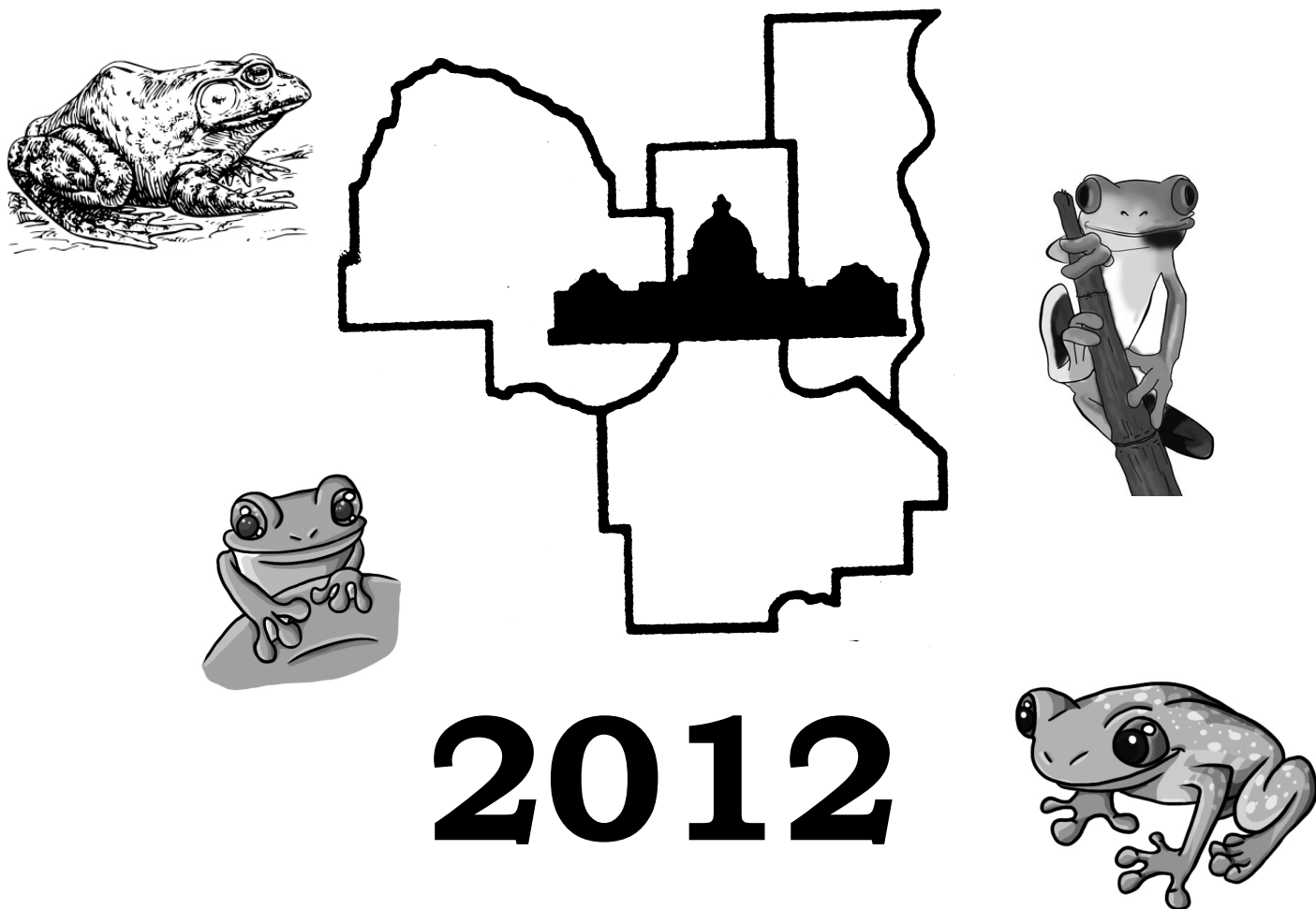


WELCOME TO THE

**74th Annual Twin Cities Regional Science Fair  
20th Annual St. Paul Science Fair  
18th Annual Western Suburbs Science Fair**



**2012**

**Science Fairs**

**February 24-25, 2012**



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

We're scientists <sup>engineers</sup>  
**inventors** marketers  
& business people of every kind.



We're 3M volunteers.

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**WELCOME TO THE 74th ANNUAL TWIN CITIES REGIONAL SCIENCE FAIR,  
THE 20th ANNUAL ST. PAUL REGIONAL SCIENCE FAIR,  
THE 18th ANNUAL WESTERN SUBURBS REGIONAL SCIENCE FAIR.**

Our Host this year is the University of Minnesota.

**YOUR SCIENCE FAIR BUTTON** is your identification as a participant in this Science Fair.

**WEAR IT AT ALL TIMES** - when you are at the Fair, both Friday and Saturday.

**DO NOT WEAR HEELS WHILE IN THE BUILDING - FLAT SOLES ONLY!**

**PLEASE PICK UP YOUR PROJECT FORMS AND KEEP them FOR A YEAR.**

\*\*\**(They may be needed for next year's project, too.)*\*\*\*



Make copies of your forms if you are selected to compete further.



1. The number by your name is your project number. It shows you where to set up your project. When you find your place, set up your project. If you ordered electricity, find your place in "Electricity Row."
2. If there is a Scientific Review Committee (SRC) violation sheet in your folder, it means that there is a problem with your paperwork. Report to the SRC table as soon as you have set up your project. You will not be allowed to compete unless you have been cleared for competition by the Scientific Review Committee.
3. After your project is completely set up, please drop off the Safety & Display page in the **IN BOX at Safety & Display** (next to SRC). Go back to your project exhibit and wait for a Safety & Display volunteer to check your exhibit so you can be cleared for competition. You must pass both SRC and Safety & Display inspections to be able to compete for awards.
4. **There is no food or beverage allowed anywhere in the competition area.** A closed bottle of drinking water is the only exception.
5. Wear your TCRSF button in a clearly visible place at all times.

**TCRSF requires that ALL TEAM members of team projects must be present at judging on Friday night (unless cleared by the fair director and the SRC chair) and that all ISEF winners must be at the Saturday Awards Ceremony.** Winners of sponsor's awards must be present at the Saturday Awards Ceremony to win, have their photo taken with their award at their project, and have a signed parental consent form already on file with TCRSF.

All ISEF winners and all persons interested in traveling with the group to ISEF **MUST** attend the Sunday 1:00 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.** 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 names being read during the awards program. 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.**

# Science doesn't start in a laboratory

A child's imagination is ignited by curiosity and powered by all the wonders of the world.

At Medtronic, we devote ourselves to finding new and better ways to alleviate pain, restore health and extend the lives of people around the world. And we know that any innovation starts with imagination. That's why we support organizations and activities that will inspire the next generation of scientific innovators.



**Bill Hawkins**  
*Chairman and Chief Executive Officer*

[www.medtronic.com/community](http://www.medtronic.com/community)



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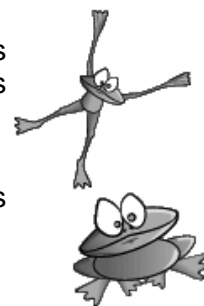
## SCHEDULE

### Friday, February 24, 2012:

<u>Time</u>	<u>Activity</u>	<u>Location</u>
1:00 - 3:30 p.m.	Registration	Field House – No heeled Shoes
1:00 - 3:30 p.m.	Set up Projects / Clear Safety&Display Grades 6-8 must be set up by 3:30 Grades 9-12 must be set up by 3:30	Field House – No heeled Shoes
4:00-9:30 p.m.	Judging	Field House – No heeled Shoes

### Saturday, February 25, 2012

8:00- 10:00a.m.	Exhibits open to the public	Field House - No heeled Shoes
9:00 - 9:30 a.m.	All Paper and Project Participants pick up envelopes containing ribbons & judging forms	Field House - No heeled Shoes



**TEACHERS – Please arrange for someone to pick up papers, folders, & exhibits of any students not able to attend the award ceremony.**

**DO NOT DISMANTLE YOUR PROJECT UNTIL AFTER THE AWARD CEREMONY!**

10:00 a.m. to 12:00 p.m.	Award Ceremony for projects & papers	Field House - University of Minnesota
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Winners of Special Sponsor Awards must be present at the Award Ceremony. ONLY projects with their signed Parental Media Release (generated during registration) turned in before judging starts will be eligible for awards which require a photograph. ALL team members must have signed media release forms on file for a team project to be eligible. Immediately after the awards ceremony, Sponsor Award winners must return to their projects until the official Fair Photographer takes their photo with the award & their display and then dismisses them.

All ISEF winners must be at both the Saturday Awards Ceremony AND the Sunday 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.

After Award Ceremony	*ISEF Finalists, Alternates and Advisors meet with the Fair Directors & SRC chair. *ISWEEEP Finalists, Alternates and Advisors meet with the Fair Directors & SRC chair.	South end of bleachers Field House
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<b>Everyone:</b>  1:30 p.m.	<b>PLEASE HELP OUR VOLUNTEERS TEAR DOWN TABLES &amp; CHAIRS ALL PROJECTS MUST BE REMOVED</b>	Please help throw trash & leave the Field House clean.
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**Minnesota State Science & Engineering Fair** (grades 6-12 projects, grades 6-8 papers)

March 18-20, 2012, **Doubletree by Hilton** (formerly Sheraton Bloomington Hotel)

**JSHS: Junior Science & Humanities Symposium** (grades 9-12 research papers)

March 17-18, 2012, **Doubletree by Hilton** (formerly Sheraton Bloomington Hotel)

**I-SWEEEP: International Sustainable World EnergyEngineering Environment Project  
Olympiad** (grades 9-12 projects), Houston, Texas, May 2–7, 2012

**ISEF: Intel International Science & Engineering Fair** (grades 9-12 projects)  
Pittsburgh, Pennsylvania, May 13–18, 2012 (Twin Cities flies out May 12<sup>th</sup>)

## JUDGING RULES AND SCHEDULE

1. Each student must remain with his/her project during the time scheduled for judging. If you are not at your project when a judge arrives, you may miss your chance to be judged.
2. Students must clear both SRC (Scientific Review Committee) & S&D (Safety & Display) before judging begins to be able to compete.
3. ONLY judges and students presenting projects are allowed in the exhibit area during judging.  
**No parents, advisors, teachers, or other non-participants are to be in the exhibit area during judging times, 4:00 PM – close Friday.**
4. Stay at your project until the official announcement over the public address system dismisses you. Dismissal will be by grade. If you leave early you may be missing out on judging for other special awards.
5. TCRSF and the University of Minnesota do not accept responsibility for equipment/instruments brought to the Fair. **DO NOT LEAVE SUCH ITEMS OVERNIGHT OR UNATTENDED.**

	Judging Begins	Estimated Dismissal Time (WAIT for official announcement)
Grade 6	4:00p.m.	6:15p.m.
Grade 7	4:00p.m.	7:00p.m.
Grade 8	4:00p.m.	8:00p.m.
Grades 9-12	4:00p.m.	9:30p.m.



ALL TIMES ARE APPROXIMATE. PLEASE LISTEN FOR ANNOUNCEMENTS!

### PROJECT LISTING

Student projects are listed by number, grade and affiliation and broken down by category within each grade level. Following this listing is an alphabetical list of all entries by grade. To find a project, or to find out where you are to set up your project, look for the signs.

GRADE	PROJECT NUMBERS	AFFILIATION CODES
6	6000-6999	(S) St. Paul Regional Science Fair
7	7000-7999	(W) Western Suburbs Regional Science Fair
8	8000-8999	(T) Twin Cities Regional Science Fair
9-12	1000-1999	<b>All 3 affiliations are collectively known as "Twin Cities Regional Science Fairs"</b>

### RESEARCH PAPERS

All research paper competitors pick up your envelope with your research paper ribbon about 9 AM Saturday before the awards program. Grades 6-8 alternates and competitors advancing to state science fair with their research paper and grades 9-12 alternates and competitors advancing to Junior Science & Humanities Symposium (JSHS) will be posted Saturday morning in the Field House. Additional awards for papers will be handed out at the Award Ceremony on Saturday morning at 10:00 a.m. in the Field House.

TCRSF AND THE UNIVERSITY ARE NOT RESPONSIBLE FOR PAPERS, SRC PAPERWORK, PROJECTS, RIBBONS, AWARDS OR EQUIPMENT LEFT AT THE UNIVERSITY OF MINNESOTA FIELD HOUSE!

REMEMBER - We are guests of the University of Minnesota. Please keep your area clean and respect the property of others. Your actions reflect not only on you, but also on your school, your parents, your advisors and the fair.

## Grade 6

### *Animal Sciences (AS)*

6001W **Sarah Betts**  
Memory Development and Myelin Growth

6002T **Evan J Klein, Nathan B Radtke**  
**Team** - Fruit Fly Genetics

6003S **Ian Obert**  
Hungry Birds

6004W **Brady T Solomon**  
Crickets Can Help!

6005S **Shoua Yee Vue**  
What Does My Pigeon Like to Eat?

### *Behavioral and Social Sciences (BE)*

6006S **Eric Duliere**  
Does the human brain concentrate better with different variables?

6007W **Elizabeth A Kruchten**  
Doodle Memory

6008S **Sophia A Michalski**  
Mirror Writing Can Be Difficult

6009W **Kylie Nevells**  
Can Eminem or Mozart Help You Study?

6010W **Riley Olson**  
What happened to my vocal range?

6011T **Santiago Ponce, Edgar Robles**  
**Team** - The Effects of Smelling On Emotion

6012W **Ellie A Scheid**  
The Memory Duel

6013T **Mae E. Shannon**  
Does Brand Name And Packaging Affect Preferences In Taste?

### *Chemistry (CH)*

6014T **Siri Bohacek**  
Greenhouse Gases

6015T **Keith Calvin-Stokes**  
Burn Baby Burn

6016S **Isabella Chaffee**  
Does cooking food change its pH?

6017W **Nicole Dorn**  
Which Wheat Flour has The Most Gluten?

6018S **David M Dowdy**  
Ionic and Covalent bonds

6019W **Audrey Gorman**  
Levels of Vitamin C in Oranges

6020S **Thomas S Hayden**  
Does the Amount of Hydrogen Peroxide Affect the Amount of Foam Produced?

6021T **Olivia A Jurek**  
Glowing Water  
**Project At Electricity Wall**

6022S **Pazao F. Lee**  
Chemical Reactions in Different Temperature Water

6023T **Jessica J Lesmeister**  
Which Vegetable Has The Most Voltage?

6024S **Christopher A. Lor**  
Sugar Crystals

6025W **Megan M Olk**  
Freaky Fizzing

6026S **Katrina A Pettis**  
Water Works

6027S **Javier Valencia**  
Salt Volcano

6028W **Savannah K Willard**  
Which Apple?

6029W **Morgan E Williams**  
Sugar Is Fun For Everyone!!!!

### *Computer Science (CS)*

6030W **James M Jurek**  
Computer Mice

### *Earth and Planetary Science (EA)*

6031T **Andrew L Barton**  
Volcanic Rocks on the North Shore:Fact or Fiction?

6032W **Lauren M Copland**  
Pop Goes the Geyser

6033S **Connor J Goodell**  
Crystals, Crystals, Crystals

6034S **Peter Weber, Otto Schroepfer**  
**Team** - How Is Erosion Best Prevented?  
**Project At Electricity Wall**

### *Energy and Transportation (ET)*

6035S **Adi Dovre Wudali, Liam Morrissey**  
**Team** - Does Temperature Affect Battery Life

6036S **Joseph Heyman**  
Solar Panel Car

- 6037S **Joe C. McConville**  
Energy Output of Wind Generators Based on Geographical Location
- 6038S **Zachary Schuster**  
How does the angle of a windmill blade affect the energy produced?

***Engineering: Electrical and Mechanical (EE)***

- 6039T **Samuel J Goaley**  
Are CFL Light Bulbs Worth The Cost  
**Project At Electricity Wall**
- 6040S **Ethan D Hennessey**  
The Amazing Pulley
- 6041T **Megan K Perpich**  
Does the position of the car motor in relation to the front axle affect the speed of the car?
- 6042T **Jake Sweetland**  
Race Against Resistance
- 6043S **Margaret S Wiebe**  
Which structure will stay up the longest when set on fire?  
**Project At Electricity Wall**

***Engineering: Materials and Bioengineering (EN)***

- 6044S **Zander Q Davis**  
Fabrics & Fire
- 6045S **Helen F Leach**  
Does Your Cantaloupe or Celery Get Contaminated When You wash it?
- 6046S **Katie E Mattocks**  
Race to the Best Suitcase
- 6047T **Clay D Vizenor, Wyatt J Nelson**  
**Team** - What type of fishing line is the strongest?

***Environmental Management (EM)***

- 6048W **Ava M Stende Miss.**  
The New Insulation Creation: Kenaf  
**Project At Electricity Wall**

***Environmental Sciences (EV)***

- 6049W **Will Kamm**  
Does Water Temperature affect UV rays?
- 6050W **Grace E Kopischke**  
Furnace Filters: Does Price Matter?
- 6051S **Devin T McGill, Charlie W Dombrow**  
**Team** - Water Clarity in Lakes
- 6052W **Meg M Pryor**  
Butterfly Metamorphosis

- 6053S **Samuel L Warner**  
Water Filtration: What Type of Soil Filters Water Best
- 6054W **Amirah A Watkins**  
Salty Daphnia

***Medicine and Health Sciences (ME)***

- 6055T **Adam J Burke**  
Does Cold Water Affect Reaction Times?
- 6056S **May R Garvey**  
What level of pollution makes difficult for an asthmatic person to breath?
- 6057S **Lillian A Lampros**  
Are Fingerprint Patterns Inherited?
- 6058S **Talia S Malka**  
Soda Warning!
- 6059W **Elise K Olson**  
Teeth vs. Soda
- 6060W **Amelia A Trembath**  
Liar,Liar Does Blood Pressure Go Higher?

***Microbiology (MI)***

- 6061W **Caroline G. Bowen**  
Does Dog Saliva Kill Bacteria?
- 6062W **Bergen Kobienia**  
My Mom Thinks I Stink!
- 6063T **Moira Weiland**  
Mold Wars
- 6064S **Ethan Wilmes**  
Which Biodegradable FoodMolds the Fastest?

***Physics and Astronomy (PH)***

- 6065W **Tommy Anderson**  
Does the Hull Design of a Boat Affect the Drag Force?
- 6066S **Asiah L. Atiq**  
Pendulums
- 6067T **Carl Bohacek**  
Meteor Storm = Micrometeor storm? (or I got a rock. From space.)
- 6068W **Samantha Burke**  
The Effect of Different Clothing While Swimming
- 6069W **Cassidy Deng**  
Go Green: Solar Powered Oven
- 6070S **Ellen Ferry**  
Does number of layers of kick wax effect speed of cross country skiing?



## Grade 7

6071T **Christen V. Gauker**  
To Boil or Not to Boil

6072T **Calum Graham**  
Is Flex-Able to Change Your Shot?

6073W **David M Her**  
Clay Launcher

6074S **Emilia Hidalgo**  
Experiments with Water Pressure

6075S **Sofie Hokanson**  
Building a better tramoline

6076S **David A Jaksha**  
3 ... 2 ... 1 ... Liftoff

6077S **Addison R Keely**  
Rocket Noses

6078W **Zach Keller**  
Shoe Anybody? Which Shoe Has The Best Traction?

6079S **Sophia H Kouay**  
Operation Catapult

6080S **Tupheng Lee**  
Catapults

6081W **Kylie K Mullaney**  
T.A.B.S. Trajectories, Angles, Balls, Spin

6082W **Daniel T Newman**  
Pulleys

6083S **Olivia K. Pope**  
A Revolution Revelation

6084S **Emma Wallisch**  
Wind Throb in Cars

### *Plant Sciences (PS)*

6085S **Eve Devens**  
Which plant has the largest final weight to seed weight ratio?

6086T **Angel Maldonado, Michael A. Naula Team** - The Effect Of Different Types Of liquid On Pant Growth

6087S **Sophie N Oubaha**  
Wich fertilizer helps mint plant grow the most?

6088W **David B Segelstrom**  
Plant Juice

6089S **Erin I Westman**  
What's wrong with my plant? Is it dead or alive?

### *Animal Sciences (AS)*

7001T **Jocelyne Alvarez, Giselle D Clemente, Mara Gomez Team** - The Goldfish's Favorite Food

7002T **Grace L Donner**  
What Minnesota Mammal has the Best Insulated Hide?

7003T **Carley M Dowell**  
Does listening to classical music help rats learn a maze faster?

7004S **Mad A Karan**  
How Does the Time of Day Affect the Amount of Food a Guinea PIg Eats?

7005W **Carson L Knoer**  
Can the Aquatic Invasive Species Known As Chinese Mytery Snails Survive Up To 21 Days Out Of Water

7006S **Sophia Poppert**  
Dog Paw Preference

7007S **Alicia St.Germain**  
The Nose Knows Smell, How About Taste?

7008S **Karina F Strom**  
How does the time of day affect how fast a hamster gets through a maze?

### *Behavioral and Social Sciences (BE)*

7009T **Abigail P Cavanaugh Ms.**  
"Does Sniffing Peppermint or Cinnamon Affect Caloric Intake?"

7010W **Laura M Deutz**  
Do different types of music affect your concentration?

7011W **Kayla V Doughty**  
Do Boys or Girls Have A Better Sense of Taste and Smell

7012W **Emmalyn R Elsen**  
Simsons Memory Game

7013T **William S. Gomes**  
Does Movie Artwork Affect Viewer Attention?

7014S **Kirby J Goodell**  
Listen!

7015W **Sophie Hedrick**  
Are Left Handed People More Ambidexterous Than Right Handed People?

7016W **Hunter Hohlfeld**  
Reaction Time

7017W	<b>Emma Kane</b> Chromatic Adaptation	7036S	<b>Sam L. Bergstrom 1</b> Splatter Patterns
7018T	<b>Joanna N Lozano</b> Does Communication In Volleyball Affect The Way You Play?	7037S	<b>Lucia M Calatayud</b> Splenda Vs. Sugar
7019S	<b>Siena I Milbauer</b> Does Playing a Musical Instrument Affect Relative Pitch?	7038T	<b>Adam J Chiarella</b> Chromatography
7020W	<b>Justin Mraz</b> Concentration	7039T	<b>David Cullen</b> How Do Beverages Kids Drink Affect Wires Used In Braces?
7021W	<b>Timmy Reed</b> Testing Time vs. Untimed	7040W	<b>Nolan S Farnam</b> Water Gases
7022W	<b>Greta Seitz</b> Senseless Tasting	7041S	<b>Ella N Fredrickson</b> Paper Chromatography
7023T	<b>Noah T Shannon</b> Does Age Impact Logic?	7042T	<b>Grace A Gallucci Ms.</b> "Does the Type of Hair on a Dog Affect How Long Dog Hair Dye Will Last?"
7024W	<b>Colleen E Wagner</b> Distracted Driving	7043W	<b>Shruti Gupta</b> Calcium Carbonate and pH
7025T	<b>Alyse J Walker</b> "Does Gender Affect the Ability to Remember Dreams?"	7044S	<b>Maddie Hawkins</b> Crazy Crystals
7026W	<b>Matthew W Wysopal</b> Does Caffeine affect typing speed?	7045S	<b>Jacob C Hearst</b> Yeast Farts and Sweeteners
<i>Biochemistry (BI)</i>			
7027T	<b>Maggie D Blaney</b> Rising Cookies	7046T	<b>Kathryn T Henschell, Victoria B Hafner Team</b> - Does Gum Change Your Temperature
7028S	<b>Ethan A BrudnakVoss</b> Plants and Chromatography	7047T	<b>Claire M Hollingsworth</b> "Which Tastes Better in Smoothies Fresh or Frozen Fruit?"
7029W	<b>Sheridan L Hanger</b> Freaky Fast Food Places	7048S	<b>Serena Jing</b> From Trash to Cash: Generating Fuel from Aluminum Waste
7030S	<b>Lucas p Heffernan</b> Electrolytes in Sport Drinks	7049S	<b>Mira E Kammueler</b> Which Type of Sand Affects the pH of Freshwater the Most?
7031W	<b>Michelle J Lu</b> Outrageous Oranges	7050T	<b>Veronica A Lundquist</b> What substances make bubbles last longer?
7032W	<b>Claire E Mellema</b> Orange You Gald We Need Vitamin C	7051W	<b>Nya L Macon, Dearest M Welwoie Team</b> - Fun with Jello
7033S	<b>Imogene J Silver</b> Death of an Orange	7052S	<b>Vanessa Manzanares</b> Best Syrup Temperature for Penny Movement
<i>Cellular and Molecular Biology (CB)</i>			
7034W	<b>Carolyn Grausam</b> Green Clean vs. Chemical Clean	7053S	<b>Natalie E Maxam</b> A Sticky Situation
<i>Chemistry (CH)</i>			
7035S	<b>Aniq S Adam</b> Crazy Crystal Creations	7054S	<b>Laura J Mayer</b> The Effect of Umami
		7055W	<b>Gracey B Scott</b> Does The Color Of The Crystal Affect Its Growth?

- 7056T **Kara P Star**  
The Maturation of Fruit
- 7057S **Richard L Thompson**  
Which detergent is capital at removing stains?

*Computer Science (CS)*

- 7058S **Caleb E Venkatrathnam**  
RAM and Computer Performance  
**Project At Electricity Wall**

*Earth and Planetary Science (EA)*

- 7059S **Hanna k Devaney**  
Tsunamis
- 7060S **Nathan Vang**  
Soils and Earthquakes

*Energy and Transportation (ET)*

- 7061W **Abby Bollensen**  
Heat Conduction
- 7062W **Bengt A Fredrickson**  
Dinner getting cold? Problem solved?
- 7063W **Olivia Pearl Groth**  
Electrified Fruit
- 7064S **Iris C Holman**  
How Wing Design Affects Lift  
**Project At Electricity Wall**
- 7065W **Giles M Koski**  
Physics of Sailing
- 7066W **Heidi N Krauss**  
Saving Energy by Measuring Watts in Your Home
- 7067S **Patrick Peterson**  
Potato Power
- 7068W **Camille Romero**  
Pinwheel Windmill
- 7069T **Craig Michael Sanislo**  
It's Not Rocket Science
- 7070S **Al A Subramanian**  
Solar Oven: Importance Of Design
- 7071S **Yufeng K Xiong**  
Making Electricity from Fruits

*Engineering: Electrical and Mechanical (EE)*

- 7072W **Mitchell D Brill**  
Motor Madness
- 7073W **Anthony L Jurek**  
Trebuchets and How They Work

- 7074W **Andrew S Krummen**  
Is Bright Light the Right Light?
- 7075S **Lucas C Mueller**  
How does the shape of troughs effect how fast oil flows down them
- 7076S **Jack A Swartz**  
Hydrodynamics of Boat Hulls

*Engineering: Materials and Bioengineering (EN)*

- 7077S **Jarod G Davis**  
Bullet Proof Protection
- 7078S **Elizabeth Demitroff**  
Insulating Materials
- 7079S **Grace L Gardner**  
Cracked! A Test on the Durability of Nail Polish
- 7080T **Duncan M Ince**  
Metal Shock Force
- 7081T **Amy C Vievering**  
Which Housing Material is the Best Insulator-  
Brick, Stucco, Wood Shakes, or Vinyl Siding?
- 7082T **Henry Warwick**  
Keeping it Under Wraps: Which Material Insulates Best?
- 7083T **Joseph M. Weber**  
Metal vs. Wood Bat Controversy

*Environmental Management (EM)*

- 7084T **Devon Olson**  
How do we become a zero waste environment?  
**Project At Electricity Wall**
- 7085T **Josh P Steckler, Marcus D Haskins**  
**Team - Sand vs. Salt**

*Environmental Sciences (EV)*

- 7086S **Seamus Flynn**  
A Clean Drink of Water?
- 7087S **Damyam W Hart**  
How do different levels of pH in water affect the growth of grass?
- 7088W **McKenna A Knapp**  
Does water quality depend on location in a creek?
- 7089T **Mark A Leinberger**  
The Effects of Pollution on Solar Cell Productivity
- 7090S **Madison m Moody**  
How Does Salt Affect Sunflowers
- 7091W **Michael J Munson**  
Light Source efficiency

7092W **Luke F Narog**  
Optimizing the Protection of Buildings and  
Sculptures from the Effects of Acid Rain

7093W **Olivia L Rossman**  
Are Cell Phone Dangerous?

7094S **Alanna R Vennemann**  
How do different types of liquid affect plant  
growth?

*Medicine and Health Sciences (ME)*

7095W **Euphrosyne Daoutidou**  
Heart Rate Recovery Times

7096T **Olivia Gabrielle De Grace**  
Which Painkiller Dissolves the Fastest in Body  
Temperature Water?

7097T **Nathaniel R Farmer**  
Children's Exposure to Black Carbon Pollution in a  
Suburban School Setting

7098T **Katherine A Fitzgerald**  
Does Exercise Help You Do Better On Tests?

7099S **Sovigne Gardner**  
Meditation vs. Relaxation: the effects of meditation  
on heart rate recovery

7100T **Norberto Hernandez Torres, Jason M Llapa  
Team** - How does a shoe affect the speed of the  
runner?

7101T **Jenna L Miller**  
Are Human or Deer Teeth More Resistant to  
Effects of Beverages?

7102T **Demosthenes C Murdakes**  
Does Gatorade Improve Church Basketball Players  
Performance?

7103T **Elizabeth V Ott**  
Gluten vs. Gluten Free

7104T **Jordan R Skof**  
Are Fingerprint Patterns Inherited?

7105S **Jamie M. Steinmann**  
How do distractions in other senses affect vision?

7106W **Genevieve Thelen**  
Taste vs. Nutrition

7107T **Isabella Vicich**  
Taking Tunes to Heart

7108S **Marie X Wulff**  
Beverages and Blood Sugar

8102S **Kalu Yang, Tiffany Ho  
Team** - Growing Nails  
Project At Electricity Wall

*Microbiology (MI)*

7109S **Jasper Leo Fleming**  
Moldy Bread

7110S **Denasia A Hamilton**  
Heat and DNA

7111S **Michael King**  
What's That Smell?

7112S **Yusra M Osman**  
The Growth of Bacteria on Different Types of  
Liquids

7113S **Sigurd C. Ostlie-Olson**  
Does less light equal more mold?

7114S **Noah M Rooze**  
Is Raw Milk Safe?

*Physics and Astronomy (PH)*

7115S **Ethan A Davenport**  
Fastball: Overhand vs. Sidearm

7116W **Rachel Deering**  
Cohesion in Liquids

7117T **Greg P Dobihal, Sam J Henkes  
Team** - Fruits VS Vegetables

7118W **Elena Extrand**  
Does Size and Shape of an Object Affect How High  
it Floats

7119W **Andrew C Hienz**  
Near Space Flight

7121T **Jack W Hoover**  
How Does Temperature Affect Battery Life?

7120T **Alexander James Hoover**  
What uses less energy an Incandescent light,  
Fluorescent light, LED light, or a Candle?

7122W **Kevin L Hughes**  
Which Grade is the Loudest

7123W **Kate S Janda**  
The Effect of Different Voltages, Materials, and  
Solutions on Separating Hydrogen from Water  
using Electrolysis

7124W **Jadon Konkol**  
Hang time

7125S **Jada M Konop-De Freitas**  
How does the temperature of a ball affect its  
bounce?

7126S **Charlie Kramer**  
Mysterious Magnetism

- 7127W **Griffin D Lawton**  
Maglev Train versus Wheeled Train
- 7128W **Thomas Q McCoy**  
Surface Tension and How Different Liquids Affect it
- 7129W **Chad McNamara**  
Angle vs Standard Deviation
- 7130S **Taja M Nehotte**  
Does the Size of a Pulsar Influence Its Radiation?
- 7131W **Donovan Peterson**  
Catapult vs. Trebuchet
- 7132S **Max C Riley**  
Obtuse
- 7133W **Stephanie V Roberts**  
how does the surface area of canards affect the trajectory flight of a rocket?
- 7134 **Collette C Sarver**  
Using a LASER to measure the speed of light in different mediums
- 7135S **Gabe Demencio Vasquez Jr**  
How does the length of the barrel affect how accurate it is?
- 7136W **Amelia R Walker**  
Speed of Sound
- 7137T **Andrew H Warner**  
Does The Temperature of a Golf Ball Affect Its Roll?

#### *Plant Sciences (PS)*

- 7138W **Annie M Amen**  
Tomato Grafting: The Fruit of the Future
- 7139W **Jesse Caldwell-Tautges**  
Do Plants Like Caffeine?
- 7140T **Corrine N Dornbach**  
Earthworms and Plant Growth
- 7141W **Katie G Ericson**  
Colorful Carnations
- 7142S **Eleanor R Harker**  
Does the Type of Light Affect How Tall Bean Plants Grow?
- 7143T **Austin M Murr**  
Density Vs. Vitamin C
- 7144W **Theo J Schmidt**  
Heat, Steam, Pop!: Measuring Popcorn Moisture Levels
- 7145T **Anachie Elizabeth Stueve**  
Water Temperature Affects On Plant Growth

- 7146S **Star P Thao**  
Effect of Salt and Sugar on Grass Seeds
- 7148S **Pornthep Thao**  
Light Color and Its Effect on Plants
- 7147S **Ken Thao**  
Amount of Biofuel in Different Plant Materials
- 7149T **Brian D Turner**  
How do electromagnetic waves affect the germination of beans?
- 7150S **Bram M Valure**  
Growth Wars
- 7151S **Natalie Watters**  
Plants vs. Sulfuric Acid
- 7152T **Andrew M Weigel**  
Oat Processing
- 7153W **Spencer M Weiss**  
Radiation - The Silent Killer

## Grade 8

### *Animal Sciences (AS)*

- 8001W **Emma Faust**  
Dogs-Lefties or Righties?
- 8002S **Darby Kennedy**  
Differences Between Natural and Artificial Flavors
- 8003S **Sienna Skye Lee**  
The Effect On Guppy Behavior in Different Water Temperatures
- 8004S **Sasha K Oines**  
Mice, Music and Mazes, Oh My!
- 8005W **Helen Palmer**  
Doggie Dooty

### *Behavioral and Social Sciences (BE)*

- 8006S **Reina E Delgado, Pahwanna J Khem Team** - Do You Remember?
- 8007T **Russell Harvell**  
Sleight of Hand
- 8008S **Anthony Y Herr**  
Does listen to music affect testing?
- 8009S **Maxine I Lightfoot**  
Whether Exposure to the Concept of Free Will Affects Morality Choices
- 8010W **Jordan Maltese**  
Is the Moon Illusion Greater on Dark or Light Walls?

8011S **Daniel A Martinez**  
How Does Age and Type of Music Affect  
Concentration and Memory

8012S **Luke W Nelson**  
Does a Video Game Distract Away Pain?

8013S **Charlie Orloske**  
8th Graders Memorizing Music

8014S **Julien S Oxenham**  
Short-term Cognitive Effects of Playing Computer  
Games

8015W **Brendan J Quinlan**  
The Effect of Gatorade vs. Water on Heart Rate  
while Running

8016T **Bee Bee R Qureshi, Layla M Aden, Hasna L  
Jama  
Team** - Do You See It?

8017T **Jacob A Shirk**  
A Colored Memory

8018S **Ellie T Thorsgaard**  
Risk Perception and the Locality Heuristic

8020S **Nova F Yang**  
Got Cereal?

8019S **Billy Yang**  
The Affect of Transposed Words on Reading  
Ability

#### *Biochemistry (BI)*

8021S **Thomas B Fritts**  
How Does Coca-Cola Effect Different Kinds Of  
Meat

8022S **Tang Vang**  
Three Kind of Apple

#### *Cellular and Molecular Biology (CB)*

8023S **Amira Eromosele**  
Cigarette Smoke and Plant Growth

8024S **Dylan Robert Solberg Gillespie**  
Diffusion Lab

8025S **Samuel B Godfrey jr**  
Which bread does mold like best?

8026W **Tristan Jensen**  
Bacteria in Lake Water

8027W **Sam Laux**  
Thawing Chicken

8028S **Maddie L Post**  
Are Fingerprints Hereditary?

8029W **Lauren Smith**  
Hand Sanitizer

#### *Chemistry (CH)*

8030S **Lia Viola Chin-Purcell**  
How Does The Amount of Silica in a Clay Body  
Affect the Amount it Shrinks

8031S **Maria J Cullen**  
What is the Amount of Glucose Before and After  
the Addition of Lactase?

8032T **Matt B Dahl**  
Cooling Soda Using Solutions of Water, Ice, and  
Salt

8033W **Claire M Gorman**  
Water Electrolysis and Battery Voltage

8034T **Gina S Jostes**  
How Do Gummybears Compare to Other  
Adhesives?

8035S **Ronald Koran**  
Burning Firewood

8036W **Brendan Loney**  
Battery Bananza

8037W **Sarah M McGoldrick**  
Milk and Other Liquids Affect on Our Bones

8038W **Julian C Ng**  
Which Metals are Most Resistant to Corrosion

8039S **Ruthie E Nordquist**  
Crazy Corrosion

8040W **Destiny N Nutter**  
Perfume Acidity and pH Levels

8041T **Tyler S Radtke**  
The Cool Blue Light of Luminol: How Does  
Temperature Affect the Chemiluminescence  
Created by Luminol?

8042W **Kelli M Richardson**  
Power Potatoes

8043S **Adryan T Riesgraf-Mahon**  
Lemonade Taste Test

8044T **Laura J Sheets**  
Crystallization

8045T **Will J Teachout**  
Acid Snow!

8046T **Hannah M Wynia**  
Cold Glow, Hot Glow? Now You Can Know!

#### *Computer Science (CS)*

Computer Science (CS)

8047S **Joe M Holdreith**  
Does Time Of Day Affect Commercials

8048T **Craig A Munson JR**  
Virtual VS. Traditional Classrooms  
**Project At Electricity Wall**

*Earth and Planetary Science (EA)*

8049S **Owen M Donnelly**  
Growing Soybeans with River Water

8050S **Keith Eicher**  
Geothermal Power: High or Low Heat Steam?

8051W **Nina Loutchko**  
Geysers

8052W **Jared J McNiff**  
The Effect of Different Liquids on Limestone  
Erosion

*Energy and Transportation (ET)*

8053S **Marcelus J Ifonlaja**  
Testing Bernoulli's Principle Using Wing Shapes

8054W **Emily E Kirkevold**  
Candles

8055T **Daniel Kussow**  
Solar Power  
**Project At Electricity Wall**

8056S **Frederick J O'Brien**  
How Does Temperature Affect the Life of Batteries

8057T **Jordan D Thompson**  
Hydropower versus Wind Power  
**Project At Electricity Wall**

8058S **Lisa I Torstenson**  
Preheating Water With Compost

8059S **Kee Xiong**  
Electrical Generator

8060T **Max Ylitalo**  
Power up! Wind Turbine Design Optimization

*Engineering: Electrical and Mechanical (EE)*

8061W **Michael T Maloney, Joseph N Wappes**  
**Team** - Nerf Gun

8062T **Conlan E Olson**  
The Effect of the Angle of a Wing on the Wing's  
Performance: A Model  
**Project At Electricity Wall**

8063S **Kyle Van Heirseele**  
Electric Motors

8064W **Alana T Wells, Matia M Maciel**  
**Team** - Cover Your Energy

8065S **Carly C Zimmerman**  
Rovers: To Boldly Go [Without Stopping] Where No  
Man has Gone Before

*Engineering: Materials and Bioengineering (EN)*

8066T **Joseph A Baumann**  
How Far Will It Go!

8067S **Jack Cordero**  
What Type of Plywood Makes the Most Flexible  
Longboard?

8068T **Shane M Furlong**  
Which Golf Ball gives you the Extra Bounce

8069T **Alexander L Guzman, Jack Strand**  
**Team** - Which Material is the Best Sound  
Attenuator?

8070T **Michael W Hughes**  
Exterior House Color

8071S **Liam B. Kelly**  
Bending Bridges, Does it Matter?

8072T **Mitchell O Krueger**  
The Best Part of Waking Up Is Insulation In Your  
Cup

8073T **Angela R Yarusso**  
Get A Grip

*Environmental Management (EM)*

8074S **Dan Johnson**  
What Filter Works Best?

8075W **Roman D Kouznetsov**  
Investigation of the Reduction of Heat Absorption  
Using Artificial Materials

*Environmental Sciences (EV)*

8076W **Meagan C Chalfen**  
Are Lakes and Rivers Really Clean?

8077W **Arush Jain**  
Investigation of Renewable Energy Generation  
from Untapped Heat Sources

8079S **Cece Johnson**  
When Compared To Untreated Wood, Will Wood  
Treated With Creosote Contaminate The Soil,  
Water, And Plants In Raised Garden Beds?

8078S **Hunter Johnson**  
How Does The Change In Pond Size, Oxygen,  
Carbon Dioxide, Temperature, And pH Affect The  
Concentration Of Microorganisms In A Pond Over  
The Course Of A Summer?

- 8080S **Nicholas e Lewis**  
The Effect of Two Environments on the Growth of Sodium Crystals
- 8081W **Marcos Luna**  
Harnessing Earth
- 8082W **Noah Z Newbauer**  
Keep the Oil From the Soil
- 8083W **Paige D. Piper-Hauswirth**  
Does the Type of Plant Affect the Amount of Biomass Produced
- 8084T **Patrick L Votel**  
A Slick Problem
- 8085W **Devin T Weiman**  
Bleach vs. Bacteria
- 8086W **Ashonte D White**  
Underwater Destruction

*Mathematical Sciences (MA)*

- 8087S **Ethan N Levin**  
How does weather affect the housing market in St. Paul?
- 8088T **Michelle Mao**  
Get Cubed: Optimized Algorithm Solution for Rubik's Cube

*Medicine and Health Sciences (ME)*

- 8089S **Frances g Fuller**  
How does the different type of athletes affect physical fitness levels
- 8090S **Andrew R Hotchkiss**  
Energy Calories  
**Project At Electricity Wall**
- 8091T **Madison R Huna**  
Cinnamon Spice and Everything Nice: The Effect of Cinnamon on Lifespan of Caenorhabditis elegans  
**Project At Electricity Wall**
- 8092T **Michael O Leahy, Jacob T Thomas**  
**Team - Tics Disorder**  
**Project At Electricity Wall**
- 8093W **Kaylen A Lowe**  
Sun Protection
- 8094S **Serena R Mauro-Brown**  
Does Caffeine and Exercise affect Heart Rate
- 8095S **Mary C. McConville**  
In What Soils are Parasitic Ova Most Commonly Found?
- 8096T **Emily A Quaal**  
How does smell affect taste?

- 8097T **Orlando Rodriguez, Miguel Angel Rodriguez Gomez**  
**Team - Effects of Soda on Bone/ Teeth**
- 8098S **Kristiina E Ruppert**  
How much does your smell affect your taste?
- 8099T **Halle M Sterling**  
The Effect of Carbohydrates on Blood Sugar
- 8100T **Linzie A Wildenauer**  
The Impact of Fat Content on Blood Glucose Levels
- 8101S **Katherine C Wohletz**  
Are Left Brain And Right Brain Traits Genetically Passed Down Through Families?

*Microbiology (MI)*

- 8103T **Jason J Dick, Jesse A Dick**  
**Team - Does eye color affect night vision**
- 8104T **Anne F Franey**  
Onions Collect Bacteria
- 8105S **Katherine Hughes**  
Does Cell Phone Radiation Cause Damage to Brain Cells (Yeast)?
- 8106W **Carolyn K Jons**  
The Effect of Oxygen Removal Treatments on Mold Growth of Blueberries
- 8107W **Claire M Kopischke**  
What is the Most Effective Way to Clean Your Toothbrush?
- 8108S **Avery Q Larsson**  
The Myth of the Five-Second Rule
- 8109S **Daniel J Rockcastle**  
A HANDS ON BUSINESS: CAN NATURAL HAND SANITIZERS WORK AS WELL AS STORE BOUGHT ONES TO PREVENT THE SPREAD OF DISEASE?
- 8110S **Colleen P Scallen**  
Does the Continual Use of Purell® Actually Affect Bacteria Levels?
- 8111T **Lauren K Schmidt**  
Microbes with Metabolisms  
**Project At Electricity Wall**
- 8112T **Brooke N Schneider**  
Growing Bacteria
- 8113S **Michael J Sosa, Pang Her**  
**Team - Bacteria Growth**



### *Physics and Astronomy (PH)*

- 8114S **Eliot Berven**  
How Does The Temperature Of The Water Affect  
The Strength Of It's Surface Tension
- 8115T **Connor R Bidwell, Noah A Rohleder**  
**Team** - Air vs. helium in a soccer ball
- 8116W **George Folley**  
The Sweet Spot on the Backboard
- 8118W **Dylan J Gibson, Edward G Kim**  
**Team** - Tee Height
- 8117W **Deja M Gibson**  
What Color Shows Up Best in Fog
- 8119W **Mitchell J Gross**  
Measuring Diamagnetism Using Levitation
- 8120W **Daniel Kiely**  
Electro-Magnetics
- 8121S **John Kostohris**  
Trebuchet Physics
- 8122S **Shamus McGovern**  
Load Test on the Through Warten Truss Bridge
- 8123W **Sophia Ann Meza, Freya B Zank, Kailleen Perez**  
**Team** - Egg Drop
- 8124S **Matthew Munkelwitz**  
Solar Panel Angle Efficiency  
**Project At Electricity Wall**
- 8125T **Justin J Paschall**  
The Brawn of Bridges
- 8126S **Sophie Perron**  
Singing Dry Ice
- 8127T **Jack E Raverty**  
Light Absorbs
- 8128W **Cole A. Scherber**  
How does the height of shooting an object affect  
how far it will go?
- 8129W **Isaiah Skinner, Arnel A Johnson**  
**Team** - Water Bottle Rockets
- 8130W **Lucia M Uppgaard, Maria T Turch**  
**Team** - Archery
- 8131S **Ryan C Yang**  
Tennis Ball Mass and Trajectory

### *Plant Sciences (PS)*

- 8132S **Isak L Bowron**  
Does Radiation Affect the Growth of Plants?

- 8133S **Mairead D Brooks**  
Water or What?
- 8134S **Nikls Cherxa Chang, Thomas Moua**  
**Team** - Can plants grow upside down?
- 8135S **Ann M Leimbach**  
The Effects of Music on Kidney Beans
- 8136W **Audrey M Sheehy**  
Ionized Hydroponics vs. Ionized Aeroponics Vs.  
Aeroponics
- 8137S **See-Ua Thao**  
Changing Water Amounts and Seed Growth

## **High School**

### *Animal Sciences (AS)*

- 1001S **Raelyn M. Rassett, Samuel J Brown**  
Grade 9,9 - **Team** - Effects of Alcohol and Caffeine  
on Daphnia

### *Behavioral and Social Sciences (BE)*

- 1002T **Jenna L Allen**  
Grade 10 - Music and How It Affects Cognitive  
Thinking and Concentration
- 1003T **Lindsay A Becker**  
Grade 10 - Pictures Affecting the Memory of  
Content from Books
- 1004T **Emily J Blosberg**  
Grade 9 - Attention in a Glass
- 1005T **Cassie K Cecchetti**  
Grade 10 - How Does Color Affect Emotion?
- 1006T **Diamond C Dionne**  
Grade 9 - Bullying and Race
- 1007T **Juana M Espinoza**  
Grade 12 - Factors Contributing to Success of  
Native American Teen Mothers
- 1008T **Laura Garbe**  
Grade 11 - Variables in Physical Performance
- 1009T **Sonrisa Sierra Gauden**  
Grade 9 - Pulse Rate and Music
- 1010T **Laura J Hermansen**  
Grade 10 - The Effect of Music on Test Scores
- 1011T **Antonia M Hopkins**  
Grade 10 - Kids These Days
- 1012T **Olivia S Koski**  
Grade 10 - Does Music Have an Effect on  
Homework?

- 1013T **Laura S Landgraf, Maggie M Green**  
Grade 12,12 - **Team** - The Development of Visual Self-Recognition in Toddlers Through Mirror Reflections and Photographs
- 1014T **Meghan E Larson**  
Grade 10 - Eye Witness Testimonies; are they accurate enough to put someone behind bars?  
**Project At Electricity Wall**
- 1015W **Bhargavi Papisetty**  
Grade 10 - Forecasting Corn Prices in India using ARIMA Model  
**Project At Electricity Wall**
- 1016T **Hanna C Peterson**  
Grade 10 - The Effects of Caffeine and Chewing Gum on Blood Flow to the Brain
- 1017T **Anastasia P Pinney-Valtierra**  
Grade 9 - Trash
- 1018T **Brittany L Pooley**  
Grade 9 - Genuine Vs. Fake Smiles
- 1019W **Aris E Prince**  
Grade 12 - A Three-generational Study on Knowledge about and Sources Used to Find Information on Brain-related Conditions
- 1020T **Lisa J Ranft**  
Grade 10 - Correlations between Stress Level and the Amount of Physical Activity in Males and Females
- 1021T **Sangeetha A Shreedaran**  
Grade 10 - An Analysis of an Eyewitness Testimony
- 1022W **Camille I Smith**  
Grade 9 - Classroom of the Future: Interactive Software vs. Traditional Teaching Methods as a Viable or Nonviable Learning Tool
- 1023T **William Spaulding**  
Grade 9 - It's Kind Of A Funny Project
- 1024T **Scott A Svare**  
Grade 10 - The Effects of ADHD on Reaction Time
- 1025S **Daria Terenteva**  
Grade 11 - Comparison of human and situational cues on the perception of infrasound
- 1026T **Jeremiah Worley**  
Grade 11 - Alleviating Math Test Anxiety With Music
- Cellular and Molecular Biology (CB)*
- 1027W **Ishmam A Ahmed**  
Grade 12 - The Efficacy of Insulin Production By "Reprogrammed" Induced Pluripotent Stem Cells—Novel Developments  
**Project At Electricity Wall**
- 1028T **Thatcher Banh, Sierra M Adrian**  
Grade 12,12 - **Team** - Modulation of the M394L and M394Q Myosin Mutations by Oxidation
- 1029S **Sundus A Hassan, Aisha A Mohamed**  
Grade 9,9 - **Team** - Fruits Conducting Electricity
- 1030W **Anna M Hendrickson, Eva Wang**  
Grade 12,12 - **Team** - Interaction of Cyclin D1 and PPAR $\alpha$  in Cancer Cell Metabolism
- 1031S **Nasro T Mohamed, Farhiyo A Madobe**  
Grade 9,9 - **Team** - The inheritance of fingerprints
- Chemistry (CH)*
- 1032S **Xafsa A Ali, Naima M Haro**  
Grade 10,10 - **Team** - How Does Color Affect Heating by Absorption of Light?
- 1033W **John W Bode**  
Grade 9 - Marker Mayhem
- 1034W **Nathaniel A Breitenfeldt**  
Grade 12 - Characterizing spectroscopic properties of a new coumarin amino-acid dye for use in protein analyses
- 1035T **Destiny A Brown**  
Grade 11 - Potassium In Different Apple Varieties
- 1036S **Youa Chang**  
Grade 9 - Chalk as Rock
- 1037T **Amanda M Jimenez**  
Grade 9 - pH in Coffee
- 1038S **Foua Khang, Pajar Lee, Chin Nou Khang**  
Grade 9,9,9 - **Team** - Get Energized
- 1039T **Gene R Lamson III, Marshall G White jr**  
Grade 12,12 - **Team** - Lead in Drinking Water
- 1040S **Abigail M Larson-Barker, Jessica Yang**  
Grade 10,10 - **Team** - The Chemistry of Luminol
- 1041S **Gaozua Ly**  
Grade 9 - Chromatogram
- 1042S **Abraham A Murillo**  
Grade 10 - Effect of Aqueous CO $_2$  on Metal Oxidation
- 1043W **Partha Naidu**  
Grade 12 - Characterization and Application of Pseudoisocyanine-Iodide in Optical Devices  
**Project At Electricity Wall**
- 1044T **Sara K Riedesel**  
Grade 10 - The Make-up of Mascara
- 1045S **Selam A Tesfatsion**  
Grade 10 - What Factors Affect The Electrolysis of Different Types of Water?

1046S **Chue Fue Vue, Joshua K Vang, Rosalita Lyons**  
Grade 9,9,9 - **Team** - Chocolate Polymorphism

*Computer Science (CS)*

1047W **Samarth A Damania**  
Grade 12 - A Data-mining Approach to Identify Factors that Contribute to High Pharmaceutical Drug Costs

1048W **Caleb J Kumar**  
Grade 11 - Designing and Validating a Java program to Improve the Diagnosis of Bladder Cancer: Year 2

1049T **Ben McConnell**  
Grade 9 - Can You Build a Computer for \$100 or Less  
**Project At Electricity Wall**

1050W **Abhishek Nayar**  
Grade 10 - Project Myke  
**Project At Electricity Wall**

1051W **Rishi Sinha**  
Grade 12 - Predictive Modeling of Rehospitalization Using Health Care Claims Data  
**Project At Electricity Wall**

*Earth and Planetary Science (EA)*

1052T **Tanner L Hansen**  
Grade 9 - How do Plants Grow When the Direction of Gravity Changes?

*Energy and Transportation (ET)*

1053W **Robert S Dorn, Saeed Hakim-Hashemi**  
Grade 12,12 - **Team** - The Future of Lighting: Improving the efficiency of organic light-emitting diodes (OLEDs)

1054T **Carissa E Klonecz**  
Grade 12 - Revamping the World's Energy Sources One Crop at a Time: Phase II

1055T **Alynie K Xiong, Danny D Dang**  
Grade 11,11 - **Team** - One Step At A Time

1056S **Ia Yang, Alexis K Xiong**  
Grade 9,9 - **Team** - Maglev Train

*Engineering: Electrical and Mechanical (EE)*

1057T **Brandon Banh, Nathaniel Treimer**  
Grade 11,11 - **Team** - Crystal Lattices: A Study Exploring the Attributes of Molecular Structures

1058T **Aisha Rose Cacique**  
Grade 9 - The Kelvin Water Dropper

1059T **Nick J Campion**  
Grade 10 - The Correlation Between Gravitational Potential Energy and Kinetic Energy

1060T **Katherine R Carman**  
Grade 10 - Dragster Aerodynamics: A Scientific Study on the Effects of Shape on an Object's Aerodynamics  
**Project At Electricity Wall**

1061T **Josh H Daum**  
Grade 9 - Is Moist Air a Better Conductor Than Dry Air?

1062T **Alex Eitzman**  
Grade 9 - Robot Car  
**Project At Electricity Wall**

1063T **Maxwell M Johnson**  
Grade 10 - The Effects of Altering the Various Dimensions of the Wing Appendage on Fixed Wing Aircraft

1064W **Taylor S McCanna**  
Grade 12 - Engineering an Inexpensive Mobile Electric Field Mill to Measure the Global Electric Circuit to Track Global Climate Change

1065T **Dane R Olson**  
Grade 12 - Development of a Stair-Climbing System

1066T **Peace N Sinyigaya**  
Grade 9 - Bridges

1067W **Alexander Spencer, Evan Chen**  
Grade 12,12 - **Team** - Recycling Waste Heat: Development of a Low-cost Thermoelectric Generator for Off-grid Energy Production  
**Project At Electricity Wall**

1068T **Andrew Wade**  
Grade 12 - Why Use Ice? Developing a Solar Powered Cooler  
**Project At Electricity Wall**

*Engineering: Materials and Bioengineering (EN)*

1069S **Nyle N Enright**  
Grade 12 - Grinding for a Finish!

1070W **Alejandro J Fenn, Andrew Engel**  
Grade 12,12 - **Team** - Engineering an Optical Cell to Improve Lithium-ion Battery Safety

1071W **Felicia Y Hamann**  
Grade 11 - Producing Water Out of Thin Air  
**Project At Electricity Wall**

1072W **Emily Hannigan**  
Grade 12 - Collecting Gas-Phase Silica Nanoparticles Into Liquid Water Using An Electric Field  
**Project At Electricity Wall**

1073T **Heather J Stone**  
Grade 10 - Developing A New Seeder For Small African Grains

- 1074W **Sam M Weiss**  
Grade 11 - Granular Segregation Patterns in a Rotating Drum
- Environmental Management (EM)*
- 1075T **Micah J Hill, Michelle J LaGarde**  
Grade 12,12 - **Team** - Formulating a Localized Equation to Convert from Electrical Conductivity to NaCl in Minneapolis Metro Area Waters
- 1076W **Iman Pakzad**  
Grade 10 - Milfoil Tendrils and Tropisms
- 1077W **Ellen J Soskin**  
Grade 12 - Bioremediation Potential of Pseudomonas putida Fu1 to Prevent Toxic Runoff Into Water Supplies
- Environmental Sciences (EV)*
- 1078T **Julia A Amaral**  
Grade 9 - Does the Rating of an Air Filter Really Make a Difference?
- 1079T **Laura E Berge**  
Grade 10 - The Effect of Household Chemicals on Photosynthesis
- 1080T **Anushua Bhattacharya**  
Grade 12 - Toxicity of Ag and Au Nanoparticles on Shewanella Oneidensis
- 1081T **Arnoldo Bruce**  
Grade 11 - NaCl Tolerance of Two Ribbon Leeches: Nephelopsis obscura and Erpobdella punctata
- 1082W **Emily Chen**  
Grade 10 - Low Cost Biosorbent for Heavy Metal Removal
- 1083S **Kaia S Fahnestock, Rory A Coleman**  
Grade 10,10 - **Team** - The Ford Plant's Impact on Hidden Falls Water
- 1084T **Angel E Harding, Alicia M Jourdain**  
Grade 12,12 - **Team** - Polychlorinated biphenyl in Minnesota Metro Area Wetlands
- 1085T **Ryan C Pinkalla**  
Grade 12 - Whitetail Deer Management Affects On Browsable Plant Material
- 1086T **Taylor J Swingle**  
Grade 10 - Light Pollution Around Cities
- Mathematical Sciences (MA)*
- 1087T **Quayd K Korman**  
Grade 9 - Which Method is Fastest for Solving a Rubik's Cube
- 1088T **Christopher K Larsson**  
Grade 10 - Derivatives in Real Life  
**Project At Electricity Wall**
- 1089W **Apekshya Panda**  
Grade 10 - Applications of Probability
- 1090W **Apurv H Shekhar**  
Grade 10 - Location, Location, Capacity: K-Means Clustering with Capacity Constraints  
**Project At Electricity Wall**
- 1091T **Alex w Uloth**  
Grade 10 - "Just How Far Are You Away"
- 1092W **Roy Zhao**  
Grade 11 - New Models for Tat Dynamics
- Medicine and Health Sciences (ME)*
- 1093T **Redeat F Abegaz, Quyen Nguyen**  
Grade 11,11 - **Team** - The Effectiveness of Cisplatin, Phosphoramidate Mustard, and the Combination of the Two as Chemotherapeutic Agents on Non-Small Lung Cancer Cells A549
- 1094T **Aliya Ahmadi**  
Grade 10 - The effects of vitamin supplements A, B12, and C.
- 1095T **Katie M. Dennis**  
Grade 10 - The Effects of Gatorade vs. Water on a High School Student's Heart Rate
- 1096T **John Fesenmaier**  
Grade 10 - The Effects of Exercise on Blood Pressure
- 1097T **Ryan J Kibler**  
Grade 10 - Does Caffeine Affect Productivity of the Heart?
- 1098W **Jenny Lai**  
Grade 11 - The Relationship of Cognitive Assessed Abilities to Errors in Instrumental Activities of Daily Living of Adults in Memory Care  
**Project At Electricity Wall**
- 1099W **Paimon Y Pakzad**  
Grade 12 - A Systems Biology Approach to Inducing Bacteriostatic Effects on M. Extorquens
- 1100S **Zoe E.Y. Palmer, Lauren E Della Selva**  
Grade 10,10 - **Team** - Tooth Decay
- 1101W **Mahati Pidaparti**  
Grade 12 - Early Studies on Interactions Between Novel Proteins Found in a Macromolecular Metabolic Complex in Leukemia Cells  
**Project At Electricity Wall**
- 1102T **Danielle M Pineiro**  
Grade 9 - Sweetener Versus Sweetener

1103W **Jessica Ryvlin, Claire M Simpson**  
Grade 11,10 - **Team** - Mercaptopyruvate-TEA: A Possible Antidote Against Homeland Security Threats of Chlorine Poisoning

1104W **Aswin Somasundaram**  
Grade 12 - Systemic Effect of Hypothermic Conditions in Bypass Surgery  
**Project At Electricity Wall**

1105T **Jan Splittgerber**  
Grade 10 - An Examination of Orthopedic Injuries Among High School Athletes : A Call for Additional Research

1106W **Roshny Vijayakar**  
Grade 12 - Food for Thought: Perinatal Iron Deficiency and the Brain

1107W **William Zeng, Orien Zeng**  
Grade 10,9 - **Team** - Deletion of Ndst1 in Smooth Muscle Decreases Aortic Wall Area and Vascular Smooth Muscle Cell Count  
**Project At Electricity Wall**

#### *Microbiology (MI)*

1108T **Aditi Das**  
Grade 10 - Cell Polarity in Bacteria: Analysis Using Green Fluorescent Protein Fusions

1109T **Kristyna M Hughes**  
Grade 10 - Placebo or Antibiotic?

1110W **Naveen Jain**  
Grade 12 - Mechanism of Tumor Suppression by CHD5: Phase Two  
**Project At Electricity Wall**

1111W **Yan Jiao**  
Grade 12 - Factors That Affect the Spread of Food-borne Multidrug-resistant Escherichia coli

1112T **Vuochly Long**  
Grade 10 - The Effectiveness of 62% Ethyl Alcohol Hand Sanitizer On Different Surface Types

1113T **Keshav K Mangalick**  
Grade 12 - Genetic Characteristics of Influenza A Viruses in Swine Populations  
**Project At Electricity Wall**

#### *Physics and Astronomy (PH)*

1114S **Emily A Devaney, Mackenzie J Olson**  
Grade 9,9 - **Team** - The Better Flex

1115T **John C Gilleo**  
Grade 9 - Coins Walking Up A Wire

1116W **Duligur Ibeling**  
Grade 12 - The Metallicity-Dependent Transition between White Dwarfs and Type II Supernovae  
**Project At Electricity Wall**

1117W **Sibi S Murugesan**  
Grade 12 - Visual Identification of Muon Neutrino Interactions in the NOvA Detector Prototype  
**Project At Electricity Wall**

1118T **Natasha M Pilacinski**  
Grade 9 - Pinhole Camera: Optimal Aperture Diameter

1119T **Jacob R Sandvig**  
Grade 10 - State of Hockey

1120T **Christopher M Santilli**  
Grade 10 - Does Bone Rubbing Wooden Baseball Bats Affect the Distances a Baseball is Hit Off of Them?

1121T **Peter A Smith**  
Grade 9 - How Far Apart Are Compact-Disc Tracks?

1122T **Cory B Spawn**  
Grade 9 - Which type of Yagi antenna works the best?

1124S **Phongxo Thao**  
Grade 9 - Its a bird, its a plane, its a paper airplane??

1123S **Jerry Thao**  
Grade 9 - Pinhole Camera

1125S **Tom Vennemann**  
Grade 12 - Projecting Particles  
**Project At Electricity Wall**

1126T **Andy Ylitalo**  
Grade 11 - The Total Displacement Cross Section of Hexagonal Boron Nitride Monolayers  
**Project At Electricity Wall**

#### *Plant Sciences (PS)*

1127T **Krista E Bain**  
Grade 10 - Thrive or Survive? An analysis of water type on the growth of hydroponically grown Lycopersicon Lycopersicum.

1128T **Ayden J Delaney**  
Grade 9 - Does the Presence of Earthworms Affect Plant Growth?

1129T **Mickie J DuFresne-To**  
Grade 9 - How Do Earthworms Affect Plant Growth?

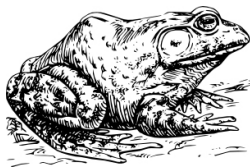
1130S **Elijah M Holliday**  
Grade 10 - Hydrogen Peroxides Effect on Pea seed Germination

1131T **Alexander J Klein**  
Grade 9 - Into the Light

1132T **Bonssa Teizazu**  
Grade 10 - The Effect of Differentiating pH Water  
Solutions on the Growth Rate of the Hedera Helix  
Plant Species



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Science Fair Finalists!



## Open Minds Spark Success

Scientists and engineers make it happen.  
You have what it takes. Congratulations,  
Science Fair Finalists!

Note: In teams with mixed grades, students compete at the highest grade of the team.

<b>Grade 6</b>		<b>Grade 7</b>	
Alvarez, Jocelyne	7001T	Macon, Nya L	7051W
Anderson, Tommy	6065W	Maldonado, Angel	6086T
Atiq, Asiah L.	6066S	Malka, Talia S	6058S
Barton, Andrew L	6031T	Mattocks, Katie E	6046S
Betts, Sarah	6001W	McConville, Joe C.	6037S
Bohacek, Siri	6014T	McGill, Devin T	6051S
Bohacek, Carl	6067T	Michalski, Sophia A	6008S
Bowen, Caroline G.	6061W	Morrissey, Liam	6035S
Burke, Adam J	6055T	Mullaney, Kylie K	6081W
Burke, Samantha	6068W	Naula, Michael A.	6086T
Calvin-Stokes, Keith	6015T	Nelson, Wyatt J	6047T
Chaffee, Isabella	6016S	Nevells, Kylie	6009W
Clemente, Giselle D	7001T	Newman, Daniel T	6082W
Copland, Lauren M	6032W	Obert, Ian	6003S
Davis, Zander Q	6044S	Olk, Megan M	6025W
Deng, Cassidy	6069W	Olson, Elise K	6059W
Devens, Eve	6085S	Olson, Riley	6010W
Dombrow, Charlie W	6051S	Oubaha, Sophie N	6087S
Dorn, Nicole	6017W	Perpich, Megan K	6041T
Dovre Wudali, Adi	6035S	Pettis, Katrina A	6026S
Dowdy, David M	6018S	Ponce, Santiago	6011T
Duliere, Eric	6006S	Pope, Olivia K.	6083S
Ferry, Ellen	6070S	Pryor, Meg M	6052W
Garvey, May R	6056S	Radtke, Nathan B	6002T
Gauker, Christen V.	6071T	Robles, Edgar	6011T
Goaley, Samuel J	6039T	Scheid, Ellie A	6012W
Goodell, Connor J	6033S	Schroepfer, Otto	6034S
Gorman, Audrey	6019W	Schuster, Zachary	6038S
Graham, Calum	6072T	Segelstrom, David B	6088W
Hayden, Thomas S	6020S	Shannon, Mae E.	6013T
Hennessey, Ethan D	6040S	Solomon, Brady T	6004W
Her, David M	6073W	Stende Miss., Ava M	6048W
Heyman, Joseph	6036S	Sweetland, Jake	6042T
Hidalgo, Emilia	6074S	Trembath, Amelia A	6060W
Hokanson, Sofie	6075S	Valencia, Javier	6027S
Jaksha, David A	6076S	Vizenor, Clay D	6047T
Jurek, Olivia A	6021T	Vue, Shoua Yee	6005S
Jurek, James M	6030W	Wallisch, Emma	6084S
Kamm, Will	6049W	Warner, Samuel L	6053S
Keely, Addison R	6077S	Watkins, Amirah A	6054W
Keller, Zach	6078W	Weber, Peter	6034S
Klein, Evan J	6002T	Weiland, Moira	6063T
Kobienia, Bergen	6062W	Westman, Erin I	6089S
Kopischke, Grace E	6050W	Wiebe, Margaret S	6043S
Kouay , Sophia H	6079S	Willard, Savannah K	6028W
Kruchten, Elizabeth A	6007W	Williams , Morgan E	6029W
Lampros, Lillian A	6057S	Wilmes, Ethan	6064S
Leach, Helen F	6045S		
Lee, Tupheng	6080S	Adam, Aniq S	7035S
Lee, Pazao F.	6022S	Amen, Annie M	7138W
Lesmeister, Jessica J	6023T	Bergstrom 1, Sam L.	7036S
Lor, Christopher A.	6024S	Blaney, Maggie D	7027T
		Bollensen, Abby	7061W
		Brill, Mitchell D	7072W
		BrudnakVoss, Ethan A	7028S
		Calatayud, Lucia M	7037S
		Caldwell-Tautges, Jesse	7139W
		Cavanaugh Ms., Abigail P	7009T
		Chiarella, Adam J	7038T
		Cullen, David	7039T
		Daoutidou, Euphrosyne	7095W
		Davenport, Ethan A	7115S
		Davis, Jarod G	7077S
		De Grace, Olivia Gabrielle	7096T
		Deering, Rachel	7116W
		Demitroff, Elizabeth	7078S
		Deutz, Laura M	7010W
		Devaney, Hanna k	7059S
		Dobihal, Greg P	7117T
		Donner, Grace L	7002T
		Dornbach, Corrine N	7140T
		Doughty, Kayla V	7011W
		Dowell, Carley M	7003T
		Elsen, Emmalyn R	7012W
		Ericson, Katie G	7141W
		Extrand, Elena	7118W
		Farmer, Nathaniel R	7097T
		Farnam, Nolan S	7040W
		Fitzgerald, Katherine A	7098T
		Fleming, Jasper Leo	7109S
		Flynn, Seamus	7086S
		Fredrickson, Ella N	7041S
		Fredrickson, Bengt A	7062W
		Gallucci Ms., Grace A	7042T
		Gardner, Grace L	7079S
		Gardner, Sovigne	7099S
		Gomes, William S.	7013T
		Gomez, Mara	7001T
		Goodell, Kirby J	7014S
		Grausam, Carolyn	7034W
		Groth, Olivia Pearl	7063W
		Gupta, Shruti	7043W
		Hafner, Victoria B	7046T
		Hamilton, Denasia A	7110S
		Hanger, Sheridan L	7029W
		Harker, Eleanor R	7142S
		Hart, Damyan W	7087S
		Haskins, Marcus D	7085T
		Hawkins, Maddie	7044S
		Hearst, Jacob C	7045S
		Hedrick, Sophie	7015W
		Heffernan, Lucas p	7030S
		Henkes, Sam J	7117T
		Henschell, Kathryn T	7046T
		Her, Pang	8113S
		Hernandez Torres, Norberto	7100T
		Hienz, Andrew C	7119W
		Hohlfeld, Hunter	7016W

Note: In teams with mixed grades, students compete at the highest grade of the team.

Hollingsworth, Claire M	7047T	Romero, Camille	7068W	Chalfen, Meagan C	8076W
Holman, Iris C	7064S	Rooze, Noah M	7114S	Chang, Nikls Cherxa	8134S
Hoover, Jack W	7121T	Rossmann, Olivia L	7093W	Chin-Purcell, Lia Viola	8030S
Hoover, Alexander James	7120T	Sanislo, Craig Michael	7069T	Cordero, Jack	8067S
Hughes, Kevin L	7122W	Sarver, Collette C	7134	Cullen, Maria J	8031S
Ince, Duncan M	7080T	Schmidt, Theo J	7144W	Dahl, Matt B	8032T
Janda, Kate S	7123W	Scott, Gracey B	7055W	Delgado, Reina E	8006S
Jing, Serena	7048S	Seitz, Greta	7022W	Dick, Jesse A	8103T
Jurek, Anthony L	7073W	Shannon, Noah T	7023T	Dick, Jason J	8103T
Kammuller, Mira E	7049S	Silver, Imogene J	7033S	Donnelly, Owen M	8049S
Kane, Emma	7017W	Skof, Jordan R	7104T	Eicher, Keith	8050S
Karan, Mad A	7004S	St.Germain, Alicia	7007S	Eromosele, Amira	8023S
King, Michael	7111S	Star, Kara P	7056T	Faust, Emma	8001W
Knapp, McKenna A	7088W	Steckler, Josh P	7085T	Folley, George	8116W
Knoer, Carson L	7005W	Steinmann, Jamie M.	7105S	Franey, Anne F	8104T
Konkel, Jadon	7124W	Strom, Karina F	7008S	Fritts, Thomas B	8021S
Konop-De Freitas, Jada M	7125S	Stueve, Anachie Elizabeth	7145T	Fuller, Frances g	8089S
Koski, Giles M	7065W	Subramanian, Al A	7070S	Furlong, Shane M	8068T
Kramer, Charlie	7126S	Swartz, Jack A	7076S	Gibson, Dylan J	8118W
Krauss, Heidi N	7066W	Thao, Ken	7147S	Gibson, Deja M	8117W
Krummen, Andrew S	7074W	Thao, Pornthep	7148S	Gillespie, Dylan Robert	8024S
Lawton, Griffin D	7127W	Thao, Star P	7146S	Solberg	
Leinberger, Mark A	7089T	Thelen, Genevieve	7106W	Godfrey jr, Samuel B	8025S
Llapa, Jason M	7100T	Thompson, Richard L	7057S	Gorman, Claire M	8033W
Lozano, Joanna N	7018T	Turner, Brian D	7149T	Gross, Mitchell J	8119W
Lu, Michelle J	7031W	Valure, Bram M	7150S	Guzman, Alexander L	8069T
Lundquist, Veronica A	7050T	Vang, Nathan	7060S	Harvell, Russell	8007T
Manzanares, Vanessa	7052S	Vasquez Jr, Gabe Demencio	7135S	Herr, Anthony Y	8008S
Maxam, Natalie E	7053S	Venkatrathnam, Caleb E	7058S	Ho, Tiffany	8102S
Mayer, Laura J	7054S	Vennemann, Alanna R	7094S	Holdreith, Joe M	8047S
McCoy, Thomas Q	7128W	Vicich, Isabella	7107T	Hotchkiss, Andrew R	8090S
McNamara, Chad	7129W	Vievering, Amy C	7081T	Hughes, Michael W	8070T
Mellema, Claire E	7032W	Wagner, Colleen E	7024W	Hughes, Katherine	8105S
Meza, Sophia Ann	8123W	Walker, Amelia R	7136W	Huna, Madison R	8091T
Milbauer, Siena I	7019S	Walker, Alyse J	7025T	Ifonlaja, Marcelus J	8053S
Miller, Jenna L	7101T	Warner, Andrew H	7137T	Jain, Arush	8077W
Moody, Madison m	7090S	Warwick, Henry	7082T	Jama, Hasna L	8016T
Mraz, Justin	7020W	Watters, Natalie	7151S	Jensen, Tristan	8026W
Mueller, Lucas C	7075S	Weber, Joseph M.	7083T	Johnson, Dan	8074S
Munson, Michael J	7091W	Weigel, Andrew M	7152T	Johnson, Arnel A	8129W
Murdakes, Demosthenes C	7102T	Weiss, Spencer M	7153W	Johnson, Hunter	8078S
Murr, Austin M	7143T	Welwoie, Dearest M	7051W	Johnson, Cece	8079S
Narog, Luke F	7092W	Wulff, Marie X	7108S	Jons, Carolyn K	8106W
Nehotte, Taja M	7130S	Wysopal, Matthew W	7026W	Jostes, Gina S	8034T
Olson, Devon	7084T	Xiong, Yufeng K	7071S	Kelly, Liam B.	8071S
Osman, Yusra M	7112S	Yang, Kalu	8102S	Kennedy, Darby	8002S
Ostlie-Olson, Sigurd C.	7113S			Khem, Pahwana J	8006S
Ott, Elizabeth V	7103T			Kiely, Daniel	8120W
Perez, Kailleen	8123W			Kim, Edward G	8118W
Peterson, Patrick	7067S	Aden, Layla M	8016T	Kirkevold, Emily E	8054W
Peterson, Donovan	7131W	Baumann, Joseph A	8066T	Kopischke, Claire M	8107W
Poppert, Sophia	7006S	Berven, Eliot	8114S	Koran, Ronald	8035S
Reed, Timmy	7021W	Bidwell, Connor R	8115T	Kostohris, John	8121S
Riley, Max C	7132S	Bowron, Isak L	8132S	Kouznetsov, Roman D	8075W
Roberts, Stephanie V	7133W	Brooks, Mairead D	8133S	Krueger, Mitchell O	8072T

**Grade 8**



Kussow, Daniel	8055T	Scherber, Cole A.	8128W	Breitenfeldt, Nathaniel A	1034W
Larsson, Avery Q	8108S	Schmidt, Lauren K	8111T	Brown, Samuel J	1001S
Laux, Sam	8027W	Schneider, Brooke N	8112T	Brown, Destiny A	1035T
Leahy, Michael O	8092T	Sheehy, Audrey M	8136W	Bruce, Arnoldo	1081T
Lee, Sienna Skye	8003S	Sheets, Laura J	8044T	Cacique, Aisha Rose	1058T
Leimbach, Ann M	8135S	Shirk, Jacob A	8017T	Campion, Nick J	1059T
Levin, Ethan N	8087S	Skinner, Isaiah	8129W	Carman, Katherine R	1060T
Lewis, Nicholas e	8080S	Smith, Lauren	8029W	Cecchettini, Cassie K	1005T
Lightfoot, Maxine I	8009S	Sosa, Michael J	8113S	Chang, Youa	1036S
Loney, Brendan	8036W	Sterling, Halle M	8099T	Chen, Emily	1082W
Loutchko, Nina	8051W	Strand, Jack	8069T	Chen, Evan	1067W
Lowe, Kaylen A	8093W	Teachout, Will J	8045T	Coleman, Rory A	1083S
Luna, Marcos	8081W	Thao, See-Ua	8137S	Damania, Samarth A	1047W
Maciel, Matia M	8064W	Thomas, Jacob T	8092T	Dang, Danny D	1055T
Maloney, Michael T	8061W	Thompson, Jordan D	8057T	Das, Aditi	1108T
Maltese, Jordan	8010W	Thorsgaard, Ellie T	8018S	Daum, Josh H	1061T
Mao, Michelle	8088T	Torstenson, Lisa I	8058S	Delaney, Ayden J	1128T
Martinez, Daniel A	8011S	Turch, Maria T	8130W	Della Selva, Lauren E	1100S
Mauro-Brown, Serena R	8094S	Uppgaard, Lucia M	8130W	Dennis, Katie M.	1095T
McConville, Mary C.	8095S	Van Heirseele, Kyle	8063S	Devaney, Emily A	1114S
McGoldrick, Sarah M	8037W	Vang, Tang	8022S	Dionne , Diamond C	1006T
McGovern, Shamus	8122S	Votel, Patrick L	8084T	Dorn, Robert S	1053W
McNiff, Jared J	8052W	Wappes, Joseph N	8061W	DuFresne-To, Mickie J	1129T
Moua, Thomas	8134S	Weiman, Devin T	8085W	Eitzman, Alex	1062T
Munkelwitz, Matthew	8124S	Wells, Alana T	8064W	Engel, Andrew	1070W
Munson JR, Craig A	8048T	White, Ashonte D	8086W	Enright, Nyle N	1069S
Nelson, Luke W	8012S	Wildenauer, Linzie A	8100T	Espinoza, Juana M	1007T
Newbauer, Noah Z	8082W	Wohletz, Katherine C	8101S	Fahnestock, Kaia S	1083S
Ng, Julian C	8038W	Wynia, Hannah M	8046T	Fenn, Alejandro J	1070W
Nordquist, Ruthie E	8039S	Xiong, Kee	8059S	Fesenmaier, John	1096T
Nutter, Destiny N	8040W	Yang, Ryan C	8131S	Garbe, Laura	1008T
O'Brien, Frederick J	8056S	Yang, Nova F	8020S	Gaulden, Sonrisa Sierra	1009T
Oines, Sasha K	8004S	Yang, Billy	8019S	Gilleo, John C	1115T
Olson, Conlan E	8062T	Yarusso, Angela R	8073T	Green, Maggie M	1013T
Orloske, Charlie	8013S	Ylitalo, Max	8060T	Hakim-Hashemi, Saeed	1053W
Oxenham, Julien S	8014S	Zank, Freya B	8123W	Hamann, Felicia Y	1071W
Palmer, Helen	8005W	Zimmerman, Carly C	8065S	Hannigan, Emily	1072W
Paschall, Justin J	8125T			Hansen, Tanner L	1052T
Perron, Sophie	8126S			Harding, Angel E	1084T
Piper-Hauswirth, Paige D.	8083W			Haro, Naima M	1032S
Post, Maddie L	8028S	<b>High School</b>		Hassan, Sundus A	1029S
Quaal, Emily A	8096T	Abegaz, Redeat F	1093T	Hendrickson, Anna M	1030W
Quinlan, Brendan J	8015W	Adrian, Sierra M	1028T	Hermansen, Laura J	1010T
Qureshi, Bee Bee R	8016T	Ahmadi, Aliya	1094T	Hill, Micah J	1075T
Radtke, Tyler S	8041T	Ahmed, Ishmam A	1027W	Holliday, Elijah M	1130S
Raverty, Jack E	8127T	Ali, Xafsa A	1032S	Hopkins, Antonia M	1011T
Richardson, Kelli M	8042W	Allen, Jenna L	1002T	Hughes, Kristyna M	1109T
Riesgraf-Mahon, Adryan T	8043S	Amaral, Julia A	1078T	Ibeling, Duligur	1116W
Rockcastle, Daniel J	8109S	Bain, Krista E	1127T	Jain, Naveen	1110W
Rodriguez, Orlando	8097T	Banh, Thatcher	1028T	Jiao, Yan	1111W
Rodriguez Gomez, Miguel	8097T	Banh, Brandon	1057T	Jimenez, Amanda M	1037T
Angel		Becker, Lindsay A	1003T	Johnson, Maxwell M	1063T
Rohleder, Noah A	8115T	Berge, Laura E	1079T	Jourdain, Alicia M	1084T
Ruppert, Kristiina E	8098S	Bhattacharya, Anushua	1080T	Khang, Foua	1038S
Scallen , Colleen P	8110S	Blosberg, Emily J	1004T	Khang, Chin Nou	1038S
		Bode, John W	1033W		

Kibler, Ryan J	1097T	Smith, Camille I	1022W
Klein, Alexander J	1131T	Smith, Peter A	1121T
Kloncz, Carissa E	1054T	Somasundaram, Aswin	1104W
Korman, Quayd K	1087T	Soskin, Ellen J	1077W
Koski, Olivia S	1012T	Spaulding, William	1023T
Kumar, Caleb J	1048W	Spawn, Cory B	1122T
LaGarde, Michelle J	1075T	Spencer, Alexander	1067W
Lai, Jenny	1098W	Splittgerber, Jan	1105T
Lamson III, Gene R	1039T	Stone, Heather J	1073T
Landgraf, Laura S	1013T	Svare, Scott A	1024T
Larson, Meghan E	1014T	Swingle, Taylor J	1086T
Larson-Barker, Abigail M	1040S	Teizazu, Bonssa	1132T
Larsson, Christopher K	1088T	Terenteva, Daria	1025S
Lee, Pajar	1038S	Tesfatsion, Selam A	1045S
Long, Vuochly	1112T	Thao, Phongxo	1124S
Ly, Gaozua	1041S	Thao, Jerry	1123S
Lyons, Rosalita	1046S	Treimer, Nathaniel	1057T
Madobe, Farhiyo A	1031S	Uloth, Alex w	1091T
Mangalick, Keshav K	1113T	Vang, Joshua K	1046S
McCanna, Taylor S	1064W	Vennemann, Tom	1125S
McConnell, Ben	1049T	Vijayakar, Roshny	1106W
Mohamed, Aisha A	1029S	Vue, Chue Fue	1046S
Mohamed, Nasro T	1031S	Wade, Andrew	1068T
Murillo, Abraham A	1042S	Wang, Eva	1030W
Murugesan, Sibi S	1117W	Weiss, Sam M	1074W
Naidu, Partha	1043W	White jr, Marshall G	1039T
Nayar, Abhishek	1050W	Worley, Jeremiah	1026T
Nguyen, Quyen	1093T	Xiong, Alexis K	1056S
Olson, Dane R	1065T	Xiong, Alynie K	1055T
Olson, Mackenzie J	1114S	Yang, Ia	1056S
Pakzad, Paimon Y	1099W	Yang, Jessica	1040S
Pakzad, Iman	1076W	Ylitalo, Andy	1126T
Palmer, Zoe E.Y.	1100S	Zeng, Orient	1107W
Panda, Apekshya	1089W	Zeng, William	1107W
Papisetty, Bhargavi	1015W	Zhao, Roy	1092W
Peterson, Hanna C	1016T		
Pidaparti, Mahati	1101W		
Pilacinski, Natasha M	1118T		
Pineiro, Danielle M	1102T		
Pinkalla, Ryan C	1085T		
Pinney-Valtierra, Anastasia P	1017T		
Pooley, Brittany L	1018T		
Prince, Aris E	1019W		
Ranft, Lisa J	1020T		
Rassett, Raelyn M.	1001S		
Riedesel, Sara K	1044T		
Ryvlin, Jessica	1103W		
Sandvig, Jacob R	1119T		
Santilli, Christopher M	1120T		
Shekhar, Apurv H	1090W		
Shreedaran, Sangeetha A	1021T		
Simpson, Claire M	1103W		
Sinha, Rishi	1051W		
Sinyigaya, Peace N	1066T		



**The Twin Cities Regional Science Fair  
family has lost a longtime friend,  
judge, and TCRSF volunteer,**

**Bill Bredesen**  
*We will miss you, Bill!*





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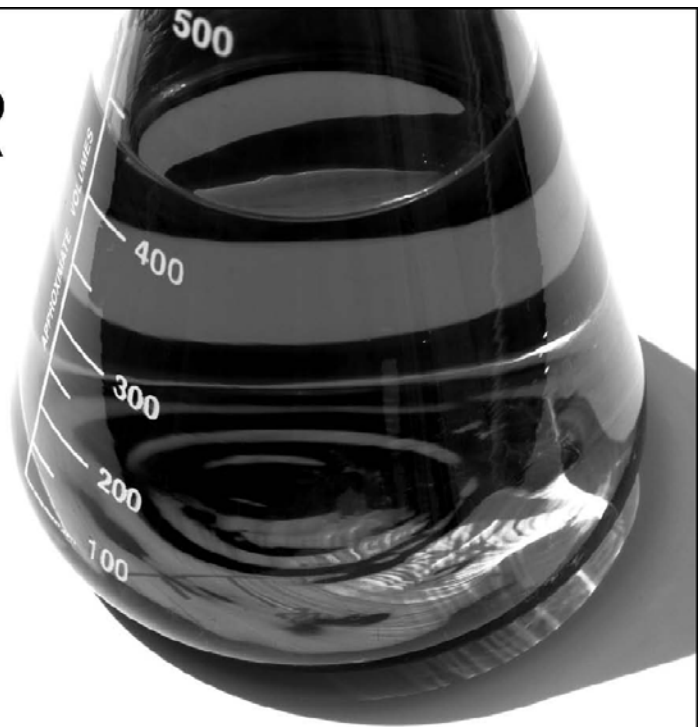
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## TWIN CITIES REGIONAL SCIENCE FAIR "ISEF" ALUMNI

Students Chosen to Represent the Twin Cities Fairs at International Science & Engineering Fair

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

1996	Laurie Louis Parker Roseville High School, Roseville	1999	Jennica Slattery Minnehaha Academy, Minneapolis
1996	David Loy Bowe Burnsville Senior High School, Burnsville	1999	Chrissy Jones Minnetonka High School, Minnetonka-Team
1996	Michael Scott Lohman Expo III High School, St. Paul	1999	Elizabeth Larkin Breck School, Minneapolis
1996	Victoria Reynolds Miller St. Agnes High School, St. Paul	1999	Melissa Borken Minnetonka High School, Minnetonka
1996	Anna Navarro Minnetonka High School, Minnetonka	1999	Alli Kellogg Minnetonka High School, Minnetonka-Team
1996	Michelle Lee Monnens Minnetonka High School, Minnetonka	2000	Mark Galatowitsch Highland High School, St. Paul
1996	James Justin Wilson Minnetonka High School, Minnetonka-Team	2000	Jennica Slattery Minnehaha Academy, Minneapolis
1996	Michael Gary Grotenhuis Minnetonka High School, Minnetonka-Team	2000	Chrissy Jones Minnetonka High School, Minnetonka
1997	Nguyen Trung Burnsville Senior High School, Burnsville	2000	Michael Chansky Burnsville High School, Burnsville
1997	Samuel Rush Minnetonka High School, Minnetonka	2000	A. Ben Suri Harding High School, St. Paul
1997	Anna Navarro Minnetonka High School, Minnetonka	2000	Emily Letourneau Central High School, St. Paul-Team
1997	Victoria Reynolds Miller St. Agnes High School, St. Paul	2000	Anna Bishop Como Park, St. Paul-Team
1997	Michael Scott Lohman Expo III High School, St. Paul	2001	Megan Bailey Breck School, Minneapolis
1997	Travis Smith Burnsville Senior High School, Burnsville	2001	Kathryn Gieselman Burnsville High School, Burnsville
1997	James Justin Wilson Minnetonka High School, Minnetonka-Team	2001	A. Ben Suri Harding High School, St. Paul
1997	Justin Rainey Minnetonka High School, Minnetonka-Team	2001	Li Mei Wayzata High School, Wayzata
1998	Dean Harvey Burnsville Senior High School-Team	2001	Laura Egerdal Burnsville High School, Burnsville
1998	Dan Harakh Burnsville Senior High School-Team	2001	Anna Bishop Como High School, St. Paul-Team
1998	Bryce Gillespie Breck School, Minneapolis	2001	Emily Letourneau Central High School, St. Paul-Team
1998	Preeya Kshetry Breck School, Minneapolis	2002	Jacob Fitzpatrick Burnsville High School, Burnsville
1998	Phally Seak Burnsville Senior High School	2002	Kaonhou Her Johnson High School, St. Paul-Team
1998	Raj Pai Burnsville Senior High School	2002	PaCha Yang Johnson High School, St. Paul-Team
1998	Michael Scott Lohman Expo III High School, St. Paul	2002	Stephen Morris Breck School, Minneapolis
1998	A. Ben Suri Harding High School, St. Paul	2002	Arun Saini Burnsville High School, Burnsville
1999	Michael Scott Lohman Expo III High School, St. Paul	2002	A. Noel Suri Harding High School, St. Paul
1999	Alison Boutin Burnsville High School, Burnsville	2003	Jessica Swatz ISD 287

2003	Ning Zhou ISD 287	2007	Brandon Lew Breck School, Minneapolis
2003	PaCha Yang Johnson High School, St. Paul	2007	John Earl Harding High School, St. Paul - Team
2003	A. Noel Suri Harding High School, St. Paul	2007	Lucas Gabrielson Harding High School, St. Paul - Team
2003	Brendan Doms Breck School, Minneapolis	2007	Jacob Stramer Harding High School, St. Paul - Team
2003	Javier Cabrera-Perez Breck School, Minneapolis	2008	Prithwis Mukhopadhyay Lake Junior High, Woodbury
2004	Adam Yock Breck School, Minneapolis	2008	Michael Cherkassky Edina High School, Edina
2004	William Mitchell Breck School, Minneapolis	2008	Madeline Taft-Ferguson Breck School, Minneapolis
2004	Noel Suri Harding High School, St. Paul	2008	Kyra Underbakke Maranatha Christian Academy, Brooklyn Park
2004	Adam Hahn Robbinsdale Armstrong High School	2008	Aly Xiong Johnson High School, St. Paul
2004	Akash Kumar Wayzata High School, Wayzata	2008	Iola Edwards Johnson High School, St. Paul
2004	Laura Heeter Breck School, Minneapolis - Team	2008	Stephen Trusheim Breck School, Minneapolis - Team
2004	Kristina Naranjo-Rivera Breck School, Minneapolis - Team	2008	Daniel Mohktari Breck School, Minneapolis - Team
2005	Kyrstin Underbakke Maranatha Christian Academy, Brooklyn Park	2009	Prithwis Mukhopadhyay Woodbury Sr High School, Woodbury
2005	Janet Li Wayzata High School, Plymouth	2009	Tiffanie Stone AFSA High School, Vadnais Heights
2005	Heidi Chun St. Paul Academy, St. Paul	2009	Michael Fuad Breck School, Minneapolis
2005	Zachary Howland Burnsville High School, Burnsville	2009	Stephen Trusheim Breck School, Minneapolis
2005	Eric Halverson Como Park Senior High, St. Paul	2009	Chee Xiong Como Park Senior High, St. Paul
2005	Kahli Her Johnson High School, St. Paul	2009	Martin Camacho Central Senior High School, St. Paul
2006	Jenna Johnson Burnsville High School, Burnsville	2009	Sahar Hakim-Hashemi Breck School, Minneapolis - Team
2006	Andrea Jensen Burnsville High School, Burnsville	2009	Sierra Danforth Breck School, Minneapolis - Team
2006	Daniel Zeng St. Paul Academy & Summit School	2009	Nicholas NaSal Burnsville High School, Burnsville - Team
2006	Matthew Weiss Breck School, Minneapolis	2009	Joseph Lane Burnsville High School, Burnsville - Team
2006	Katherine Schaeffer Breck School, Minneapolis	2010	Prithwis Mukhopadhyay Woodbury Sr High School, Woodbury
2007	Ummul Kathawalla Blake High School	2010	Tiffanie Stone AFSA High School, Vadnais Heights
2007	Daniel Zeng St. Paul Academy & Summit School	2010	Martin Camacho Central Senior High School, St. Paul
2007	Kyra Underbakke Maranatha Christian Academy, Brooklyn Park	2010	Houa Xiong Johnson High School, St. Paul

2010 Gavin Ovsak  
Eden Prairie Senior High School, Eden Prairie

2010 Charles Morris  
Breck School, Minneapolis

2010 Ava Mokhtari  
Breck School, Minneapolis - Team

2010 Addison Weiler  
Breck School, Minneapolis - Team

2010 Ashley Santilli  
Burnsville High School, Burnsville - Team

2010 Emily Bostrom  
Burnsville High School, Burnsville – Team

2011 Alysia Flores  
Johnson High School, St. Paul

2011 Andrew Ylitalo  
Stillwater High School, Stillwater

2011 Martin Anderson  
Burnsville High School, Burnsville

2011 Redeat Abegaz  
Burnsville High School, Burnsville

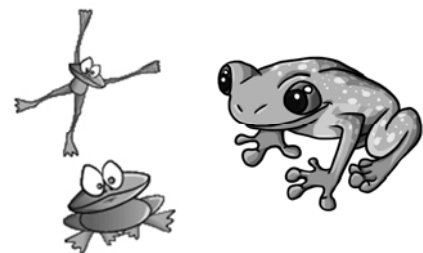
2011 Gavin Ovsak  
Eden Prairie Senior High School, Eden Prairie

2011 (Ernst) Tom Erdmann  
Breck School, Minneapolis



It is with deep sorrow that we grieve the loss of fair director, scientist, volunteer, and most importantly, friend, **Penny Lohman**.

Without Penny & Mike, the Twin Cities Regional Science Fair would not be what it is today. It is through their tireless volunteering and Penny's management that the fair is such a successful opportunity for the students in the Twin Cities.



Penny - *THANK YOU* - for sharing your time & energies, making this a better world!



## 2012 Research Papers

<b>Name</b>	<b>Grade</b>	<b>Title</b>
Sarah Betts	6	Memory Development and Myelin Growth
Annie M Amen	7	Tomato Grafting: The Fruit of the Future
John Anthony Bittner	7	Mnemonic
Noah J Brownlee	7	How to Get the Most Out of a Solar Panel
Abigail P Cavanaugh Ms.	7	"Does Sniffing Peppermint or Cinnamon Affect How Hungry You Feel and Your Caloric Intake?"
Ethan A Davenport	7	Fastball Overhand vs. Sidearm
Olivia Gabrielle De Grace	7	Which Painkiller Dissolves the Fastest in Body Temperature Water?
Nathaniel R Farmer	7	Children's Exposure to Black Carbon Pollution in a Suburban School Setting
Seamus Flynn	7	A Clean Drink of Water?
Grace A Gallucci Ms.	7	"Does the Type of Hair on a Dog Affect How Long Dog Hair Dye Will Last?"
Grace L Gardner	7	Cracked! A Test on the Durability of Nail Polish
Sovigne Gardner	7	Meditation vs. Relaxation: the effects of meditation on heart rate recovery
Claire M Hollingsworth	7	"Which Tastes Better in Smoothies Fresh or Frozen Fruit?"
Iris C Holman	7	How Wing Design Affects Lift
Jack W Hoover	7	How Does Temperature Affect Battery Life?
Natalie E Maxam	7	Removing Gum From Hair
Siena I Milbauer	7	Does Playing a Musical Instrument Affect Relative Pitch?
Lucas C Mueller	7	How does the shape of troughs effect how fast oil flows down them
Demosthenes C Murdakes	7	Does Gatorade Improve Church Basketball Players Performance?
Noah M Rooze	7	Is Raw Milk Safe?
Theo J Schmidt	7	Heat, Steam, Pop!: Measuring Popcorn Moisture Levels
Caleb E Venkatrathnam	7	RAM and Computer Performance
Alyse J Walker	7	"Does Gender Affect the Ability to Remember Dreams?"
Spencer M Weiss	7	Radiation - The Silent Killer
Mairead D Brooks	8	Water or What?
Grace Elizabeth Clemens	8	Does age affect your memory?
Madison R Huna	8	Cinnamon Spice and Everything Nice: The Effect of Cinnamon on Lifespan of C. elegans
Hunter Johnson	8	How Does The Change In Pond Size, Oxygen, Carbon Dioxide, Temperature, And pH Affect The Concentration Of Microorganisms In A Pond Over The Course Of A Summer?
Cece Johnson	8	When Compared To Untreated Wood, Will Wood Treated With Creosote Contaminate The Soil, Water, And Plants In Raised Garden Beds?
Carolyn K Jons	8	The Effect of Oxygen Removal Treatments on Mold Growth of Blueberries
John Kostohris	8	Trebuchet Physics
Luke W Nelson	8	Does a Video Game Distract Away Pain?
Ruthie E Nordquist	8	Crazy Corrosion
Conlan E Olson	8	The Effect of the Angle of a Wing on the Wing's Performance: A Paper

Tyler S Radtke	8	The Cool Blue Light of Luminol: How Does Temperature Affect the Chemiluminescence Created by Luminol?
Colleen P Scallen	8	Does the Continual Use of Purell® Actually Affect Bacteria Levels?
Audrey M Sheehy	8	Ionized Hydroponics vs. Ionized Aeroponics Vs. Aeroponics
Quayd K Korman	9	Which Method is Fastest for Solving a Rubik's Cube
Camille I Smith	9	Classroom of the Future: Comparing Interactive Software vs. Traditional Teaching Methods as a Viable or Nonviable Learning Tool
Sumaya M Aden	10	Mirror Tracing
Aliya Ahmadi	10	The effects of vitamin supplements A, B12, and C.
Jenna L Allen	10	Music and How It Affects Cognitive Thinking and Concentration
Emily A Anderson	10	Effects of Growing Plants Under Different Colored Lights
Del A Anderson	10	Sound Amplification Devices and Their Effectiveness
Krista E Bain	10	Thrive or Survive? An analysis of water type on the growth of hydroponically grown Lycopersicon Lycoperscium.
Lindsay A Becker	10	Pictures Affecting the Memory of Content from Books
Laura E Berge	10	The Effect of Household Chemicals on Photosynthesis
Danielle K Blanshan	10	The Effect of Physical Exertion on Physical and Mental Response
Andrew K Brinkmann	10	Effects of different breathing methods on heart rate during long-distance running
Alayna Buysse	10	Do People Have a Bias Towards Vitamins?
Molly R Calhoon	10	The Pulmonary Benefits of Playing a Wind Instrument Compared to Aerobic Exercise
Brian B Campana	10	How Different Liquids Affect Corrosion
Conlan M Campbell	10	Correlation Between Color and Short-Term Memory in Kindergarteners
Nick J Campion	10	The Correlation Between Gravitational Potential Energy and Kinetic Energy
Kate M Carithers	10	Effects of Subliminal Messaging on Studying
Katherine R Carman	10	Dragster Aerodynamics: A Scientific Study on the Effects of Shape on an Object's Aerodynamics
Britt M Cavanor	10	Acne Medication Effects on Proliferation of E. Coli
Cally L Caviness	10	The Correlation Between Color and Appetite
Cassie K Cecchetti	10	How Does Color Affect Emotion?
Samantha J Connolly	10	Effect of Cleaners Breaking Down Protein
Aditi Das	10	Cell Polarity in Bacteria: Analysis Using Green Fluorescent Protein Fusions
Rhiannon Davis	10	Music's Effect On Heart Rate
Maxwell S Davison-Kerwood	10	The Effects of Over-the-Counter Acne Medications on Propionibacterium Acnes
Katie M. Dennis	10	The Effects of Gatorade vs. Water on a High School Student's Heart Rate
Alexis R Dobrzynski	10	The Correlation of BMI and Body Temperature in Sophomore Males and Females
Sam C. Dockry	10	Effects of Multitasking on Accuracy
Lindsey A Etzkorn	10	Salinity's Effect On Noodle Absorption
Taylor S Ewing	10	The Effect of Changes in Water Temperature on the Velocity of an Object upon Contact with the Water
Andrea D Farrell	10	Just Beat It
John Fesenmaier	10	The Effects of Exercise on Blood Pressure

Courtney A Fischer	10	The Effects of Exercise on Blood Pressure in High School Students
Charlie D Fredericks	10	How Lacrosse Mesh Differ
Desmond J Fulton	10	The Effects Of Wing Design On Aviation and Flight Patterns
Sara A. Funkhouser	10	Time of day and types of water effects on plant growth
Greta T Geist	10	Oily Situation
Caitlin E. Grant	10	The Effects of Aerobics and Yoga on Learning
Samantha D Gray	10	Lie to Me: The Complications of Lie Detection
Laura J Hermansen	10	The Effect of Music on Test Taking Scores
Vivian Hett	10	When Is the Most Effective Time in the Growth Cycle of Grass to Apply Fertilizer?
Grant C Hopkins	10	Correlation Between Location of Light Source and Direction of Plant Growth
Antonia M Hopkins	10	Kids These Days
Samuel A Houchins	10	Sweet Science
Kristyna M Hughes	10	Placebo or Antibiotic?
Maxwell M Johnson	10	The Effects of Altering the Various Dimensions of the Wing Appendage on Fixed Wing Aircraft
Shaun H Johnson	10	Does Price Sway the Perception of Taste?
Austin C Kangas	10	The effect of color on teenage consumption of confectionery foods
Mackenzie L Kaplan	10	Alcohol vs. Non-Alcohol Sanitizing
Maggie R Kaplan	10	Gender Relations in Ability to Follow Directions with Changes in Test Environment
Matt Kappel	10	Frame Rate vs. Quality
Jacob D Kesler	10	The Effect of Heat on Pigments Commonly Used in Paint
Erica M Kesseh	10	Can You Taste Artificial Flavouring?
Ryan J Kibler	10	Does Caffeine Affect Productivity of the Heart?
Daniel F Knoblauch	10	Personality Writing
Olivia S Koski	10	Does Music Have an Effect on Homework?
Justin A Ladwig	10	Fishing Lines Take a Test of Strength
Landon J LaFavre	10	Power It Up!
Mackenzie L Larson	10	Early Growth Rate in Organic vs. Non-Organically Fed Chickens
Meghan E Larson	10	Eye Witness Testimonies; are they accurate enough to put someone behind bars?
Christopher K Larsson	10	Derivatives in Real Life
Kallie N LaValle	10	Which side of your brain is smarter
Maraya C Lawson	10	The Common Bean Plant Watered with Different Solutions
Vuochly Long	10	The Effectiveness of 62% Ethyl Alcohol Hand Sanitizer On Different Surface Types
Brandon Luu	10	Audio Vs. Visual Memory
Alex A Mason	10	The Affect of Extracurricular Activites on School Grades
Ella N McClarnon	10	Dress for the Best
William J. Misssling	10	Up to Bat: Wood vs. Aluminum
Alyssa C Muelken	10	Do Boys or Girls Score Higher on Math Tests?
Shay C Myers	10	Effects of Hair Dye on Hair Strength
Logan R Nelson	10	Flammability of Fabrics
Briita A Nelson	10	Do You Remember ?
Eric T Nguyen	10	The Influence of Genetics on Fingerprints

Peter Nordgren	10	The Effects of Temperature on the Bounce of Baseballs
Jack M O'Brien	10	Strength Test of Wood Glues
Ashley E Odegard	10	Impact of Audio and Visual Cue in Memory
Jacob E Odom	10	Hectic Hand Washing – A Study on the Effectiveness of Antibacterial Bar Soaps
Timothy K Oliver	10	The Body's Reaction to Temporary Limitation of Vision and Hearing: Is it Immediate?
Apekshya Panda	10	Applications of Probability
Bhargavi Papisetty	10	Forecasting Corn Prices in India using ARIMA Model
Betsy J Peterson	10	Which Cooking Method Preserves the Most Vitamin C in Potatoes?
Hanna C Peterson	10	The Effects of Caffeine and Chewing Gum on Blood Flow to the Brain
Brianna L Pint	10	The Effects Of Growth In Morning Glories When Exposed To Vibrio Fischeri and Level Of Luminescence After Exposure.
Samuel K Porter	10	Propeller Diameters Effect on Efficiency
Lisa J Ranft	10	Correlations between Stress Level and the Amount of Physical Activity in Males and Females
Kristen M Resvick	10	How Children Learn a New Subject Best
Sara K Riedesel	10	The Make-up of Mascara
Cassandra J Sabol	10	Music and the Mind
Jacob R Sandvig	10	State of Hockey
Christopher M Santilli	10	Does Bone Rubbing Wooden Baseball Bats Affect the Distances a Baseball is Hit Off of Them?
Tyler J Schonewill	10	The Effects of Temperature on the Growth of Poa pratensis l.
Gretchen E Seewald	10	The Effect of Birth Order on Personality and Self-Perception
Apurv H Shekhar	10	Location, Location, Capacity: K-Means Clustering with Capacity Constraints
Sangeetha A Shreedaran	10	An Analysis of an Eyewitness Testimony
Adam J Sink	10	Bridge Beams: A Look into the Effectiveness of a Bridge's Strength
Cora L Spear	10	The Effects Of Texting on Student's Grades (GPA's)
Jan Splittgerber	10	An Examination of Orthopedic Injuries Among High School Athletes : A Call for Additional Research
Scott A Svare	10	The Effects of ADHD on Reaction Time
Kalley J Swift	10	The Knowledge of Science Misconceptions Between Adults and Ninth Graders
Taylor J Swingle	10	Light Pollution Around Cities
Frank J Takkinen	10	Choke Tubes 101
Bonssa Teizazu	10	The Effect of Differentiating pH Water Solutions on the Growth Rate of the Hedera Helix Plant Species
Julianna M Thomas	10	Minimization of Bacterial Count in Various Game
Cassondra L Thornton	10	The Effect Music Has on a Person's Heart Rate While Exercising
Coltt R Thunstrom	10	Levels of Pollution in Minnesota Bodies of Water
Logan A Trachsel	10	Commercialized Vs. Non-commercialized Batteries: Which Lasts Longer?
Alex w Uloth	10	"Just How Far Are You Away"
Julia A VandenBoom	10	The Amount of Energy Different Colors Absorb Through Sunlight
John M Walker	10	Preferred Major Key Signatures
Amber C Wetzel	10	It's all how you look at it
Autumn H Wetzel	10	'Eye' Conform Test

Austin L Wilharber	10	Does Age Affect Memory?
William Zeng, Orien Zeng	10,9	Deletion of Ndst1 in Smooth Muscle Decreases Aortic Wall Area and Vascular Smooth Muscle Cell Count
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Laura Garbe	11	Variables in Physical Performance
Jenny Lai	11	The Relationship of Cognitive Assessed Abilities to Errors in Instrumental Activities of Daily Living of Adults in Memory Care
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Andy Ylitalo	11	The Total Displacement Cross Section of Hexagonal Boron Nitride Monolayers
Yara Zoghaib	11	Compost vs. Fertilizer
Ishmam A Ahmed	12	The Efficacy of Insulin Production By “Reprogrammed” Induced Pluripotent Stem Cells—Novel Developments
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Anushua Bhattacharya	12	In-Vitro Toxic Assessment of Noble Metal Nanoparticles on Mammalian and Bacterial Cells
Nathaniel A Breitenfeldt	12	Characterizing spectroscopic properties of a new coumarin amino-acid dye for use in protein analyses
Samarth A Damania	12	A Data-mining Approach to Identify Factors that Contribute to High Pharmaceutical Drug Costs
Robert S Dorn, Saeed Hakim-Hashemi	12,12	The Future of Lighting: Improving the efficiency of organic light-emitting diodes (OLEDs)
Alejandro J Fenn, Andrew Engel	12,12	Engineering an Optical Cell to Determine Dissolution and Re-plating Rates of Metal-particle Contaminants in Lithium-ion Batteries
Emily Hannigan	12	Collecting Gas-Phase Silica Nanoparticles Into Liquid Water Using An Electric Field
Anna M Hendrickson, Eva Wang	12,12	Interaction of Cyclin D1 and PPAR $\alpha$ in Cancer Cell Metabolism
Duligur Ibeling	12	The Metallicity-Dependent Transition between White Dwarfs and Type II Supernovae
Naveen Jain	12	Mechanism of Tumor Suppression by CHD5
Yan Jiao	12	Effects of Conjugation Efficiency and Fitness Cost on the Propensity of E. coli to Gain and Maintain Multidrug Resistance in Solid and Liquid Environments
Laura S Landgraf, Maggie M Green	12,12	The Development of Visual Self-Recognition in Toddlers Through Mirror Reflections and Photographs
Keshav K Mangalick	12	Genetic Characteristics of Influenza A Viruses in Swine Populations
Taylor S McCanna	12	Engineering an Inexpensive Mobile Electric Field Mill to Measure the Global Electric Circuit to Track Global Climate Change
Partha Naidu	12	Characterization and Application of Pseudoisocyanine-Iodide in Optical Devices
Dane R Olson	12	Development of a Stair-Climbing System

Paimon Y Pakzad	12	A Systems Biology Approach to Inducing Bacteriostatic Effects on <i>M. Extorquens</i>
Mahati Pidaparti	12	Early Studies on Interactions Between Novel Proteins Found in a Macromolecular Metabolic Complex in Leukemia Cells
Ryan C Pinkalla	12	Whitetail Deer Management Affects On Browseable Plant Material
Aris E Prince	12	A Three-generational Study on Knowledge about and Sources Used to Find Information on Brain-related Conditions
Rishi Sinha	12	Investigating the Effects of Overexpression of the HIF-2 Gene in Cancer Cells
Aswin Somasundaram	12	Systemic Effect of Hypothermic Conditions in Bypass Surgery
Alexander Spencer, Evan Chen	12,12	Recycling Waste Heat: Development of a Low-cost Thermoelectric Generator for Off-grid Energy Production
Roshny Vijayakar	12	Effects of Perinatal Iron Deficiency on Glucose Transporter Gene Expression in Five Regions of the Brain

# Science doesn't start in a laboratory

A child's imagination is ignited by curiosity and powered by all the wonders of the world.

At Medtronic, we devote ourselves to finding new and better ways to alleviate pain, restore health and extend the lives of people around the world. And we know that any innovation starts with imagination. That's why we support organizations and activities that will inspire the next generation of scientific innovators.



**Bill Hawkins**  
Chairman and Chief Executive Officer

[www.medtronic.com/community](http://www.medtronic.com/community)



UC20001124 - 1/11



## 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 Renewable Energy Award  
 American Chemical Society  
 American Psychological Association  
 American Council of Engineering  
 Companies  
 American Meteorological Society  
 American Psychology Association  
 ASM Materials Education International  
 Foundation  
 Association of Women Geoscientists  
 Broadcam® MASTERS®  
 East Side Science Club Alumni  
 Frog Impact Award in memory of Penny  
 Lohman  
 Glen & Jacob Domeier Memorial  
 Graduate Women in Science  
 I SWEEP  
 Integrated Approach to Science  
 Intel Excellence in Computer Science  
 International Science & Engineering Fair  
 (ISEF)  
 Inventor Award (Doug Cornelius)  
 ISEF Alumni Award – Mike Lohman, Jr.  
 (1996, 1997, 1998, 1999)  
 ISEF Alumni Awards – Kyra Underbakke  
 (2007, 2008)  
 ISEF Alumni Awards – Kyrstin Underbakke  
 (2005)  
 ISEF Alumni Awards – Timara Underbakke  
 (1973)  
 Joel Wagner Caring Bridge Award  
 Junior Science & Humanities Symposium  
 Killeen Memorial Award  
 Minnesota Academy of Science Inquiry  
 award  
 Medalists (6th grade)  
 Minnesota Agriculture in the Classroom  
 Minnesota Astronomical Society  
 Minnesota Chapter of American Fisheries  
 Society  
 Minnesota Space Frontier Society  
 Minnesota State Science & Engineering  
 Fair  
 Mu Alpha Theta Mathematics



National Society of Professional Engineers  
 NOAA National Oceanic and Atmospheric  
 Administration  
 North Central Tri-state Junior Science &  
 Humanities Symposium Research  
 Papers  
 Penny Lohman Memorial Award  
 Radio City  
 Research Paper trophies  
 Ricoh Sustainable Development Award  
 Schools trophies  
 Society for In Vitro Biology  
 Sponsor: 3M Foundation  
 Sponsor: Alliant Techsystems  
 Sponsor: Dow Chemical  
 Sponsor: Ecolab  
 Sponsor: General EC Rawlings  
 Sponsor: Medtronic  
 Sponsor: Midway Party Rental  
 Sponsor: Mintáhoe Hospitality Services  
 Sponsor: Office Max  
 Sponsor: Slattery Sales  
 Sponsor: St. Paul Youth Fund  
 Sponsor: University of Minnesota  
 State Science Fair – Research Papers  
 State Science Fair - Projects  
 Stockholm Junior Water Prize  
 TCRSF Award for Excellence  
 Teacher Excellence Award  
 Team Awards  
 University of Minnesota College of Science  
 and Engineering Award  
 US Air Force  
 US Army  
 US Department of Health and Human  
 Services  
 US Metric Association  
 US Navy/Marine  
 USDA Forest Service  
 USDA Research Service  
 West Metro Medical Society Alliance  
 Yale Science and Engineering Association



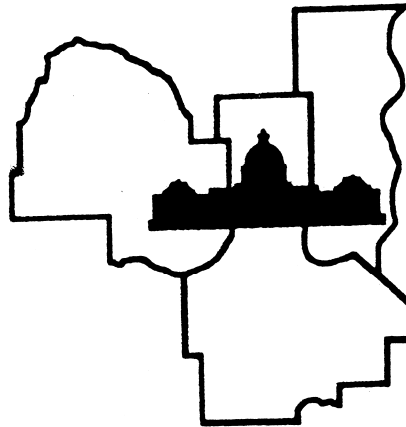
Project presentation hosted by the University of Minnesota

Research paper program hosted on our website at [www.tcrsf.org](http://www.tcrsf.org)

Special thanks to all our volunteers, new & old, especially the U.S.S. Nokomis

Special thanks to the University of Minnesota US Military ROTC for their assistance in setting up, judging, and tear down.

*In memory of  
Penny Lohman*



*In memory of  
Bill Bredesen*



### 2011-2012 Twin Cities Regional Science Fair Committee

**Science Fair Director:**

**SRC Chair:**

**Facilities:**

**Public Relations:**

**Funding**

**Treasurer:**

**Special Awards Chair:**

**Judging Coordinator:**

**Website & Databases:**

**Data Processing:**

**Safety & Display:**

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Karin Ostrand

Michael Lohman, Sr.

Michael Lohman, Sr  
& Terry Slattery

Michael Lohman, Sr

Dr. Gary Kwong

Nancy Day

David & Timara  
Underbakke

David Underbakke &

Timara Underbakke

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Dr. Douglas Erbeck

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Kyra Underbakke

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