias	10	Accuracy of Nutrition Facts On Chip Bags
Finn Emerson	10	Alternatives to Herbicide Treatment of Invasive Buckthorn
Alec Erickson	10	How Does the Perception of Time Change with Age?
Miaoting Fang	10	Content of Vitamin C in Various Fruits
Scott Froebe	10	Correlation Between Mulch Type Used on Soil and Soil Moisture Retainment
Peter Genis	10	Does The Shape Of A Vehicle Effect How Aerodynamic It Is?
Kaylee Greve	10	Leading name brand Vs. Generic brand disinfectant wipes
Anaca Griffin	10	Correlation Between Nail Polish Type and Scratch Resistance
Amira Gure	10	Hidden Sugars In Food
Mya Halliday	10	The Effects of Acidity in Fruits on the Growth of Bacteria
Lillie Hanto	10	The effectiveness of different kinds of antibiotics in killing bacteria
Collin Heckman	10	Vitamin C in Oranges
Maxx Her	10	Parachute
Linh Hoang	10	The effect of sky glow
Leah Horne	10	Glucose Concentration Before and After Adding Invertase
Eli Hove	10	Packing Products' Effect On Acceleration
Quinn Hughes, Tyler Clair	10,10	Using Monte Carlo Simulation to Optimize Vitamin C Production in Lactuca sativa by Varying Light Intensity and Wavelength, Year II
Emily Hull	10	How accurate is the Kastle-Meyer test for blood?
Amran Hussein	10	how do Different Scents Affect People's ability to Learn
Mariana Jimenez	10	What Causes Times of Dissolution to Be Different in Various Types of Pills?
Zaria Jimoh	10	what brand gets the most bacteria off hands?
Emma Klug	10	How temperature affects capillary action
Khadija Kouser	10	Designing & testing a Solar-Powered, Eutrophication-prevention (SPEP) Robot for Stagnant Waters
Owen Krick	10	Difference Between Corn Bag Fabrics and How They Impact the Game
Hazel Kubisiak	10	Five Second Rule
Isabella LaGorio	10	The Effect of Adding Wrist Weights to a Figure Skater's Spin
Jordyn Larson	10	Correlation Between the Texture of Facial Cleansers and the Amount of Bacteria Killed
Soren Leafblad	10	Effect of White Noise on Cognitive Performance Speed
Ethan Luedtke	10	Light Color Effect on Plant Growth
Evelin Martinez	10	Electrolytes Between Fruit Juice And Sports Drinks
Jane McGuire	10	How do different types of portable water filters affect the cleanliness of lakewater? \t \t
Peter Mendez	10	Effect of Building Materials on Wi-Fi Signal Strength
Swati Menon	10	Municipal Water Vs. Well Water Contamination in Snow
Cameron Moore	10	Correlation Between Caffeine and Marigold Plant Growth.
Hannah Mourad	10	The Ripening of Non-Organic Bananas vs. Organic Bananas
Olivia Murphy	10	The Effect of Colored Paper on Memory

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Katie Murray	10	The testing of glue strength
Riley Nelson	10	How Does the Amount of Hydrogen Peroxide in Whitening Products Affect Stained Teeth?
HienTue Nguyen	10	Flammability of Clothing
Yazan Nouh	10	Correlation between firewood types and Burning temperature
William Nurminen	10	Final science project electromyography (EMG) biofeedback
Ella O'Hanlon	10	Which Salt-to-Water Ratio is Best for Killing E. coli?
Alex O'Konski	10	The Effect of Household Repellants on Ants
Joseph Ong	10	The speed of light and index of refraction of various substances
Khadra Osman	10	A Comparison of the Vitamin C Content in Fresh and Frozen Fruit
Kaitlynn Patterson	10	What toothpastes are more effective at whitening teeth and how do their ingredients affect their whitening properties?
Natalie Portwood	10	Determining if Shape and Color Complexity Affects the Speed of a Visual Search
Leul Samuel	10	Energy in Different Types of Snack Foods
Owen Sczepanski	10	Effects of different types of soaps on bacteria
Mohamed Shariff	10	Dish Soaps vs Bacteria
Riya Shoor	10	Which product of surface cleaning products kills the most bacteria?
Bianca Sirju	10	Effect of Extracurricular Activity on Student Grade Point Average
Malak Stambouli	10	Effect of Caffeine on Heart Rate
Dylan Streeter	10	Liquid densities effect on the molecular friction of sound waves
Allison Stuart	10	How Sight Affects the Ability to Balance
Nuria Warfa	10	Energy Output of Model Wind Turbines
Benjamin Watson	10	How Temperature Affects Hockey Pucks Sliding On Ice
Mackenzie Wright	10	One's sex and how it affects visual memory.
Sarah Zamudio	10	Making natural gas from compost.
Griffin Anderson	11	Identification of Trends in Oil-Instigated Bacterial Growth
William McNally, Samuel Bae	11,11	The Pleiotrophin Puzzle: Investigating the expression of pleiotrophin in post-injury adult cardiac mouse hearts
Annie Bai	11	Solar Cycle Impacts on Agriculture - Longer Lived Cattles or More Abundant Milk
Henry Choi	11	The Effect of Gefitinib on Cell Proliferation and Invasion in 2D and 3D Cultures of MDA-MB-231 Cells
Yash Dagade	11	WATT from VAWT : Design of A Novel Vertical Airborne Wind Turbine (VAWT) Clean Energy Farm
Noah DeMichaelis	11	Music and the Mind: the Intersection of Reading Readiness and Musical Proficiency
Noah Getnick	11	Following the Flow: Expanding the Capabilities of a 2D Fluid Simulation to Study Biomimetic Bodies
Kareena Israni	11	Bringing meaning to numbers: Randomized controlled trials that inform candidates about which centers transplant patients like them.
Rita Li	11	The effects of music lyrics on memory
Ivy Miller, Corinne Moran	11,11	Deciphering DUX4: Is transient expression of DUX4 sufficient to cause muscular dystrophy?
Muminah Nihaar Mohammed	11	Unbind the Blind

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Rishi Bhargava, Humza Murad	11,11	Project WASP: Watering Atmospheric Self-Irrigating Planter
William Richardson	11	Studying the Impact of Microplastics on Quinoa Growth
Shreshth Shrivastava	11	Wi-C.A.R.E (Computer Assisted Remote Elder Care - Year IV)
Srikara Vishnubhatla	11	Implementing Machine Learning to Single-Molecule Fluorescence Resonance Energy Transfer Analysis
Mina Adabag	12	Lead's Butterfly: Effect Determining the impact of Lead Pollution on Danaus plexippus and Pieris rapae
Gabriel Bangoura	12	Effect of Electricity on Plant growth
Chetan Boddeti	12	The Clash between Researchers: Conquering the interactions of the cell within a database to facilitate research collaboration and scientific advancement
Kenneth Chen	12	An Agent-Based Simulation of COVID-19 Transmission and Learning Loss in Schools: Evaluating Mitigation Strategies
Chloe Chu	12	Lighting the Way to Healthy Snakes: The Effect of Artificial UVB Light on Vitamin D Levels in Boa imperators
Julia Colbert	12	Teeth Cleaning Chewing Gum
Norah Dillner, Linnaea Dillner	12,12	Atta and Acromyrmex Waste Deters Tropical Agricultural Pests
Dureti Gamada	12	Fungi vs. Bacteria: Using Beneficial Microbes Naturally Recruited by Corn Crops to Combat Corn Fungal Pathogens
Maryeva Gonzalez	12	Effect of Temperature on the Accuracy of Caffeine Extraction
Samuel Oelschlaeger, Dehlia Woltman, Elizabeth Grove	11,12,12	The Effects of Road-Salt Contaminated Water on Plant Growth
Julia Harms	12	Investigation into Potential Inhibition of Alzheimer's Tau Aggregation by Cinnamaldehyde
Calvin He	12	An Analysis of Saxophone Pad Degradation and Quality After Exposure to Human Saliva
Arreh Jain	12	Neurological Nuances: Revolutionizing early detection of neurodegenerative diseases and strokes using multi-photon imaging and optogenetics in vivo
Yash Kshirsagar	12	The Effect of Varying Concentrations of Titanium dioxide on the Movement of Caenorhabditis elegans
Aaron Lindeman	12	Creating an Environmentally-Friendly Dry-Erase ink Composition
Sydney McDaniel	12	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
Calais Michaelsson	12	Re-sensitization of E. coli to tetracycline using plant-derived efflux pump inhibitors
Aryun Nemani	12	The Effect of Varying Solute Concentrations on Bioluminescence within Vibrio Fischeri
Sarah Peterson	12	Protecting Plants: Investigating the relationship between fertilizers and insect damage in an urban garden
Ava Jaffe, Romy Peterson	12,12	Face Your Fears: Creating a system to study how mice overcome their fears
Alia Peterson	12	Design and development of a two-piece wirelessly interactive children's toy
Krish Inba Rajashankar	12	Medical device recall prediction using MAUDE reports
Becca Richman	12	The impact of light color and light intensity on variegation quantity of Epipremnum aureum

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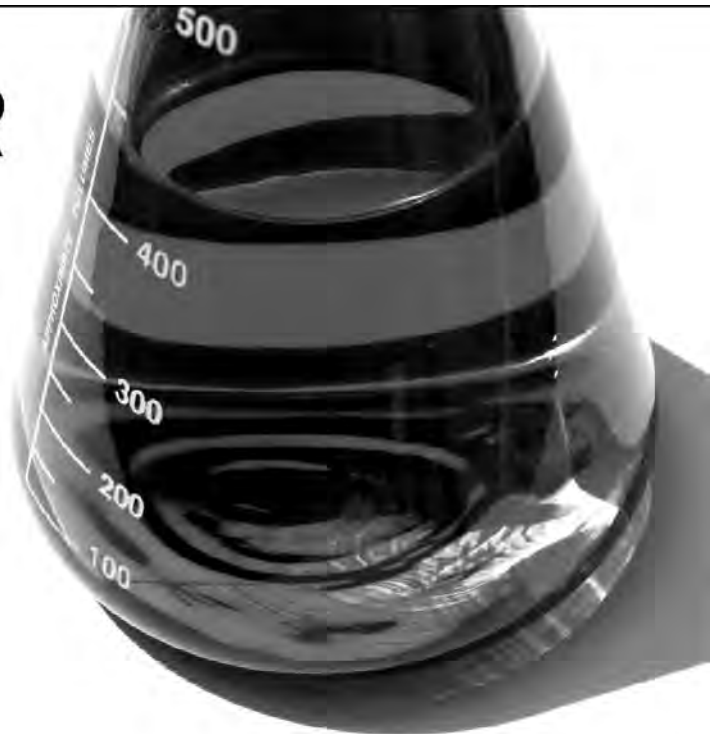
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Trisha Samba, Amira Sinclair	12,12	Your Training H.I.R.O.: Developing a “Haptic Interface for Real-time Optimization” of Out-of-water Swimming Form
Nadia Wang	12	Don't be coy, decoy!: Determining the minimal lens needed for a non-neutralizing antibody to bind to a 'decoy' epitope on the GP5 protein of PRRSV
Kendall White	12	The Perfect Solution: Optimizing an enzyme-linked immunosorbent assay to determine antibody concentrations in glioblastoma patients
Steven Yang	12	Preposterous Proteoglycans! Defining the Role of CSPG4 in Pancreatic Cell Invasion and Spheroid Formation to Achieve Effective Immunotherapy Treatments
Andrew Zhang	12	Extremal values for the Steiner k-distance and the Steiner k-Wiener index
Cassandra Zirps	12	The Effects of Education on Perception of Advertising

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NORTHROP GRUMMAN

TWIN CITIES REGIONAL SCIENCE FAIR “ISEF” ALUMNI
Students Chosen to Represent the Twin Cities Fairs at International Science & Engineering Fair

1973	Timara Kulzer Underbakke	1987	Brenda Zenk
	Harding High School, St. Paul		Sibley High School, West St. Paul
1974	Craig Johnson	1987	Ann Bailey
	Harding High School, St. Paul		Mahtomedi High School, Mahtomedi
1975	Dennis Scanlon	1988	Sara Greenslit
	Harding High School, St. Paul		Mounds View High School, Arden Hills
1976	Mark Foertsch	1988	Ann Marie Gentes
	Grace High School, Fridley		Westonka High School, Mound
1976	Linda Ann MacDonald	1989	Ann Marie Gentes
	Mounds View High School, Arden Hills		Westonka High School, Mound
1977	Steve Rabatin	1989	Todd Capistrant
	Benilde-St. Margaret, St. Louis Park		Minnesota Zoo School
1977	Charles Clevenger	1990	Cynthia Schaumburger
	Westonka High School, Mound		Harding High School, St. Paul
1978	Mitchell Voechl	1990	Ryan Egeland
1978	Charles Clevenger		Wayzata High School, Wayzata
	Westonka High School, Mound	1991	Ryan Egeland
1979	Jeffrey Rabatin		Wayzata High School, Wayzata
	Benilde-St. Margaret, St. Louis Park	1991	Jonathon Kubik
1979	Joseph Rabatin		Sibley High School, West St. Paul
	Benilde-St. Margaret, St. Louis Park	1992	Heidi Konkler
1980	Jeffrey Rabatin		Wayzata High School, Wayzata
	Benilde-St. Margaret, St. Louis Park	1992	Ryan Egeland
1980	Joseph Rabatin		Wayzata High School, Wayzata
	Benilde-St. Margaret, St. Louis Park	1993	Ryan Egeland
1981	Jeffrey Rabatin		Wayzata High School, Wayzata
	Benilde-St. Margaret, St. Louis Park	1993	Andrew Grande
1981	Joseph Rabatin		St. Thomas Academy, Mendota Heights
	Benilde-St. Margaret, St. Louis Park	1993	Kelley Lohman
1982	Micheal Rabatin		Harding High School, St. Paul
	Benilde-St. Margaret, St. Louis Park	1993	Jens Strand
1982	Brian Hallberg		St. Paul Academy, St. Paul
	Harding High School, St. Paul	1994	John Hassett
1983	Thinh Hoang Tran		Burnsville High School, Burnsville
	Westonka High School, Mound	1994	Ana Navarro
1983	UNKNOWN		Minnetonka High School, Minnetonka
1984	Susan Kain	1994	Victoria Miller
	Edina High School, Edina		St. Agnes High School, St. Paul
1984	Steve Herrman	1994	Julia Goetzke
	Mahtomedi High School, Mahtomedi		Harding High School, St. Paul
1985	Brenda Zenk	1995	John Hassett
	Sibley High School, West St. Paul		Burnsville High School, Burnsville
1985	Steve Herrman	1995	Adam Tatarynowicz
	Mahtomedi High School, Mahtomedi		Burnsville High School, Burnsville
1986	Brenda Zenk	1995	Victoria R. Miller
	Sibley High School, West St. Paul		St. Agnes High School, St. Paul
1986	Steve Herrman	1995	Marcus Rollins
	Mahtomedi High School, Mahtomedi		St. Paul Open School, St. Paul

TWIN CITIES REGIONAL SCIENCE FAIR “ISEF” ALUMNI
Students Chosen to Represent the Twin Cities Fairs at International Science & Engineering Fair

1995 Anna Navarro Minnetonka High School, Minnetonka	1998 Michael Scott Lohman Expo III High School, St. Paul
1995 Samuel Rush Minnetonka High School, Minnetonka	1998 A. Ben Suri Harding High School, St. Paul
1996 Laurie Louis Parker Roseville High School, Roseville	1999 Michael Scott Lohman Expo III High School, St. Paul
1996 David Loy Bowe Burnsville Senior High School, Burnsville	1999 Alison Boutin Burnsville High School, Burnsville
1996 Michael Scott Lohman Expo III High School, St. Paul	1999 Jennica Slattery Minnehaha Academy, Minneapolis
1996 Victoria Reynolds Miller St. Agnes High School, St. Paul	1999 Chrissy Jones Minnetonka High School, Minnetonka-Team
1996 Anna Navarro Minnetonka High School, Minnetonka	1999 Elizabeth Larkin Breck School, Minneapolis
1996 Michelle Lee Monnens Minnetonka High School, Minnetonka	1999 Melissa Borken Minnetonka High School, Minnetonka
1996 James Justin Wilson Minnetonka High School, Minnetonka-Team	1999 Alli Kellogg Minnetonka High School, Minnetonka-Team
1996 Michael Gary Grotenhuis Minnetonka High School, Minnetonka-Team	2000 Mark Galatowitsch Highland High School, St. Paul
1997 Nguyen Trung Burnsville Senior High School, Burnsville	2000 Jennica Slattery Minnehaha Academy, Minneapolis
1997 Samuel Rush Minnetonka High School, Minnetonka	2000 Chrissy Jones Minnetonka High School, Minnetonka
1997 Anna Navarro Minnetonka High School, Minnetonka	2000 Michael Chansky Burnsville High School, Burnsville
1997 Victoria Reynolds Miller St. Agnes High School, St. Paul	2000 A. Ben Suri Harding High School, St. Paul
1997 Michael Scott Lohman Expo III High School, St. Paul	2000 Emily Letourneau Central High School, St. Paul-Team
1997 Travis Smith Burnsville Senior High School, Burnsville	2000 Anna Bishop Como Park, St. Paul-Team
1997 James Justin Wilson Minnetonka High School, Minnetonka-Team	2001 Megan Bailey Breck School, Minneapolis
1997 Justin Rainey Minnetonka High School, Minnetonka-Team	2001 Kathryn Gieselmann Burnsville High School, Burnsville
1998 Dean Harvey Burnsville Senior High School-Team	2001 A. Ben Suri Harding High School, St. Paul
1998 Dan Harakh Burnsville Senior High School-Team	2001 Li Mei Wayzata High School, Wayzata
1998 Bryce Gillespie Breck School, Minneapolis	2001 Laura Egerdal Burnsville High School, Burnsville
1998 Preeya Kshetry Breck School, Minneapolis	2001 Anna Bishop Como High School, St. Paul-Team
1998 Phally Seak Burnsville Senior High School	2001 Emily Letourneau Central High School, St. Paul-Team
1998 Raj Pai Burnsville Senior High School	2002 Jacob Fitzpatrick Burnsville High School, Burnsville

TWIN CITIES REGIONAL SCIENCE FAIR “ISEF” ALUMNI
Students Chosen to Represent the Twin Cities Fairs at International Science & Engineering Fair

2002	Kaonhou Her	2006	Jenna Johnson
	Johnson High School, St. Paul-Team		Burnsville High School, Burnsville
2002	PaCha Yang	2006	Andrea Jensen
	Johnson High School, St. Paul-Team		Burnsville High School, Burnsville
2002	Stephen Morris	2006	Daniel Zeng
	Breck School, Minneapolis		St. Paul Academy & Summit School
2002	Arun Saini	2006	Matthew Weiss
	Burnsville High School, Burnsville		Breck School, Minneapolis
2002	A. Noel Suri	2006	Katherine Schaeffer
	Harding High School, St. Paul		Breck School, Minneapolis
2003	Jessica Swatrz	2007	Ummul Kathawalla
	ISD 287		Blake High School, Minneapolis
2003	Ning Zhou	2007	Daniel Zeng
	ISD 287		St. Paul Academy & Summit School
2003	PaCha Yang	2007	Kyra Underbakke
	Johnson High School, St. Paul		Maranatha Christian Academy, Brooklyn Park
2003	A. Noel Suri	2007	Brandon Lew
	Harding High School, St. Paul		Breck School, Minneapolis
2003	Brendan Doms	2007	John Earl
	Breck School, Minneapolis		Harding High School, St. Paul - Team
2003	Javier Cabrera-Perez	2007	Lucas Gabrielson
	Breck School, Minneapolis		Harding High School, St. Paul - Team
2004	Adam Yock	2007	Jacob Stramer
	Breck School, Minneapolis		Harding High School, St. Paul - Team
2004	William Mitchell	2008	Prithwis Mukhopadhyay
	Breck School, Minneapolis		Lake Junior High, Woodbury
2004	Noel Suri	2008	Michael Cherkassky
	Harding High School, St. Paul		Edina High School, Edina
2004	Adam Hahn	2008	Madeline Taft-Ferguson
	Robbinsdale Armstrong High School, Robbinsdale		Breck School, Minneapolis
2004	Akash Kumar	2008	Kyra Underbakke
	Wayzata High School, Wayzata		Maranatha Christian Academy, Brooklyn Park
2004	Laura Heeter	2008	Aly Xiong
	Breck School, Minneapolis - Team		Johnson High School, St. Paul
2004	Kristina Naranjo-Rivera	2008	Iola Edwards
	Breck School, Minneapolis - Team		Johnson High School, St. Paul
2005	Kyrstin Underbakke	2008	Stephen Trusheim
	Maranatha Christian Academy, Brooklyn Park		Breck School, Minneapolis - Team
2005	Janet Li	2008	Daniel Mohktari
	Wayzata High School, Plymouth		Breck School, Minneapolis - Team
2005	Heidi Chun	2009	Prithwis Mukhopadhyay
	St. Paul Academy, St. Paul		Woodbury Sr High School, Woodbury
2005	Zachary Howland	2009	Tiffanie Stone
	Burnsville High School, Burnsville		AFSA High School, Vadnais Heights
2005	Eric Halverson	2009	Michael Fuad
	Como Park Senior High, St. Paul		Breck School, Minneapolis
2005	Kahli Her	2009	Stephen Trusheim
	Johnson High School, St. Paul		Breck School, Minneapolis

TWIN CITIES REGIONAL SCIENCE FAIR “ISEF” ALUMNI
Students Chosen to Represent the Twin Cities Fairs at International Science & Engineering Fair

2009	Chee Xiong	2012	Margaret Green
	Como Park Senior High, St. Paul		Burnsville High School, Burnsville - Team
2009	Martin Camacho	2012	Laura Landgraf
	Central Senior High School, St. Paul		Burnsville High School, Burnsville - Team
2009	Sahar Hakim-Hashemi	2012	Caleb Kumar
	Breck School, Minneapolis - Team		Breck School, Minneapolis
2009	Sierra Danforth	2012	Taylor McCanna
	Breck School, Minneapolis - Team		Breck School, Minneapolis
2009	Nicholas NaSal	2012	Alejandro Fenn
	Burnsville High School, Burnsville - Team		Breck School, Minneapolis - Team
2009	Joseph Lane	2012	William Engel
	Burnsville High School, Burnsville - Team		Breck School, Minneapolis - Team
2010	Prithwis Mukhopadhyay	2012	Thomas Vennemann
	Woodbury Sr High School, Woodbury		Johnson High School, St. Paul
2010	Tiffanie Stone	2013	Andrew Ylitalo
	AFSA High School, Vadnais Heights		Stillwater Area High School, Stillwater
2010	Martin Camacho	2013	Aditi Das
	Central Senior High School, St. Paul		Roseville Area High School, Roseville
2010	Houa Xiong	2013	Connor Duffy
	Johnson High School, St. Paul		Mounds View High School, Arden Hills
2010	Gavin Ovsak	2013	Graham Gabrielson
	Eden Prairie Senior High School, Eden Prairie		Harding High School, St. Paul
2010	Charles Morris	2013	Mai Moua
	Breck School, Minneapolis		Harding High School, St. Paul
2010	Ava Mokhtari	2013	Carolyn Jons
	Breck School, Minneapolis - Team		Eden Prairie Senior High School - Eden Prairie
2010	Addison Weiler	2013	Jessica Ryvlin
	Breck School, Minneapolis - Team		Breck School, Minneapolis
2010	Ashley Santilli	2013	Apurv Hirsh Shekhar
	Burnsville High School, Burnsville - Team		Blake High School - Northrop campus
2010	Emily Bostrom	2014	Carolyn Jons
	Burnsville High School, Burnsville - Team		Eden Prairie Senior High School - Eden Prairie
2011	Alysia Flores	2014	Jason Sylvestre
	Johnson High School, St. Paul		Benilde-St. Margaret's, St. Louis Park
2011	Andrew Ylitalo	2014	Jacob W Levy
	Stillwater Area High School, Stillwater		Breck School, Minneapolis - Team
2011	Martin Anderson	2014	Sofie M Kim
	Burnsville High School, Burnsville		Breck School, Minneapolis - Team
2011	Redeat Abegaz	2014	Aditi Das
	Burnsville High School, Burnsville		Roseville Area Senior High, Roseville
2011	Gavin Ovsak	2014	Heather J Stone
	Eden Prairie Senior High School, Eden Prairie		Mounds View High School, Arden Hills
2011	(Ernst) Tom Erdmann	2014	Amrita Mohanty
	Breck School, Minneapolis		Woodbury Sr High School, Woodbury
2012	Andrew Ylitalo	2014	Nicolina Mao
	Stillwater Area High School, Stillwater		Harding High School, St. Paul
2012	Keshav Mangalick	2014	Rosemary O Olatunbosun
	Mounds View High School		Harding High School, St. Paul

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2015	Amrita Mohanty	2017	Geeta Rajamani
	Woodbury Sr High School, Woodbury		Highland Park Senior High, St. Paul
2015	Maxwell Ylitalo	2018	Everett Kroll
	Stillwater Area High School, Stillwater		Stillwater Area High School, Stillwater
2015	Aadarsh Padiyath	2018	Manashree Padiyath
	Woodbury Sr High School, Woodbury		Woodbury Sr High School, Woodbury
2015	Carolyn Jons	2018	Justin Duffy
	Eden Prairie Senior High School - Eden Prairie		Mounds View High School, Arden Hills
2015	Arush Jain	2018	Flannery Enneking-Norton
	Eden Prairie Senior High School - Eden Prairie		St.Paul Academy and Summit School, St. Paul
2015	Emilia Topp-Johnson	2018	Michael Hall
	St Paul Academy and Summit School, St. Paul		St.Paul Academy & Summit School, St.Paul-Team
2015	Serena Jing	2018	Daniel Ellis
	Central Senior High School, St. Paul		St.Paul Academy & Summit School, St.Paul-Team
2016	Maxwell Ylitalo	2018	Cole Maxwell
	Stillwater Area High School, Stillwater		Breck School, Minneapolis
2016	Nathaniel R Farmer	2018	Siyuan Ma
	Stillwater Area High School, Stillwater		Breck School, Minneapolis - Team
2016	Claire E Wentzloff	2018	Alexander Anderson
	Burnsville High School, Burnsville		Breck School, Minneapolis - Team
2016	Prashant Godishala	2018	Leonardo Clarke
	Breck School, Minneapolis - Team		Minnetonka Senior High School, Minnetonka
2016	Brennan Clark	2019	Manashree Padiyath
	Breck School, Minneapolis - Team		Woodbury Sr High School, Woodbury
2016	Avni Jain	2019	Haley Jostes
	Eden Prairie Senior High School - Eden Prairie		Stillwater Area High School, Stillwater
2016	Jessica Weng	2019	Osman Warfa
	Wayzata High School, Plymouth		Burnsville High School, Burnsville
2016	Emilia Topp-Johnson	2019	Melissa Nie
	St Paul Academy and Summit School, St. Paul		St.Paul Academy and Summit School, St. Paul
2016	Serena Jing	2019	Ethan Dincer
	Central Senior High School, St. Paul		St.Paul Academy and Summit School, St. Paul
2017	Alex Li	2019	Parthiv Krishna
	Mounds View High School, Arden Hills - Team		Minnetonka Senior High School, Minnetonka
2017	Rebecca Li	2019	Kerui Yang
	Mounds View High School, Arden Hills - Team		Edina Senior High School, Edina
2017	Everett Kroll	2019	Rachel Gunderson
	Stillwater Area High School, Stillwater		Breck School, Minneapolis - Team
2017	Claire E Wentzloff	2019	Boatema Agyeman-Mensah
	Burnsville High School, Burnsville		Breck School, Minneapolis - Team
2017	Archana Murali	2020	Milan Jostes
	Breck School, Minneapolis		Stillwater Area High School, Stillwater
2017	Gauri Binoy	2020	Bingsheng "Andrew" Guo
	Wayzata High School, Plymouth		Mounds View High School, Arden Hills
2017	Meghana Iyer	2020	Eric Feng
	Edina High School, Edina		Mounds View High School, Arden Hills
2017	Serena Jing	2020	Anindita Rajamani
	Central Senior High School, St. Paul		Highland Park Senior High, St. Paul

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2020 Mani Chadaga
Central Senior High School, St. Paul - Team
2020 Akshay Nambudiripad
Central Senior High School, St. Paul - Team
2020 Quentin "Xander" Hughes
Minnetonka Senior High School, Minnetonka
2020 William Sepesi
Minnetonka Senior High School, Minnetonka
2020 Abigail Roh
Breck School, Minneapolis - Team
2020 Samantha Detor
Breck School, Minneapolis - Team
2021 Tarun Kota
Eastview Senior High, Apple Valley
2021 Ellen Guo
Mounds View High School, Arden Hills
2021 Johnny Yue
Mounds View High School, Arden Hills - Team
2021 Sydney Peng
Mounds View High School, Arden Hills - Team
2021 Naci Konar-Steenberg
St. Paul Academy and Summit School, St. Paul
2021 Levi Mellin
St. Paul Academy & Summit School, St. Paul-Team
2021 Nikolas Liepins
St. Paul Academy & Summit School, St. Paul-Team
2021 Quentin "Xander" Hughes
Minnetonka Senior High School, Minnetonka
2021 Austin Hunter
Minnetonka Senior High School, Minnetonka
2021 Atreyus Bhavsar
Blake High School - Northrop campus
2021 Fiona Kinney
Breck School, Minneapolis - Team
2021 Simren Samba
Breck School, Minneapolis - Team
2022 Karen Nakamura
Math and Science Academy, Woodbury
2022 Caroline Schlehuder
Convent of the Visitation School, Mendota Heights
2022 Nickolas Zander
New Life Academy, Woodbury
2022 Srinath Hariharan
Woodbury High School, Woodbury
2022 Maggie Banks
Mounds Park Academy, St. Paul

2022 Ruth Mellin
St. Paul Academy & Summit School, St. Paul-Team
2022 Alexander Moore
St. Paul Academy & Summit School, St. Paul-Team
2022 Krish Inba Rajashankar
Minnetonka Senior High School, Minnetonka
2022 Elizabeth Levinshteyn
Spring Lake Park HS, Spring Lake Park
2022 Ava Jaffe
Breck School, Minneapolis - Team
2022 Amrit Menon
Breck School, Minneapolis - Team
2022 Shreshth Shrivastava
Eden Prairie High School, Eden Prairie
2022 Jared Geppert
Blaine HS Ctr for Eng., Math., & Science, Blaine



DuPont Water Solutions congratulates your achievements in competing at the Twin Cities Regional Science Fairs.

We thank DuPont Water Systems for their sponsorship of this event!

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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Twin Cities Regional Science Fair Awards

(This list is an expected list of awards to be given from this fair but does not constitute a guarantee that the award will be given this year.)

3M Display Materials and Systems Division
3M Engineering and Manufacturing
Technology, Optimized Operations
3M Specialty Materials Development Lab
3M Personal Safety Division Award
3M Young Inventor Recognition Award
American Chemical Society
American Meteorological Society
American Psychological Association
ASM Materials Education Foundation
Association of Women Geoscientists
Caffeinated Student Award
DoD STEM Leadership Prize
Excellence Award
Genius Olympiad
Graduate Women in Science for Excellence
in Research
Graduate Women in Science for Excellence
in Writing
Inspiring Excellence Awards
Integrated Science Award
International Science & Engineering Fair
(ISEF)
ISEF Alumni Awards – Timara Underbakke
(1973)
Lemelson Early Inventor Prize
Minnesota American Society of Microbiology
Minnesota Chapter of American Fisheries
Society
Minnesota State Science & Engineering Fair
Mu Alpha Theta Mathematics
NASA EARTH System Science Award
National Geographic Society That's
Geography! Award

NOAA National Oceanic and Atmospheric
Administration – Taking the Pulse of the
Planet
North Central Tri-state Junior Science &
Humanities Symposium Research Papers
Research Paper trophies
Regeneron Biomedical Science Award
Ricoh Sustainable Development Award
Schools trophies
Science Potential Award
Society for In Vitro Biology
Sponsor: 3Mgives
Sponsor: DuPont Water Solutions
Sponsor: Ecolab
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Sponsor: City of St. Paul Youth Fund
Stockholm Junior Water Prize
Student's Achieving Volunteering Excellence
(S.A.V.E)
TCRSF Excellence Award
Teacher Excellence Award
Thermo Fisher Scientific Junior Innovator's
Challenge
United States Department of Agriculture
Research Service
US Air Force
US Metric Association
US Navy/Marine Office of Naval Research
USAID – US Agency for International
Development
USDA Research Service
Yale Science and Engineering Association



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Science Fairs and applauds the creativity and
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Thanks to all our volunteers, new & old, especially thank you to 3M employees!

THANK YOU TO OUR PLATINUM SPONSORS:



2022-2023 Twin Cities Regional Science Fair Committee

Director:	Timara Underbakke	Committee At Large:	Scientific Review:
SRC Chair:	Karin Ostrand	Dr. Gary Kwong	Karin Ostrand, Chair
Treasurer:	Dr. Gary Kwong	Erik Jostes	Dr. Jennifer Hugstad-Vaa
Development Director	Karilyn Jons	Gary Ostrand	Dr. Caroline Ylitalo
Public Relations:	Michael Lohman, Sr.	Stacy Banks	Dr. Jack Ball
Funding	Michael Lohman, Sr, Karilyn Jons, & Timara Underbakke	Dr. Caroline Ylitalo	Dr. Barry Rittberg
Special Awards Chair:	<i>position open</i>	Haley Jostes	Matthew Weingartz
Awards Coordinator:	Dr. Caroline Ylitalo	Karilyn Jons	Dr. Steven Jons
Display & Safety Chair:	Devi Kyanam & Chandra Papisetty	Dr. Steven Jons	Dr. Linnea Lentz
Judging Coordinator:	David & Timara Underbakke	Dr. Jennifer Hugstad-Vaa	Timara Underbakke
Website & Databases:	David & Timara Underbakke	Dr. Jack Ball	David Underbakke
Data Processing:	David Underbakke	Princesa Hansen	Karilyn Jons
IT Department:	David Underbakke	Dr. Barry Rittberg	Board of Directors:
Volunteer Coordinator:	Denise Jostes	Kyra Zimmerman	Karilyn Jons
Educational Outreach:	Dr. Steven Jons	Phill Goldmann	Dr. Steven Jons
Social Media Coordinator:	<i>position open</i>	Lynne Tauer	Dr. Gary Kwong
Social Media Coordinator:	Avni Jain	Tom Sinn	Michael Lohman, Sr.
Science Clubs Outreach:	Mike Lohman, Gary Kwong & Timara Underbakke	Denise Jostes	Karin Ostrand
		Devi Kyanam	Timara Underbakke
		Chandra Papisetty	David Underbakke
		Christine Kroll	Dr. Caroline Ylitalo

We have additional volunteer openings for those interested. We are currently looking for a Special Awards chair, a Social Media Coordinator and a Logistics person. We are also looking for an SRC co-chair.

Do you have other ideas or talent to contribute?

If you have time to help, we are 100% Volunteer educational 501c3 non-profit. All donations are tax deductible & are invested in our youth!