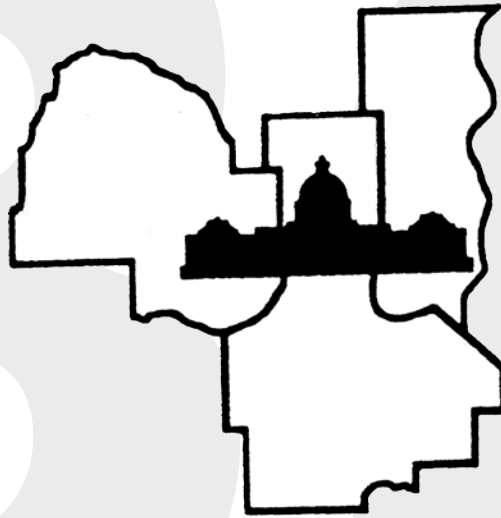


WELCOME TO THE

**80th Annual Twin Cities Regional Science Fair  
26th Annual St. Paul Science Fair  
24th Annual Western Suburbs Science Fair**

# **Twin Cities Regional Science Fairs**



**2018**

**March 2 – 3**



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

**3M** Science.  
Applied to Life.™



**Investing in the next  
generation of scientists.**

Visit us at [3Mgives.com](http://3Mgives.com)

3M and "3M Science. Applied to Life." are trademarks of 3M.

**WELCOME TO THE 80th ANNUAL TWIN CITIES REGIONAL SCIENCE FAIR,  
THE 26th ANNUAL ST. PAUL REGIONAL SCIENCE FAIR,  
THE 24th ANNUAL WESTERN SUBURBS REGIONAL SCIENCE FAIR.**

Our Host this year is the Minnesota State Fairgrounds – Warner Coliseum

**Students: YOUR NAME BADGE is required both Friday and Saturday.**

All projects must have a **vertically displayed abstract** at their exhibit. Print a copy of this abstract by logging into your student account at [www.tcrsf.net](http://www.tcrsf.net) and View TCRSF Abstract from your Student Home page. All projects who required a **Form 1C** (for work done in any site other than home, school or field) and/or **Form 7** (for projects that are a continuation from a previous year) must post these vertically on the project exhibit. Save all your project forms after the fair. TCRSF will send project forms to state for those projects advancing to state, but you will still need a copy at your project exhibit during state. Alternates to state: you may be promoted to become a state presenter. Save your display and forms!

1. The 4 numbers & 1 letter 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. After your project is completely set up, self-check your display to make sure it meets all the requirements on the green Display & Safety checklist. If you need help, ask. This year, put the green Display & Safety page that you checked on your exhibit table top. Our Display & Safety team members will walk up and down the aisles. Wait for them to check your display. If you have any videos or photos to show judges, please be ready to show them to the Display & Safety team. You will need to correct any violations before competition.
3. **There is no food or beverage allowed anywhere in the competition area.** A closed bottle of drinking water is the only exception. (Food may be eaten in the lobby area by the concessions food, or very carefully in the seats around the coliseum. Keep the building clean! )
4. **Wear your TCRSF name badge in a clearly visible place, BOTH Friday and Saturday. Do NOT forget. You need your badge for the awards program!**

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

All ISEF winners and all persons interested in traveling with the group to ISEF **MUST** attend the **Sunday 12:30 p.m.** ISEF meeting. (This meeting is *only* for ISEF winners, ISEF alternates, & their teachers/mentors/and family members.) The location and time of this meeting will be confirmed with the ISEF winners immediately following the Awards Ceremony.

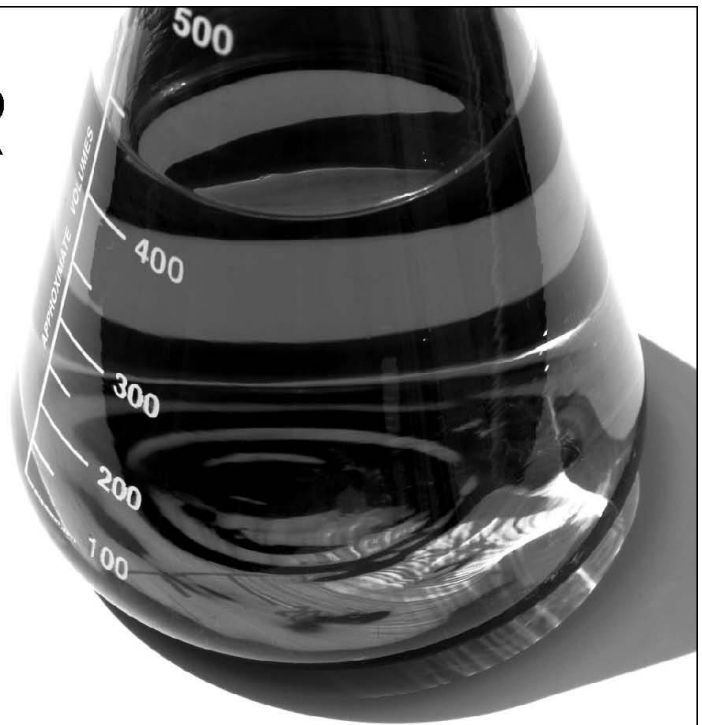
**Green, Red, and Blue ribbon winners are all eligible to win special awards. Some special awards are specifically for certain fields of science or other criteria that are separate from the ribbon earned.** All students: please listen carefully for your name during the awards program on Saturday. In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

# THE LEADER IN CLEAN

At Ecolab, we use cutting-edge science and technology to continually develop innovative breakthroughs for our customers - earning our reputation as the leader in clean.

To learn more about our innovative solutions, call Ecolab at 1.800.2.ECOLAB or visit us at [www.ecolab.com](http://www.ecolab.com).

**ECOLAB®**



© 2007 Ecolab Inc. All rights reserved.

USS Nokomis Twin Cities  
Star Trek Fan Club  
<http://www.ussnokomis.org/>

*Volunteering to make a difference.*

**SLATTERY SALES GROUP, INC.**

VALUE DIFFERENTIATION STRATEGIES  
AND EXECUTION THAT ENHANCE RESULTS

[info@slatterysales.com](mailto:info@slatterysales.com)

PH 952.832.5436 FX 952.832.5438

4940 VIKING DRIVE, SUITE 101, MINNEAPOLIS, MN 55435  
[WWW.SLATTERYSALES.COM](http://WWW.SLATTERYSALES.COM)

**Orbital ATK**

**Orbital ATK** is proud to sponsor this hands-on event that helps provide an opportunity for Twin Cities' youth to better understand the sciences and technology. By inspiring curiosity and interest today, we develop our future scientists, engineers and astronauts. Congratulations and good luck to all participants. Headquartered in Dulles, Virginia, **Orbital ATK** is a leading provider of advanced weapon and space systems with \$4.4 billion in annual sales, approximately 12,000 employees, and operations in 17 states. The company is the world's leading supplier of solid rocket motors and the nation's largest manufacturer of ammunition.

## SCHEDULE

### Friday, March 2, 2018

<u>Time</u>	<u>Activity</u>	<u>Location</u>
1:00 - 3:30 p.m.	Registration	Warner Coliseum Concourse
1:00 - 3:30 p.m.	Set up Projects / Clear Display&Safety Grades 6-8 must be set up by 3:30 Grades 9-12 must be set up by 3:30	Warner Coliseum Arena
4:00-9:30 p.m.	Judging (grades 6,7,&8 done earlier)	Warner Coliseum Arena

### Saturday, March 3, 2018

8:00- 10:00a.m.	Exhibits open to the public	Warner Coliseum Arena
9:00 - 9:30 a.m.	All Paper and Project Participants pick up envelopes containing ribbons (may be open early!)	Warner Coliseum Concourse

**TEACHERS:** Please arrange for someone to pick up papers, awards, & exhibits of any students not able to attend the award ceremony. Research paper ribbons are also available for pickup.

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

10:00 a.m. to 12:20 p.m.	Award Ceremony for projects & research papers	Warner Coliseum (seating around arena)
-----------------------------	--	---

Winners of Special Sponsor Awards must be present at the Award Ceremony or an alternate will become the winner. Sponsor Award winners must have their photo taken by the official Fair Photographer with the award

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 (unless cleared by the Fair Director and the SRC chair).

After Award Ceremony	*ISEF Finalists, Alternates and Advisors meet with the Fair Directors & SRC chair.	Arena near awards podium
-------------------------	---	-----------------------------

<b>Everyone:</b> 1:30 p.m.	<b>PLEASE</b> help clean up. Throw all trash. <b>ALL PROJECTS MUST BE REMOVED</b>	Please help throw trash & leave the Fairgrounds clean.
-------------------------------	--	--

#### **Minnesota State Science & Engineering Fair** (grades 6-12 projects)

April 8-10, 2018, **Earl Browne Heritage Center**, 6155 Earle Brown Dr, Brooklyn Center, MN 55430.

**JSHS: Junior Science & Humanities Symposium** (grades 9-12 research papers, and as part of the Minnesota State Science & Engineering Fair hosted with JSHS, grades 6-8 research papers) March 24, 2018, **University of Northwestern, St. Paul.** *(Need to register by Monday, March 5)*

**I-SWEEEP: International Sustainable World Energy Engineering Environment Project Olympiad** (grades 9-12 projects), Houston, Texas, postponed until 2019 due to Hurricane Harvey

**ISEF: Intel International Science & Engineering Fair** (grades 9-12 projects)  
Pittsburgh, PA, May 13–18, 2017 (Twin Cities flies out May 12<sup>th</sup>)



Custom Automation Equipment: **CONCEPT** ▶ **DESIGN** ▶ **BUILD**

Madison, WI

[www.isthmuseng.com](http://www.isthmuseng.com)

*Isthmus Engineering is a Worker-Owned Cooperative*

**Isthmus Engineering & Manufacturing**  
congratulates the students of the  
Twin Cities on their excellent and  
innovative projects!

Premier Bank is committed to community.

<https://premierbanks.com/>

Premier Bank is a local, community bank,  
with global reach and supports  
science education by donating to the  
Twin Cities Regional Science Fairs.

Thank you to our new sponsor!



**Office DEPOT® OfficeMax®**

Program printed by Justin Breiwick

Office Depot, Maple Grove at the Fountains

Phone: 763-732-3792

*Office Depot supports the Twin Cities Regional Science Fairs and  
applauds the creativity and hard work of the regional competitors.*

## 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) & D&S (Display & Safety) before judging begins at 4:00 p.m.
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 your grade. If you leave early you may be missing out on judging for other special awards.
5. TCRSF and the Minnesota State Fairgrounds do not accept responsibility for equipment or 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.	6:30p.m.
Grade 7	4:00p.m.	7:30p.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. Team members must be all in either middle school or all in high school, not a mix. This year, middle school teams compete at the grade of the team leader.

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. We will also post a list of competitors & alternates advancing with their research papers. Pick up your envelopes! All who advance (grades 6-8 and grades 9-12) will present a PowerPoint version of their paper to a panel of judges & observers. Reminder – you have only Sunday and Monday to get registered for the paper competitions! Additional awards for papers will be handed out at the Award Ceremony on Saturday morning at 10:00 a.m. in the Warner Coliseum Arena.

TCRSF AND THE State Fairgrounds ARE NOT RESPONSIBLE FOR PAPERS, SRC PAPERWORK, PROJECTS, RIBBONS, AWARDS, PERSONAL ITEMS, OR EQUIPMENT LEFT AT THE State Fairgrounds Coliseum!

REMEMBER - We are guests of the State Fairgrounds. 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.





# Water & Process Solutions

**Dow Water & Process Solutions congratulates your achievements in competing at the Twin Cities Regional Science Fair.**

**We thank Dow Water & Process Solutions for their sponsorship of this event!**

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

**Dow Water & Process Solutions, a subsidiary of The Dow Chemical Company,** is committed to advancing water treatment technologies and ensuring availability of clean water to those who need it-through advanced research and industry-leading application expertise.



## **AWARD SPECIALIST**

31 YEARS IN BUSINESS

900 3rd Street Suite C  
St. Paul Park, MN 55071

TROPHIES - PLAQUES - MEDALS  
PLASTIC SIGNS & BADGES

-----CALL DONNA-----

(651) 459-6237

fax (651) 458-9252

[edstrophies@comcast.net](mailto:edstrophies@comcast.net)

Good luck to all participants



## **BROADWAY PARTY & TENT RENTAL**

**"We Rent Celebrations!"**

[www.broadwaypartyrental.com](http://www.broadwaypartyrental.com)

763-208-1357

Custom catering,  
event planning and  
memorable spaces  
for every occasion.

612-253-0025  
[ahanson@mintahoe.com](mailto:ahanson@mintahoe.com)

# Mintáhoe



H O S P I T A L I T Y   G R O U P



## Grade 6

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

6001T **Greydon Isebrand**  
Can You Spot the Real Pinocchio?

6002W **Riley McSherry Riri**  
Adults v.s. Kids Multitasking

### *Biomedical and Health Sciences (BMED)*

6003W **Alannah Campbell**  
What is the best way to get rid of hiccups?

### *Chemistry (CHEM)*

6004T **Maggie Banks**  
Fruity Power: Making A Biodegradable Battery

6005W **Faith Barrett**  
Liquid Viscosity

6006T **Carissa Chow**  
Instant Ice Pack Science

6007W **Andrew Daher**  
Dissolving Pops

6008W **Gianna Johnson**  
What type of room temperature liquid melts an ice cube the fastest.

6009W **Emma Johnson**  
What Type of Cookie Sheet Works the Best

6010T **Grace Lieber, Harmony Painter**  
**Team** - Ice Ice Baby!

6011W **Samantha Magee**  
Does metal, plastic, or glass water bottles keep the water closer to the temp the water was poured in at

6012T **Estrada Martinez**  
How many germs at Eagle Ridge Middle School?

6013T **Natalie Moua**  
Bubble-ology

6014W **Gabriel Osterbauer Gabe**  
Potato fries

6015W **Norah Telander**  
Gummy Osmosis

6016T **Anna Tomas, Kendra Distad**  
**Team** - Eggstraordinary Floatation

6017W **Benjamin Wappes**  
Water Balloons

### *Earth and Environmental Sciences (EAEV)*

6018T **Liam Clift**  
Can You Recreate Global Warming With Waterballoons

6019T **Matthew Trussell**  
Oil vs Water

### *Embedded Systems (EBED)*

6020W **William Van Buren**  
Sidewalk Traffic

### *Energy: Physical (EGPH)*

6021T **Jack Glausser**  
What color of fabric will keep me the cool on warm days and warm on cool days?

6022T **Lewis Jemtrud**  
Comparing the Effectiveness of Different Types of Smoke Detectors

6023T **Jarissett Reyes Volkov, Herani Moses**  
**Team** - Getting A Bang

6024W **Adriana Rice Adriana**  
Can Magnets Generate Power

6025W **Joseph Wischmeier**  
What metal is most effective to my metal detector

### *Engineering Mechanics (ENMC)*

6026T **Andrew Morgan**  
Hovering to Victory

6027T **Kenny Steffen**  
How Ball Bearings Help Things Spin

6028T **Jade Strayer**  
Breaking News

### *Materials Science (MATS)*

6029W **Lilyann Jansma**  
Coca Cola VS. Clorox Wipes

6030T **Maya Orellana, Addison Warren**  
**Team** - The Egg-selent Egg Drop

6031T **Aditya Shoor**  
Wi - No - Fi

### *Mathematics (MATH)*

6032W **Clayton Derr**  
M&M'S

### *Physics and Astronomy (PHYS)*

6033T **Collin Boyum, Gerald Johnson**  
**Team** - The Effect of Mint on Water Temperature

- 6034T **Braiden Moher**  
Moher Warmth
- 6035T **Joshua Trussell**  
The Heat is On
- 6036T **Tim Trussell**  
Hit Me With Your Best Shot

*Plant Sciences (PLNT)*

- 6037T **Yordanos Eshete**  
Chemical Plants
- 6038T **Alexander Kneisl, Benjamin Stortroen Team** - Hydroponic Hyper Growth

*Robotics and Intelligent Machines (ROBO)*

- 6039W **Mitchell Spack Mitch**  
What is the Farthest Distance Bluetooth can Connect?

**Grade 7**

*Animal Sciences (ANIM)*

- 7001S **Caitlyn Budd**  
Paw Dominance in Dogs
- 7002T **Akio Johnson**  
Planaria Regeneration
- 7003S **Alec Richardson**  
What's That Color?
- 7004S **Campbell Wencel**  
The Science of Smell
- Behavioral and Social Sciences (BEHA)*
- 7005T **Joey Bertini, Joey Dick Team** - Making A Lie Detector Test
- 7006S **Ian Blohm**  
How Does Music Affect Your Concentration
- 7007T **Samantha Flanagan**  
At What Magnification Does the Human Eye Recognize Common Objects?
- 7008S **Betty Hebble**  
Work Out Your Brain
- 7009S **Gay Htoo**  
How Does Music Affect Your Concentration
- 7010S **Natalie Humbert**  
How Does Chewing Gum Affect Your Memory
- 7011S **Oliver Pletch**  
How does the color of a book affect the likelihood of it being picked

- 7012S **Lyra Sato**  
Grading Your Sense Of Smell
- 7013S **Flannery Sheets, Anna Rynkiewich, Lucia Witzke Team** - Strooping In Style
- 7014S **Clare Swanson, Zoe Lee Team** - The stroop effect
- 7015S **Ryan Terry**  
Pinochio's Arms: A Lie Detector Test
- 7016T **Margaret Weiss, Mari Rummel Team** - Testing Glasser's Choice Theory of Power in Children

*Biochemistry (BCHM)*

- 7017T **Sophia Cruz**  
The 5 Second Rule
- 7018W **Dureti Gamada**  
What is the effect of naturally sweetened coke on teeth compared to other coca cola products?
- 7019S **Greta Laliberte**  
Too hot to handle
- 7020T **William Moe**  
The Caffeinated Reader
- 7021S **Lydia Westerlund**  
Eggs

*Biomedical and Health Sciences (BMED)*

- 7022S **Elsa Bildtsen**  
Does a Sugary Breakfast Affect Your Test Score?
- 7023W **Hannah Coonan, Brenna McLean Team** - Hydan Veggies
- 7024S **Gajan Dileepan**  
How does the amount of sugar in soda affect the amount of decay in teeth?
- 7025T **Iris Nelson, Emily Coughlin Team** - The Rotting Game
- 7026W **Harini Senthilkumar**  
The effects of Shoe heels on Posture and Stride length
- 7027S **Jack Swenson**  
How does the temperature affect how far you can stretch?

*Cellular and Molecular Biology (CELL)*

- 7028S **Chineze Okolo Ms.**  
How Does Shampoo Affect the Curl of Hair

*Chemistry (CHEM)*

- 7029T **Arjun Acharya**  
The Electrolysis of Water
- 7030S **Abby Altman**  
Cotton kills
- 7031S **Grace Blumer-LaMotte**  
Cookie Craze
- 7032S **Amarylla Chermak**  
Baths are Bomb
- 7033W **Lark Davis**  
Bombs Away: The impact of citric acid on the time it takes for a bath bomb to dissolve.
- 7034S **Alexa DeRoche**  
How leavening agents work in muffins
- 7035S **Maggie Fuller**  
How does the amount of beating time affect the outcome of a meringue
- 7036S **Katerina Gercheva, Alex Phung, Greta Stoyke Team** - Chemical crystals
- 7037S **Ja'Ryce Jett**  
Timing a chemical reaction
- 7038S **Una Jhocson**  
The Staying Power of Hair Dyes on Blonde Hair
- 7039T **Jacob Johnson**  
Cleaning Catastrophe
- 7040T **Audra Johnson**  
Changes in Density, Gases, and Temperature
- 7041W **Michael Laux, Griffin Moe Team** - Cleaning Coins With Household Liquids
- 7042T **Emily Navarro**  
Which Liquids Slow Enzyme Browning in Apples?
- 7043T **Toby Parcon**  
The Effect of Mint on Water
- 7044T **Harsha Pillai, Amy Portillo Team** - Floating of an Egg
- 7045T **Benjamin Ryan**  
Which Filtration Material Leads to the Best Drinking Water?
- 7046W **Amira Sinclair, Natol Nejo Team** - What are the corrosive effects of sour candy?
- 7047T **Jorden Thondup**  
Do Different Types of Liquids and Temperatures Affect Evaporation Rate?

- 7048T **Nyla Truzy**  
Reuse Leftovers To Make Paint

*Earth and Environmental Sciences (EAEV)*

- 7049S **Dallas Beilke**  
How Fast Does Paper Decompose
- 7050T **Amanda McKellips, Grace Weitzel Team** - Zebra Mussels' Preferred Water Conditions
- 7051W **Gordon Novak**  
Water Purification
- 7052S **Kaya Solheid**  
Tracking Particulate Matter Pollution From Trains Using The Magnetic Susceptibility Of Tree Leaves
- 7053W **Annika Veurink**  
Nature's Solvents Vs. Man's Mining: The Impact of Natural Resources on Water pH

*Energy: Chemical (EGCH)*

- 7054T **Lilyan Haller**  
Baking Soda + Vinegar = Lift Off
- 7055T **Isabelle Williams**  
What Kind of Salt Makes a Car go the Fastest?

*Energy: Physical (EGPH)*

- 7056S **Jonathan Lane, Matthew Stolte Team** - pH vs Electricity
- 7057T **Jacob Manor**  
That's The Way The Ball Bounces
- 7058T **Iris Peterson**  
Flowing Liquids
- 7059T **Elianan Sileshe**  
How Does Temperature Affect Light Intensity?

*Engineering Mechanics (ENMC)*

- 7060T **Antonio Kutz**  
The 30 Meter Glide
- 7061S **Chal Lawson**  
Paper Planes
- 7062T **Bennett Peterson**  
Effect of Pellet Shape on Expansion and Penetration Depth
- 7063T **Michael Siv**  
Box n eggs
- 7064S **Kevin Torstenson**  
How does the grit of sandpaper used on pinewood derby car axles affect how far it goes after rolling down a ramp?



**3M** Science.  
Applied to Life.™

**3M is pleased to  
join with Twin Cities  
Regional Science Fairs  
in helping our youth  
reach their full potential.**

**Visit us at [3Mgives.com](http://3Mgives.com)**

3M and "3M Science. Applied to Life." are trademarks of 3M.

*Environmental Engineering (ENEV)*

- 7065S **Hemetii Apet**  
Taking Out Toxic Gases and Pollutants:  
Biochemistry Air Filters
- 7066S **Ayden Brudnak Voss**  
Build A Raft Powered By Surface Tension
- 7067W **Trisha Samba, Romy Peterson, Luke Rowen  
Team** - An inexpensive portable water filter for  
disaster relief

*Materials Science (MATS)*

- 7068W **Isabell Agner**  
Oh No... My Wig's On Fire
- 7069S **Francis Barnard**  
The sound absorbing efficiency of various materials
- 7070S **Sophia Carey**  
Trashion
- 7071S **Matilda Chowen, Maren Zimney  
Team** - Battle of the Bags
- 7072S **Leila Hagedorn , Eleanor Mulvaney  
Team** - Run Run Revolution!
- 7073S **Elizabeth Hamill**  
Caps n' Laps
- 7074W **Katie Healey**  
Toxic Temptation? Putting nail polish to the test...
- 7075W **Madeline Hopkins, Grace Tuttle  
Team** - What Materials Block Wifi Signals the  
Best?
- 7076S **Elsa Mechelke**  
Friction:
- 7077S **Levi Nichols**  
How Does the Rice:Water Ratio of Rice Glue  
Affect the Strength of the Glue?
- 7078T **Erika Snyder**  
Improvements of Salt Filtration Through the  
Testing of Different Media
- 7079S **Abigail Weislow, Mia David  
Team** - Suits in Pursuit
- 7080W **Lillian Ziegler**  
What Materials Block a Wifi Signal?
- 7081S **Owen Zimmerman**  
Does it Conduct Electricity?

*Microbiology (MCRO)*

- 7082W **Benjamin Ertl**  
5 Second Rule?

- 7083S **Katherine Kozak**  
Does antibacterial soap that contains Benzalkonium  
Chloride kill more bacteria than traditional soaps?
- 7084T **Eva Luangdetmalay**  
Bacteria in Chicken

*Physics and Astronomy (PHYS)*

- 7085T **Zach Behme, Henry Peterson  
Team** - What Type of Salt Melts Ice Fastest?
- 7086T **Sophie Copeland**  
Do mints affect the temperature of water
- 7087T **Paul Martynow**  
You got a gold rush... um lead rush
- 7088S **Max Mills**  
How does the mass and velocity of an object affect  
the amount of energy generated by a generator
- 7089T **Jonathan Ryan**  
Mixing Mystery: Why Does Tumbling Separate  
Mixtures
- 7090W **Peter Velgersdyk**  
Rocket Splash Off; The Impact of Fin Area on the  
Distance and Altitude of a Rocket's Flight

*Plant Sciences (PLNT)*

- 7091T **Abby Arndt**  
Eco-Friendly Chemicals
- 7092S **Adam Gaudio**  
How Does pH in Water Affect Plant Type
- 7093W **Zachariah Johnson**  
Taking the Bull by its Thorns: Will Winter Rye  
Control the Spread and Growth of Bull Thistle?
- 7094W **Faye Kelley, Sophia Zappa  
Team** - The Effects of Natural Preservatives on  
Pumpkins
- 7095S **Alexander Le**  
How does soil pH affect how fast mung beans  
grow?
- 7096T **Therese Phan**  
How Do Plants Respond To Classical Music?
- 7097T **Jocelyn Rojas**  
Color Effects on Plant Growth
- 7098S **Bodie Treiber**  
Coffee For Compost
- 7099W **Leihanah Weinacht**  
Hydroponics: Design on a Dime
- 7100S **Andrew Woodage**  
Growing Crops on Planets Orbiting Red Dwarfs

*Translational Medical Science (TMED)*

7101T **Kaylee Caron**  
Which Toothpaste has the Most Whitening Power?

**Grade 8**

*Animal Sciences (ANIM)*

8001T **Natalie Hua**  
Ant Farms

*Behavioral and Social Sciences (BEHA)*

8002T **Katherine Coppa**  
Fears Through the Ages

8003S **Alexander Kamenov**  
How Does Color of Food Affect Taste And Smell

8004W **Maeve Katics**  
How does an educational campaign impact the recycling habits of different age groups?

8005S **Erika Kyba**  
Can a Smile Affect One's Opinions?

8006S **Olivia Rencher**  
How similar are Identical Twins in physical and behavioral traits?

8007T **Savanna Ross**  
Sleep Quality and Dreams

8008T **August Tinklenberg**  
The Ultimatum Game

8009S **Izabella Usitalo**  
Remember Me

8010S **Ella Wackman**  
Does Age Affect Delay of Gratification

*Biochemistry (BCHM)*

8011S **Colin Farnham**  
The Antimicrobial Properties of Natural Substances

8012S **Annelise Purcell**  
Can i use the amylase enzyme to break down bioplastics?

*Biomedical and Health Sciences (BMED)*

8013S **William Benson**  
Fighting the Opioid Epidemic: Lay Administration of Naloxone

8014S **Taylor Branson**  
No More Cracking Flacking Or Peeling

8015S **Cael Cookman**  
What kills more germs handwashing or handsanitizer?

8016S **David Eggleston**  
Which Helmet is the Most Protective

8017S **Clare Friar**  
Comparing the Nutritional Differences of Organic and Conventional Apples

8018T **Quinn McKane**  
How Long Does Memorization Take

8019W **Abirami Rajasekaran**  
Carbon Conundrum

8020T **Jasper Strayer, Aaden Spencer Team** - How Effective Are Different Types of Antifungal Medication?

8021T **Amanda Wyllie**  
Electrophoresis Chamber Vs. Popular Drinks

*Cellular and Molecular Biology (CELL)*

8022S **Betsy Hofer**  
How Do Essential Oils Affect The Apoptosis Of HL-60 Cancer Cells

*Chemistry (CHEM)*

8023S **Roan Bougie**  
How does the amount of sodium chloride added to water affect the specific heat of the solution?

8024W **Margaret Deering**  
Viscosity Marble Race In Liquid

8025T **Minhnhat Le**  
Burning Facts

8026T **Teresa Le-Vu**  
Household Rust

8027W **Jake Maisel**  
Does the Melting Rate of Ice Change in Different Liquids?

8028S **Aleiyah Men**  
Salt vs. Sugar

8029T **Ryan Schabert**  
How PHast Will Acids Corrode Metal?

*Earth and Environmental Sciences (EAEV)*

8030S **Alharith Dameh**  
Does Your Water Fit the EPA's Standards (and how does it affect you)?

8031T **Matthew Korf**  
Water Filtration

8032S **Frances Ronning**  
The Chameleon Building

8033T **Anna Schafhauser**  
Global Warming vs. Marine Life

*Energy: Chemical (EGCH)*

- 8034T **Rikhil Seshadri**  
Low Cost, Non-aqueous Electrolyte Based Supercapacitors for Energy Storage  
**Project At Electricity Wall**

*Energy: Physical (EGPH)*

- 8035T **Charlie Diebel**  
Sound Through Pipes
- 8036W **Iesh Gujral**  
Effect of blade design on the energy produced by wind turbine under varying wind speeds  
**Project At Electricity Wall**
- 8037T **Tyler Haddorff**  
Colorful Light
- 8038T **Simon Palmer**  
Which Light Bulb Works Best

*Engineering Mechanics (ENMC)*

- 8039T **Dhairya Sharma**  
Deadweight Drone
- 8040T **Orion Tyrrell**  
An Improved launch method for mini CAN SAT projects

*Environmental Engineering (ENEV)*

- 8041S **Seamus Dougherty**  
How Do Various Flying Organisms Differ From Mechanical Objects In Flying Technique and Design?
- 8042S **Fiona Mundy**  
What kind of filter works best to filter out microfibers from the Wash Cycle?
- 8043T **Zoe Olson**  
Limonene Styrofoam Dissolution
- 8044T **Noelle Rogers, Bryna Eigenfeld**  
**Team - Wash N' Dry System**
- 8045T **Eliana Scheldberg**  
Making Pollution A Solution
- 8046S **Samuel Skinner**  
How Does the Temperature of a Superabsorbant Polymer Affect the Rate it Absorbs Water?
- 8047S **Sebastian Zarkower**  
Effect of biodegradable darts on flight characteristics

*Materials Science (MATS)*

- 8048T **Forrest Bowman, Troy Jackson**  
**Team - Glue Strength**

- 8049S **Jazmine Hawkins**  
Warm Hands

- 8050T **Nickolas Zander**  
Mailbox Mail Sensor

*Mathematics (MATH)*

- 8051S **Joseph Hoang**  
Understanding Convergence in the Riemann Zeta Function
- 8052S **Soren Sackreiter**  
Solar Equations
- 8053S **Paw Wah**  
The golden ratio

*Microbiology (MCRO)*

- 8054S **Brennan Crow**  
Amount of Bacteria Food Picks up Over Time
- 8055S **Gavin Dobson**  
Clostridium Botulinum, A Sweet Scent
- 8056S **Owen Finlay**  
Can Mushrooms Degrade Crude Oil?
- 8057S **Isadora McGinley Myers**  
Light and Airborne Mold Growth

*Physics and Astronomy (PHYS)*

- 8058T **Kienan Block**  
Boat Wake
- 8059T **Jayden Chow**  
What's The Hang
- 8060T **Sutton Ellis**  
Can you hear me now? Do cell phones emit harmful amounts of radiation?
- 8061S **James Kahn**  
How Does The Area Of The Nozzle Affect The Total Impulse Of A Solid State Rocket
- 8062T **Andrew Woessner**  
What Floats Your Boat?

*Plant Sciences (PLNT)*

- 8063S **Grace Bettenburg**  
How Does Microwave Radiation Affect Plant Growth?
- 8064W **Edith Crowley**  
Do Microwaves Kill Nutrients
- 8065T **Zachary Friedmann**  
Feeding Plants Sugar



8066W **Quentin Hughes, Vaughn Hughes**  
**Team** - As the World Moves to Vertical Farming, is Human Nutrition Compromised? Testing the Brix Factor of Ocimum Basilicum using Refractometer Analysis

8067T **Dylan Kist**  
Cat Grass Vs. Limestone & Sulfur

8068S **Will Schmitt**  
Something Out of Nothing: Using Greywater to Grow Plants Aeroponically

8069S **Isabella Shapland**  
Fun(gi) in the Sun

8070W **Lulu Skroch, Tori Reisberg**  
**Team** - What is the affect of macronutrient solutions on plant germination in a hydroponic system?

### *Robotics and Intelligent Machines (ROBO)*

8071W **Nova Midwinter**  
Should robots have tails?  
**Project At Electricity Wall**

8072T **Kaitlynn Mitchell**  
Crossing The Terrain

### *Translational Medical Science (TMED)*

8073S **Peter Wenger**  
Little Green Fuel

## High School

### *Animal Sciences (ANIM)*

1001S **Sorcha Ashe**  
Grade 12 - Nerve Cell Distribution Among the Eight Arms of Octopus vulgaris

1002W **Theo Coval, Emma Beveridge**  
Grade 9,9 - **Team** - Horseshoe Crab Sanctuary: Year 1

1003S **Annie Lam**  
Grade 11 - The Effect of Acute Copper Exposure On Object Recognition Memory in Zebrafish (Danio Rerio)

1004W **Namrata Padmanabhan**  
Grade 11 - Effects of Acromyrmex sp. Microbiome on Atta sp. Escovopsis

1005S **Elta Paw**  
Grade 9 - Chipmunk Food Preference

1006S **Hser Poh, Nicole Moffitt**  
Grade 9,9 - **Team** - How does the types of food affect the types of small mammals trapped?

1007W **Connor Roberson**  
Grade 9 - What Time of Day Are Birds Most Active Winter 2017/18

1008S **Shayd Young, Magen Schwarting**  
Grade 9,9 - **Team** - How do the locations of traps affect the efficiency of capturing a small animal?

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

1009S **Natalie Braga**  
Grade 9 - I Forgot The Title: The Effect of Distractions on Memory

1010T **Tucker Brown**  
Grade 10 - Office space vs productivity

1011S **Izzy Campbell**  
Grade 9 - Could your stress be related to your parents

1012T **Hayden Dempsey**  
Grade 10 - Improving Memory Retention and Concentration with Essential Oils

1013T **Michael Finch**  
Grade 10 - Leadership: A Study in Political Psychology

1014T **Sean Floersch**  
Grade 10 - The Effect Bluetooth Phones Have on Driving Versus Handheld Phones

1015T **Kayla Gant**  
Grade 10 - Can you remember

1016T **Najib Hassan**  
Grade 10 - Effects of Age Upon Reaction Time

1017T **Megan Hopkins**  
Grade 10 - How Color Impacts Visual Acuity

1018W **Louise Kim, Spencer Yueh**  
Grade 11,11 - **Team** - Unplugged: Quantifying the effect of technology on adolescent sleep and mood

1019W **Samuel Leville, Abigail Roh**  
Grade 11,10 - **Team** - Understanding Empathy in the Digital Age: Characterizing online patient support using a lexical analysis tool

1020T **Mark Lynch**  
Grade 10 - Stroop Effect and Gender

1021T **Christine Maina**  
Grade 10 - Beauty in the Eye of the Beholder

1022W **Ishan Nadkarni, Nathan DeMichaelis**  
Grade 9,9 - **Team** - Platform for Peak Performance: Enhancing Student Learning and Comprehension Online vs. In Text

1023T **Naome Peterson**  
Grade 10 - Chewing gum and test performance

1024W **Spencer Sweeney**  
Grade 12 - Effects of Improved Sleep on High School Teenagers in Test Scores and Confidence

*Biochemistry (BCHM)*

1025S **Grace Dombrow Jr., Neesha Moore Sr.**  
Grade 11,12 - **Team** - Jell-o Mate

1026T **Brianna Hoebet Ms.**  
Grade 10 - Public Restrooms Versus Shopping Carts

1027T **Yodahit Philipos**  
Grade 10 - The Affect of Light on Yeast

*Biomedical and Health Sciences (BMED)*

1028T **Shaima Abukar**  
Grade 10 - Are you too pressed?

1029W **Boatema Agyeman-Mensah, Sahana Mangipudi**  
Grade 10,9 - **Team** - Breast Cancer Screenings for Women - A Decision Tree for General Practitioners and OB-GYNS

1030T **Katherine Berge**  
Grade 10 - What is the Fat Percentage in Different Types of Nuts?

1031S **Phillip Bragg**  
Grade 11 - Converting Morphine to Methadone: A Systematic Review

1032T **Mitchell Drobnick**  
Grade 10 - What helmet designs best prevent concussions

1033T **Justin Duffy**  
Grade 12 - Mast Cell Quantity and Localization in the Heart, Quadriceps, and Diaphragm of a Duchenne Muscular Dystrophy Model

1034W **Nell Ganley, Simren Samba**  
Grade 9,9 - **Team** - Immune System Boosting Products

1035S **Lelonie Hester**  
Grade 12 - Will you freeze.?

1036S **Kay Htoo, Wah Moo**  
Grade 11,12 - **Team** - The Forces of a soccer ball

1037T **Sarah Leipnitz**  
Grade 10 - Amount of Sugar in Soda

1038W **Cole Maxwell**  
Grade 12 - More than skin deep: Deciphering the role of Bartonella henselae infection in melanoma metastasis (Phase 2)

1039T **Ella Menke**  
Grade 10 - Cooling Vitamin C

1040T **Ryan Mokandu**  
Grade 10 - The Pressure Is On

1041W **Devika Narayan**  
Grade 11 - Measuring Insulin as the primary actor for AB fibril formation in Alzheimer's patients  
**Project At Electricity Wall**

1042W **Ava Raffel, Mary O'Grady**  
Grade 10,10 - **Team** - Facing off with FSHD: Pioneering a cure for muscular dystrophy through gene editing

1043W **Alexa Reynders, Benjamin Larson**  
Grade 12,12 - **Team** - Vertical Flow Assay Detection for GM2-AP in Simulated Urine of Non Small Cell Lung Cancer Patients

1044W **Kathryn Sherman**  
Grade 9 - Assessing Alternative Medicine With Staphylococcus Epidermidis

1045W **Lana Trautman, Catherine Pirtle**  
Grade 11,11 - **Team** - Mesenchymal Missiles: Utilizing Stem Cells to Revolutionize Targeted Cancer Treatment

*Biomedical Engineering (ENBM)*

1046S **Tseyone Bogale**  
Grade 11 - Designing a Variable Expandable Shunt Using Thermoplastic Materials

1047W **Felisha Fox, Michael Pupel**  
Grade 12,12 - **Team** - Pain-Averting Device(PAD) for Injections

1048W **Henry Koch, Quinn Ehlen**  
Grade 12,12 - **Team** - Size-Adjustable, Affordable Foot Shell for Lower Extremity Prosthetics

1049T **Everett Kroll**  
Grade 11 - 3D Printable Biocompatible Prosthetic Shank  
**Project At Electricity Wall**

1050W **Siyuan Ma, Alexander Anderson**  
Grade 12,11 - **Team** - Holding Your Heart in Your Hand: 3D-Printing a Mechanically Accurate Aortic Valve Model

1051S **Enrique Vazquez, Liam Morrissey**  
Grade 12,12 - **Team** - The Smart IUD: A novel approach to bioinformatics

*Cellular and Molecular Biology (CELL)*

1052W **Luke Bunday**  
Grade 12 - Engineering Pfu DNA polymerase with split inteins

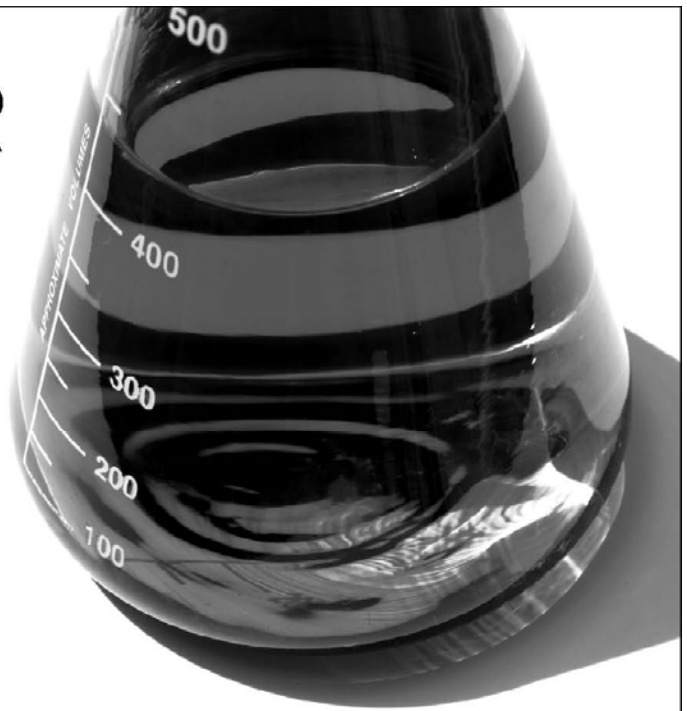
1053W **Emma Carr**  
Grade 12 - Sex, Mice, and Alzheimer's: Linking neurodegenerative disease and gender through mouse models

# THE LEADER IN CLEAN

At Ecolab, we use cutting-edge science and technology to continually develop innovative breakthroughs for our customers - earning our reputation as the leader in clean.

To learn more about our innovative solutions, call Ecolab at 1.800.2.ECOLAB or visit us at [www.ecolab.com](http://www.ecolab.com).

**ECOLAB®**



© 2007 Ecolab Inc. All rights reserved.



Premier Bank is committed to community.  
<https://premierbanks.com/>

Premier Bank is a local, community bank, with global reach and supports science education by donating to the Twin Cities Regional Science Fairs. Thank you to our new sponsor!



**Custom Automation Equipment**

*Madison, WI*

[www.isthmuseng.com](http://www.isthmuseng.com)

*Isthmus Engineering is a Worker-Owned Cooperative*

1054W **Brandon Lai**  
Grade 12 - MyoR Regulation of Skeletal Muscle  
Regeneration  
**Project At Electricity Wall**

1055W **Thomas Peterson, Kylie Spangler**  
Grade 11,11 - **Team** - The Key to a Cure:  
Unlocking new cancer treatments using  
immunotoxins

1056W **Darlene Radichel, Karthik Papisetty**  
Grade 11,11 - **Team** - Inhibiting Cancer  
Progression by Removing CSPG4: Bringing New  
Ideas to Life Using CRISPR Technology  
**Project At Electricity Wall**

1057W **Morgan Robinson**  
Grade 12 - Mapping the USP33 Gene and Its  
Involvement in Cardiomyocyte Regeneration in  
Neonatal Mice

1058W **Emily Schulenberg**  
Grade 12 - How Glutathione-S-Transferase Genes  
Affect the Longevity of isp-1 Mutated C. elegans  
Worms

1059T **Barath Sridher**  
Grade 10 - How To Extract DNA From Anything  
Living

1060T **Aarathi Vijayakumar, Michelle Sung**  
Grade 11,11 - **Team** - Validation of Cre Specificity  
in PCP2-Cre GCaMP6 Transgenic Mice

### *Chemistry (CHEM)*

1061S **Caleb Bowron, Edward Shaw**  
Grade 12,12 - **Team** - Omnipresence of Acetic  
Acid In A Lava Dome Environment Containing  
Sodium Hydrogen Carbonate

1062T **Abigail Fors**  
Grade 10 - Light It Up

1063S **Alyssa Gomez**  
Grade 11 - Potato Osmosis

1064T **Meagan Haase**  
Grade 10 - Electro-Lemon

1065S **Sylvi Nord**  
Grade 12 - Grapefruit and Catalase

1066T **Brianna O'Brien**  
Grade 10 - Corrosion on Metals

1067T **Natalie Thoresen**  
Grade 10 - Polarity of water clocks

1068T **Daniel Vazquez**  
Grade 10 - The Chemistry of Dyeing with Kool Aid

1069W **Kerui Yang**  
Grade 10 - A Simple and Inexpensive Sensor for  
Glucose and Fluoride Using Boric Acid  
**Project At Electricity Wall**

### *Computational Biology and Bioinformatics (CBIO)*

1070W **Samuel Aronson, Alex Cheng**  
Grade 12,12 - **Team** - Predicting the risk of  
chemotherapy-induced cardiotoxicity in breast  
cancer patients using supervised machine learning

1071T **Max Carlson**  
Grade 10 - Yeast

1072W **Molly Carroll, Mari Leland**  
Grade 12,12 - **Team** - Breaking the Barrier to Safe  
Food: Identifying Functions for Disruption of  
Foodborne Pathogen Biofilms  
**Project At Electricity Wall**

1073S **Mani Chadaga, Akshay Nambudiripad,  
Alexander Hydrie**  
Grade 9,9,9 - **Team** - Utilizing Python-scripted  
Neural Networks to Identify the most Indicative  
Factors of Heart Disease  
**Project At Electricity Wall**

1074W **Saahil Chadha, Elena Romashkova**  
Grade 12,12 - **Team** - Determination of ancient  
Earth day length through reconstruction and  
analysis of ancestral circadian rhythm proteins

1075W **Gabrielle Evans**  
Grade 12 - Identification and evaluation of function  
of conserved and mutated regions of the RyR1 and  
RyR2 between species.

1076S **Rachel Khodursky**  
Grade 12 - On the Prevalence of Antibiotic  
Resistance

1077W **Caroline Pernat, Alison Grobel**  
Grade 11,11 - **Team** - Who Will Win in a Fight?  
Pseudonocardia or Streptomyces? Find Out Here!

1078W **Pranav Rupireddy**  
Grade 11 - Untangling Parkinsonian Dynamics:  
Analyzing Spatio-Temporal Neural Spiking  
Patterns under Second-Order Network Structures in  
Parkinsonian-like networks  
**Project At Electricity Wall**

1079W **Sydney Weinandt, Sam Swanson**  
Grade 11,11 - **Team** - Survival of the Fittest: How  
Microbes Survive in Underwater Volcanos

### *Earth and Environmental Sciences (EAEV)*

1080W **David Ahrens, Christiana Wilke, Cassidy  
Roland**  
Grade 12,11,12 - **Team** - Spilling the Beans: A  
Ground-breaking Approach to Mitigate Phosphorus  
Loss in Urban Agriculture

- 1081T **Nathan Andersen**  
Grade 10 - Sunlight Hurts
- 1082T **Aurora Anderson**  
Grade 10 - Emmert's Law and Full Moon Illusion
- 1083S **Roland Berg, Veronica Sannes, Lauren Mendoza**  
Grade 12,12,12 - **Team** - D(O<sub>2</sub>) You Lake Healthy Aquatic Ecosystems?
- 1084T **Ryan Crawford**  
Grade 10 - The Effects of Wind Erosion on Soil
- 1085T **Josie Evjen**  
Grade 10 - Oil in the Waves
- 1086T **Tatum Frey, Grace Campbell**  
Grade 12,11 - **Team** - Effects of Fertilizers on Orthophosphate Levels in Fresh Water Lakes
- 1087T **Garrett Johnson, Taylor Hermansen**  
Grade 12,12 - **Team** - Effects of pollution on algae oxygen production within 24 hours of exposure
- 1088T **Haley Jostes**  
Grade 11 - Using Ceratophyllum Demersum as a Water Filter and Fertilizer in an Organic Farming Cycle
- 1089W **Neil Khadilkar**  
Grade 11 - Global Climate Change - Hoax or Reality: A stochastic simulation of macroscale causal factors and effects on life indicators
- 1090S **Arianna Krongard**  
Grade 9 - Soil Nutrients and Human Activity
- 1091T **Kent Le-Vu**  
Grade 10 - Effects of H<sub>2</sub>O<sub>2</sub> on Seeds
- 1092T **Ruoxin Liu**  
Grade 10 - Conductivity In Drinkable Water Of Two Schools
- 1093S **Hailey Martin**  
Grade 10 - The Impact of Soil Acidity on Plant Growth
- 1094T **Eaden Mezemure**  
Grade 10 - How do changes in acidity affect the survival rates of an invertebrate population?
- 1095S **Elsa Runquist**  
Grade 12 - Tardigrade Abundance as a Bioindicator for Water Quality
- 1096T **Livia Selby**  
Grade 10 - How Does Soil Affect Greenhouse Gas Emissions
- 1097W **Ayush Shah**  
Grade 11 - Development of a Polymer-Based Fertilizer From Readily Accessible Food Waste
- 1098T **Rachel TerHaar, Arika Robinson**  
Grade 12,12 - **Team** - The Effects of Glyphosate on *Pomacea bridgesii*
- 1099T **Claire Wentzlaff**  
Grade 12 - The Effect of Non-Pathogenic Bacteria on the Invasive Species *Lemna minor* (Duckweed), Year II
- 1100T **Diana Zhu**  
Grade 11 - Global Pattern of Solar Cycle Impacts on Nitrogen Dioxide Levels
- 1163S **Xee Thao**  
Grade 11 - Determining if Methyl IAA is Naturally Present in *Arabidopsis thaliana*
- Embedded Systems (EBED)*
- 1101T **Milan Jostes**  
Grade 9 - Concussion Sensing Helmet
- 1102W **Dylan Vincent, Nathan Tank**  
Grade 10,11 - **Team** - Cellophane to Sensor: Designing a Low-cost Method for Detecting and Characterizing Oil in Water
- Energy: Chemical (EGCH)*
- 1103T **Nawal Mahamed**  
Grade 10 - The effect of heat on neodymium magnet
- 1104T **Reed Thoma**  
Grade 10 - Methane Production From Manure
- Energy: Physical (EGPH)*
- 1105T **Ushmil Azad**  
Grade 10 - Energy Consumption of Cooking Oil Using a Calorimeter
- 1106T **Casey Hennessy**  
Grade 10 - Efficiency Improvement of Photovoltaic Solar Cells Using Forced Air Convection
- Engineering Mechanics (ENMC)*
- 1107S **Hussen Gemada**  
Grade 12 - Auditory devices for speech impediments
- 1108T **Daniel Habiger**  
Grade 10 - Bernoulli's Principle
- 1109T **Steven Nguyen**  
Grade 10 - Types of Keyboards Effect on Typing Speed
- Environmental Engineering (ENEV)*
- 1110W **Avni Jain**  
Grade 11 - Wastewater Treatment: Utilizing hydroponics to develop a novel and sustainable solution to nutrient pollution

- 1111W **Stanley Kohls**  
Grade 12 - Comparison of adsorption and absorptive methods of metal immobilization in the in vitro quaternary treatment of AMD with Oedogonium spp.
- 1112T **Manashree Padiyath**  
Grade 10 - Pulp Fiction?! Lead remediation with biochar made from the Apiaceae (Carrot) plant family (Year 2)
- 1113T **Ayana Stauffer**  
Grade 10 - Utilizing Non-Recyclable Plastic Material to Create Emergency Shelter
- 1114T **Nancy Wang**  
Grade 10 - Disaster Resistant House
- Materials Science (MATS)*
- 1115T **Marwah Ismail**  
Grade 10 - Effects of UV Radiation on Different Types of Cotton
- 1116T **Katelyn Kleiter**  
Grade 10 - Mushroom Packaging
- 1117T **Max Kortenhof**  
Grade 10 - Are the advertisements true?
- Mathematics (MATH)*
- 1118W **Aaron Bae**  
Grade 12 - Characterizing the Measles Virus: Analyzing Pediatric Hospitalizations from 1997-2012
- Microbiology (MCRO)*
- 1119T **Rahma Abdullahi**  
Grade 10 - Got plaque?
- 1120W **Irene Choi**  
Grade 11 - DNA-Engineering Bacteria with CRISPR-Cas9 Technology
- 1121T **Kiah Christopherson**  
Grade 10 - Affects of Pollution on Microorganism Populations
- 1122W **Maya Czeneszew, Erica Iliarski**  
Grade 12,12 - **Team** - Terminating Tuberculosis: Creating a Bacterial Model to Determine the Genetic Basis for Rifampicin Tolerance
- 1123T **Arthur Dao**  
Grade 10 - Does Music Affect Bacteria Growth?
- 1124S **Isabel Dieperink, Valerie Bares**  
Grade 11,11 - **Team** - Adding Calcium Chloride to Improve Bacterial Adhesion in a Xylem Filter: A Novel Mechanism for Water Filtration
- 1125T **Rory Donohue**  
Grade 10 - How Light Affects Yeast Growth
- 1126W **Addison Gleekel, Melinda Samaratunga**  
Grade 12,12 - **Team** - Turning the tide against ocean pollution: Investigating the role of VanK in aromatic acid chemotaxis
- 1127S **Jeffrey Huang**  
Grade 11 - Investigating the effects of the light-dark cycle and wavelength of light on the length of bioluminescence of P. lunula
- 1128T **Brianna Kieffer**  
Grade 10 - What Mouthwash Kills The Most Bacteria?
- 1129T **Emma Meyer**  
Grade 10 - Zapping Zits
- 1130W **Alana Mueller**  
Grade 11 - Which Household Cleaners Clean the Best?
- 1131T **Marwa Osman**  
Grade 10 - Effects of Garlic on E. Coli
- 1132T **Kerrie Schaefers**  
Grade 10 - Does irradiated chicken have more bacteria than fresh or frozen chicken?
- 1133T **Austen Scheuneman**  
Grade 10 - Effects of different colored lights on yeast's time to activate
- 1134S **Lia Wallace, Stephanie Hulander**  
Grade 11,11 - **Team** - Let's take it BAC(teria) to water
- 1135S **Riley Will**  
Grade 12 - A Study of the Effects of a Biotinylated Peptide from BAM on the Growth of Escherichia coli
- 1136T **Molly Willmert**  
Grade 10 - Different Concentrations of Silver Nanoparticles Effects on E. coli Bacteria
- 1162S **Camryn Franke**  
Grade 11- Optimizing Escherichia coli Energy Usage for Chemotaxis and Reproduction Through Experimental Evolution
- Physics and Astronomy (PHYS)*
- 1137T **Britney Bahena Juarez**  
Grade 10 - Light Experiment
- 1138T **Abigail Banks-Hehenberger**  
Grade 11 - The Metal at the End of the Rainbow: Using Digital Spectroscopy to Draw Correlations Between Molarity of Solute and Line Intensity of Heavy Metal Ions to Identify Pollutants in Urban Water Sources
- 1139W **Leonardo Clarke**  
Grade 12 - The Relationship Between the Primary Pulsation Period and the Blazhko Effect in RR Lyrae Variables

1140T **Sofia Fix**  
Grade 9 - Proving the existence of a “Wheeler”  
Wormhole with a free-electron laser

*Plant Sciences (PLNT)*

1141S **Grace Aerts, Alice Andrastek, Emma McGrew**  
Grade 12,12,12 - **Team** - Seed Germination

1142S **Luke Chen**  
Grade 12 - Freezing Point Depression in Brassica  
rapa using Methyl Alcohol

1143W **Ravi Chopuri**  
Grade 12 - Feeding the World: Efficient Soybean  
Modification with DNA Replicons  
**Project At Electricity Wall**

1144S **Flannery Enneking-Norton**  
Grade 12 - Exploring the facilitative relationship  
between Lumbricidae and Rhamnus cathartica

1145T **Fatima Garza-Ramon**  
Grade 10 - Square Foot Gardening Vs. Normal  
Gardening

1146T **Phannara Kim**  
Grade 10 - Heat To Energy and Why it's Important

1147W **Fiona Kinney, Abby Samuel, Faben Bekele**  
Grade 9,9,9 - **Team** - Cloning African Violets:  
Using the Stem, Flower and Leaf to Achieve the  
Most Accurate Replica

1148S **Sarah Lind-MacMillan**  
Grade 12 - These Plants Are Sippin' on Lacroix

1149T **Katie Lyon, Gregory Johnson**  
Grade 12,12 - **Team** - Effectiveness of Chlorella  
Algae in the Bioremoval of Sodium ions from an  
Artificial Pond Ecosystem

1150S **Kody Matykiewicz, Jenifer Ruiz Garcia**  
Grade 10,10 - **Team** - How does Juglone affect the  
growth of Solanum lycopersicum

1151T **Ryan Nguyen**  
Grade 10 - Gross Greywater

1152T **Mitchell Remarcik**  
Grade 10 - How lights affect plants

1153T **Rachel Ryan**  
Grade 10 - Rehabilitation of Soil with the Use of  
Polymers

1154T **Alexa Tinder**  
Grade 10 - Developing a Renewable, Sustainable  
Energy Source: Algae Biofuel

1155S **Emilia Topp-Johnson**  
Grade 12 - Behind the Kernels VI: An  
Identification and Assessment of Potential  
Endophytic Mutualists

*Robotics and Intelligent Machines (ROBO)*

1156W **James Clinton, David Mah**  
Grade 10,10 - **Team** - Weed Spotting: Using  
Machine Learning to Identify Dandelions

1157S **Michael Hall, Daniel Ellis**  
Grade 12,12 - **Team** - CARL: A Convolutional  
Neural Network Powered Self-Driving Car  
**Project At Electricity Wall**

1158W **Parthiv Krishna**  
Grade 11 - Development of Autonomous  
Unmanned Aerial Systems for Semi-Dense Point  
Cloud Generation in Disaster Scenarios  
**Project At Electricity Wall**

1159W **Maxwell Rader, Christopher Simmons**  
Grade 11,12 - **Team** - Robotic Exoskeleton for  
Rehabilitation Applications  
**Project At Electricity Wall**

*Systems Software (SOFT)*

1160T **Elizabeth Ostendorf, Isabel Romay**  
Grade 12,11 - **Team** - Hand Therapy App

*Translational Medical Science (TMED)*

1161W **Jason Weng**  
Grade 12 - Examining the Role of Neuronal IKKB  
in the Neuropathology of SCA1



**3M** Science.  
Applied to Life.™

**Congratulations, Twin  
Cities Regional Science  
Fair Participants!**

Visit us at [3Mgives.com](http://3Mgives.com)

3M and “3M Science. Applied to Life.” are trademarks of 3M.



**Grade 6**

Banks, Maggie 6004T  
 Barrett, Faith 6005W  
 Boyum, Collin 6033T  
 Campbell, Alannah 6003W  
 Chow, Carissa 6006T  
 Clift, Liam 6018T  
 Daher, Andrew 6007W  
 Derr, Clayton 6032W  
 Distad, Kendra 6016T  
 Eshete, Yordanos 6037T  
 Glausser, Jack 6021T  
 Isebrand, Greydon 6001T  
 Jansma, Lilyann 6029W  
 Jemtrud, Lewis 6022T  
 Johnson, Gianna 6008W  
 Johnson, Emma 6009W  
 Johnson, Gerald 6033T  
 Kneisl, Alexander 6038T  
 Lieber, Grace 6010T  
 Magee, Samantha 6011W  
 Martinez, Estrada 6012T  
 McSherry Riri, Riley 6002W  
 Moher, Braiden 6034T  
 Morgan, Andrew 6026T  
 Moses, Herani 6023T  
 Moua, Natalie 6013T  
 Orellana, Maya 6030T  
 Osterbauer Gabe, Gabriel 6014W  
 Painter, Harmony 6010T  
 Reyes Volkov, Jarissett 6023T  
 Rice Adriana, Adriana 6024W  
 Shoor, Aditya 6031T  
 Spack Mitch, Mitchell 6039W  
 Steffen, Kenny 6027T  
 Stortroen, Benjamin 6038T  
 Strayer, Jade 6028T  
 Telander , Norah 6015W  
 Tomas, Anna 6016T  
 Trussell, Joshua 6035T  
 Trussell, Tim 6036T  
 Trussell, Matthew 6019T  
 Van Buren, William 6020W  
 Wappes, Benjamin 6017W  
 Warren, Addison 6030T  
 Wischmeier, Joseph 6025W

**Grade 7**

Acharya, Arjun 7029T  
 Agner, Isabell 7068W  
 Altman, Abby 7030S  
 Apet, Hemetii 7065S  
 Arndt, Abby 7091T

Barnard, Francis 7069S  
 Behme, Zach 7085T  
 Beilke, Dallas 7049S  
 Bertini, Joey 7005T  
 Bildtsen, Elsa 7022S  
 Blohm, Ian 7006S  
 Blumer-LaMotte, Grace 7031S  
 Brudnak Voss, Ayden 7066S  
 Budd, Caitlyn 7001S  
 Carey, Sophia 7070S  
 Caron, Kaylee 7101T  
 Chermak, Amarylla 7032S  
 Chowen, Matilda 7071S  
 Coonan, Hannah 7023W  
 Copeland, Sophie 7086T  
 Coughlin, Emily 7025T  
 Cruz, Sophia 7017T  
 David, Mia 7079S  
 Davis, Lark 7033W  
 DeRoche, Alexa 7034S  
 Dick, Joey 7005T  
 Dileepan, Gajan 7024S  
 Ertl, Benjamin 7082W  
 Flanagan, Samantha 7007T  
 Fuller, Maggie 7035S  
 Gamada, Dureti 7018W  
 Gaudio, Adam 7092S  
 Gercheva, Katerina 7036S  
 Hagedorn , Leila 7072S  
 Haller, Lilyan 7054T  
 Hamill, Elizabeth 7073S  
 Healey, Katie 7074W  
 Hebble, Betty 7008S  
 Hopkins, Madeline 7075W  
 Htoo, Gay 7009S  
 Hughes, Vaughn 8066W  
 Humbert, Natalie 7010S  
 Jett, Ja'Ryce 7037S  
 Jhocson, Una 7038S  
 Johnson, Jacob 7039T  
 Johnson, Zachariah 7093W  
 Johnson, Akio 7002T  
 Johnson, Audra 7040T  
 Kelley, Faye 7094W  
 Kozak, Katherine 7083S  
 Kutz, Antonio 7060T  
 Laliberte , Greta 7019S  
 Lane, Jonathan 7056S  
 Laux, Michael 7041W  
 Lawson, Chal 7061S  
 Le, Alexander 7095S  
 Lee, Zoe 7014S  
 Luangdetmalay, Eva 7084T  
 Manor, Jacob 7057T  
 Martynow, Paul 7087T  
 McKellips, Amanda 7050T  
 McLean, Brenna 7023W  
 Mechelke , Elsa 7076S  
 Mills, Max 7088S  
 Moe, Griffin 7041W  
 Moe, William 7020T  
 Mulvaney, Eleanor 7072S  
 Navarro, Emily 7042T  
 Nejo, Natol 7046W  
 Nelson, Iris 7025T  
 Nichols, Levi 7077S  
 Novak, Gordon 7051W  
 Okolo Ms., Chineze 7028S  
 Parcon, Toby 7043T  
 Peterson, Henry 7085T  
 Peterson, Bennett 7062T  
 Peterson, Romy 7067W  
 Peterson, Iris 7058T  
 Phan, Therese 7096T  
 Phung, Alex 7036S  
 Pillai, Harsha 7044T  
 Pletch, Oliver 7011S  
 Portillo, Amy 7044T  
 Richardson, Alec 7003S  
 Rojas, Jocelyn 7097T  
 Rowen, Luke 7067W  
 Rummel, Mari 7016T  
 Ryan, Jonathan 7089T  
 Ryan, Benjamin 7045T  
 Rynkiewich, Anna 7013S  
 Samba, Trisha 7067W  
 Sato, Lyra 7012S  
 Senthilkumar, Harini 7026W  
 Sheets, Flannery 7013S  
 Sileshe, Elianan 7059T  
 Sinclair, Amira 7046W  
 Siv, Michael 7063T  
 Snyder, Erika 7078T  
 Solheid, Kaya 7052S  
 Stolte, Matthew 7056S  
 Stoyke, Greta 7036S  
 Swanson, Clare 7014S  
 Swenson , Jack 7027S  
 Terry, Ryan 7015S  
 Thondup, Jordan 7047T  
 Torstenson , Kevin 7064S  
 Treiber, Bodie 7098S  
 Truzy, Nyla 7048T  
 Tuttle, Grace 7075W  
 Velgersdyk, Peter 7090W  
 Veurink, Annika 7053W  
 Weinacht, Leihanah 7099W  
 Weislow, Abigail 7079S  
 Weiss, Margaret 7016T  
 Weitzel, Grace 7050T



## Water & Process Solutions

**Dow Water & Process Solutions congratulates your achievements in competing at the Twin Cities Regional Science Fair.**

**We thank Dow Water & Process Solutions for their sponsorship of this event!**

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

**Dow Water & Process Solutions, a subsidiary of The Dow Chemical Company,** is committed to advancing water treatment technologies and ensuring availability of clean water to those who need it-through advanced research and industry-leading application expertise.



**Orbital ATK** is proud to sponsor this hands-on event that helps provide an opportunity for Twin Cities' youth to better understand the sciences and technology. By inspiring curiosity and interest today, we develop our future scientists, engineers and astronauts. Congratulations and good luck to all participants. Headquartered in Dulles, Virginia, **Orbital ATK** is a leading provider of advanced weapon and space systems with \$4.4 billion in annual sales, approximately 12,000 employees, and operations in 17 states. The company is the world's leading supplier of solid rocket motors and the nation's largest manufacturer of ammunition.



Custom catering, event planning and memorable spaces for every occasion.

612-253-0025

[ahanson@mintahoe.com](mailto:ahanson@mintahoe.com)

Wencel, Campbell	7004S	Midwinter, Nova	8071W	Berg, Roland	1083S
Westerlund , Lydia	7021S	Mitchell, Kaitlynn	8072T	Berge, Katherine	1030T
Williams, Isabelle	7055T	Mundy, Fiona	8042S	Beveridge, Emma	1002W
Witzke, Lucia	7013S	Olson, Zoe	8043T	Bogale, Tseyone	1046S
Woodage, Andrew	7100S	Palmer, Simon	8038T	Bowron, Caleb	1061S
Zappa, Sophia	7094W	Purcell, Annelise	8012S	Braga, Natalie	1009S
Ziegler, Lillian	7080W	Rajasekaran, Abirami	8019W	Bragg, Phillip	1031S
Zimmerman, Owen	7081S	Reisberg, Tori	8070W	Brown, Tucker	1010T
Zimney, Maren	7071S	Rencher, Olivia	8006S	Bunday, Luke	1052W

### Grade 8

Benson, William	8013S	Rogers, Noelle	8044T	Campbell, Izzy	1011S
Bettenburg, Grace	8063S	Ronning, Frances	8032S	Campbell, Grace	1086T
Block, Kienan	8058T	Ross, Savanna	8007T	Carlson, Max	1071T
Bougie, Roen	8023S	Sackreiter, Soren	8052S	Carr, Emma	1053W
Bowman, Forrest	8048T	Schabert, Ryan	8029T	Carroll, Molly	1072W
Branson, Taylor	8014S	Schafhauser, Anna	8033T	Chadaga, Mani	1073S
Chow, Jayden	8059T	Scheldberg, Eliana	8045T	Chadha, Saahil	1074W
Cookman, Cael	8015S	Schmitt, Will	8068S	Chen, Luke	1142S
Coppa, Katherine	8002T	Seshadri, Rikhil	8034T	Cheng, Alex	1070W
Crow, Brennan	8054S	Shapland, Isabella	8069S	Chepuri, Ravi	1143W
Crowley, Edith	8064W	Sharma, Dhairya	8039T	Choi, Irene	1120W
Dameh, Alharith	8030S	Skinner, Samuel	8046S	Christopherson, Kiah	1121T
Deering, Margaret	8024W	Skroch, Lulu	8070W	Clarke, Leonardo	1139W
Diebel, Charlie	8035T	Spencer, Aaden	8020T	Clinton, James	1156W
Dobson, Gavin	8055S	Strayer, Jasper	8020T	Coval, Theo	1002W
Dougherty, Seamus	8041S	Tinklenberg, August	8008T	Crawford, Ryan	1084T
Eggleston, David	8016S	Tyrrell, Orion	8040T	Czeneszew, Maya	1122W
Eigenfeld, Bryna	8044T	Usitalo, Izabella	8009S	Dao, Arthur	1123T
Ellis, Sutton	8060T	Wackman, Ella	8010S	DeMichaelis, Nathan	1022W
Farnham, Colin	8011S	Wah, Paw	8053S	Dempsey, Hayden	1012T
Finlay, Owen	8056S	Wenger, Peter	8073S	Dieperink, Isabel	1124S
Friar, Clare	8017S	Woessner, Andrew	8062T	Dombrow Jr., Grace	1025S
Friedmann, Zachary	8065T	Wyllie, Amanda	8021T	Donohue, Rory	1125T
Gujral, Iesh	8036W	Zander, Nickolas	8050T	Drobnick, Mitchell	1032T
Haddorff, Tyler	8037T	Zarkower, Sebastian	8047S	Duffy, Justin	1033T

### High School

Hawkins, Jazmine	8049S	Abdullahi, Rahma	1119T	Ellis, Daniel	1157S
Hoang, Joseph	8051S	Abukar, Shaima	1028T	Enneking-Norton, Flannery	1144S
Hofer, Betsy	8022S	Aerts, Grace	1141S	Evans, Gabrielle	1075W
Hua, Natalie	8001T	Agyeman-Mensah,	1029W	Evjen, Josie	1085T
Hughes, Quentin	8066W	Boatemaa		Finch , Michael	1013T
Jackson, Troy	8048T	Ahrens, David	1080W	Fix, Sofia	1140T
Kahn, James	8061S	Andersen, Nathan	1081T	Floersch, Sean	1014T
Kamenov, Alexander	8003S	Anderson, Aurora	1082T	Fors , Abigail	1062T
Katics, Maeve	8004W	Anderson, Alexander	1050W	Fox, Felisha	1047W
Kist, Dylan	8067T	Andrastek, Alice	1141S	Franke, Camryn	1162S
Korf, Matthew	8031T	Aronson, Samuel	1070W	Frey, Tatum	1086T
Kyba, Erika	8005S	Ashe, Sorcha	1001S	Ganley, Nell	1034W
Le, Minhnhat	8025T	Azad, Ushmil	1105T	Gant, Kayla	1015T
Le-Vu , Teresa	8026T	Bae, Aaron	1118W	Garza-Ramon, Fatima	1145T
Maisel, Jake	8027W	Bahena Juarez, Britney	1137T	Gemada, Hussen	1107S
McGinley Myers, Isadora	8057S	Banks-Hehenberger, Abigail	1138T	Gleekel, Addison	1126W
McKane, Quinn	8018T	Bares, Valerie	1124S	Gomez, Alyssa	1063S
Men, Aleiyah	8028S	Bekele, Faben	1147W	Grobel, Alison	1077W
				Haase, Meagan	1064T
				Habiger, Daniel	1108T
				Hall, Michael	1157S

Hassan, Najib	1016T	Mokandu, Ryan	1040T	Spangler, Kylie	1055W
Hennessy, Casey	1106T	Moo, Wah	1036S	Sridher, Barath	1059T
Hermansen, Taylor	1087T	Moore Sr., Neesha	1025S	Stauffer, Ayana	1113T
Hester, Lelonie	1035S	Morrissey, Liam	1051S	Sung, Michelle	1060T
Hoebet Ms., Brianna	1026T	Mueller, Alana	1130W	Swanson, Sam	1079W
Hopkins, Megan	1017T	Nadkarni, Ishan	1022W	Sweeney, Spencer	1024W
Htoo, Kay	1036S	Nambudiripad, Akshay	1073S	Tank, Nathan	1102W
Huang, Jeffrey	1127S	Narayan, Devika	1041W	TerHaar, Rachel	1098T
Hulander, Stephanie	1134S	Nguyen , Ryan	1151T	Thao,Xee	1163S
Hydrie, Alexander	1073S	Nguyen, Steven	1109T	Thoma, Reed	1104T
Iliarski, Erica	1122W	Nord, Sylvi	1065S	Thoresen, Natalie	1067T
Ismail, Marwah	1115T	O'Brien, Brianna	1066T	Tinder, Alexa	1154T
Jain, Avni	1110W	O'Grady, Mary	1042W	Topp-Johnson, Emilia	1155S
Johnson, Garrett	1087T	Osman, Marwa	1131T	Trautman, Lana	1045W
Johnson, Gregory	1149T	Ostendorf, Elizabeth	1160T	Vazquez, Enrique	1051S
Jostes, Haley	1088T	Padiyath, Manashree	1112T	Vazquez, Daniel	1068T
Jostes, Milan	1101T	Padmanabhan, Namrata	1004W	Vijayakumar, Aarthi	1060T
Khadilkar, Neil	1089W	Papisetty, Karthik	1056W	Vincent, Dylan	1102W
Khodursky, Rachel	1076S	Paw, Elta	1005S	Wallace, Lia	1134S
Kieffer , Brianna	1128T	Pernat, Caroline	1077W	Wang, Nancy	1114T
Kim, Phannara	1146T	Peterson, Naome	1023T	Weinandt, Sydney	1079W
Kim, Louise	1018W	Peterson, Thomas	1055W	Weng, Jason	1161W
Kinney, Fiona	1147W	Philipos, Yodahit	1027T	Wentzlaff, Claire	1099T
Kleiter, Katelyn	1116T	Pirtle, Catherine	1045W	Wilke, Christiana	1080W
Koch, Henry	1048W	Poh, Hser	1006S	Will, Riley	1135S
Kohls, Stanley	1111W	Pupel, Michael	1047W	Willmert, Molly	1136T
Kortenhof, Max	1117T	Rader, Maxwell	1159W	Yang, Kerui	1069W
Krishna, Parthiv	1158W	Radichel, Darlene	1056W	Young, Shayd	1008S
Kroll, Everett	1049T	Raffel, Ava	1042W	Yueh, Spencer	1018W
Krongard, Arianna	1090S	Remarcik, Mitchell	1152T	Zhu, Diana	1100T
Lai, Brandon	1054W	Reynders, Alexa	1043W		
Lam, Annie	1003S	Roberson, Connor	1007W		
Larson, Benjamin	1043W	Robinson, Morgan	1057W		
Le-Vu, Kent	1091T	Robinson, Arika	1098T		
Leipnitz, Sarah	1037T	Roh, Abigail	1019W		
Leland, Mari	1072W	Roland, Cassidy	1080W		
Leville, Samuel	1019W	Romashkova, Elena	1074W		
Lind-MacMillan, Sarah	1148S	Romay, Isabel	1160T		
Liu, Ruoxin	1092T	Ruiz Garcia, Jenifer	1150S		
Lynch , Mark	1020T	Runquist, Elsa	1095S		
Lyon, Katie	1149T	Rupireddy, Pranav	1078W		
Ma, Siyuan	1050W	Ryan, Rachel	1153T		
Mah, David	1156W	Samaratunga, Melinda	1126W		
Mahamed, Nawal	1103T	Samba, Simren	1034W		
Maina, Christine	1021T	Samuel, Abby	1147W		
Mangipudi, Sahana	1029W	Sannes, Veronica	1083S		
Martin, Hailey	1093S	Schaefer, Kerrie	1132T		
Matykiewicz, Kody	1150S	Scheuneman, Austen	1133T		
Maxwell, Cole	1038W	Schulenberg, Emily	1058W		
McGrew, Emma	1141S	Schwarting, Magen	1008S		
Mendoza, Lauren	1083S	Selby, Livia	1096T		
Menke, Ella	1039T	Shah, Ayush	1097W		
Meyer, Emma	1129T	Shaw, Edward	1061S		
Mezemure, Eaden	1094T	Sherman, Kathryn	1044W		
Moffitt, Nicole	1006S	Simmons, Christopher	1159W		



**Dow Water & Process Solutions**

<http://www.dowwaterandprocess.com>

## 2018 Research Papers

Name	Grade	Title
Maggie Banks	6	Fruity Power: Making A Biodegradable Battery
Tim Trussell	6	Hit Me With Your Best Shot
Isabell Agner	7	Oh No... My Wig Is On Fire
Zach Behme, Henry Peterson	7,7	What Type of Salt Melts Ice Fastest?
Lark Davis	7	Bombs Away: The Impact of Citric Acid on the time it takes for a bath bomb to dissolve
Reilly Klug	7	Rust
Eva Luangdetmalay	7	Bacteria in Chicken
Amanda McKellips, Grace Weitzel	7,7	Zebra Mussels' Preferred Water Conditions
Toby Parcon	7	Does Mint Cool Things?
Harini Senthilkumar	7	The effects of Shoe heels on Posture and Stride length
Elianan Sileshe	7	How Does Temperature Affect Light Intensity
Jorden Thondup	7	Do Different Types of Liquids and Temperatures Affect Evaporation Rate?
Peter Velgersdyk	7	Rocket Splash Off: The Impact of Fin Area on the Altitude and Distance of a Rocket's Flight
Annika Veurink	7	Nature's Solvents Vs. Man's Mining: The Impact of Natural Resources on Water pH
William Benson	8	The Advantages of Lay Administration of Naloxone to Reduce Deaths Due to the Opioid Epidemic
Jayden Chow	8	What's The Hang
Alharith Dameh	8	Does Your Water Meet the EPA's Standards (and how does it affect you)?
Drew Fisher	8	Hockey Pucks
Claire Geis	8	Painkillers
Natalie Hua	8	Ant Farms in Different Temperatures
Quentin Hughes, Vaughn Hughes	8,7	As the World Moves to Vertical Farming, is Human Nutrition Compromised? Testing the Brix Factor of Ocimum Basilicum using Refractometer Analysis
Nova Midwinter	8	Should Robots Have Tails?
Zoe Olson	8	Limonene Styrofoam Dissolution
Simon Palmer	8	Which Light Bulb Works Best
Rikhil Seshadri	8	Low Cost Supercapacitors for Energy Storage
Sofia Fix	9	Proving the existence of a "Wheeler" Wormhole with a free-electron laser
Milan Jostes	9	Concussion Sensing Helmet
Rahma Abdullahi	10	What type of Sodium Fluoride is most effective against streptococcus mutans?
Shaima Abukar	10	Are you too pressed?
Caden Allen	10	Golf range
Aidan Alme	10	Modeling Spider-Man's Web Swinging
Nathan Andersen	10	Sunlight hurts
Aurora Anderson	10	Emmert's Law and Full Moon Illusion
Joseph Anderson	10	Does the perception of color affect the perception of taste?
Anna Austin	10	Effect of Grass on Water Soil Erosion
Ushmil Azad	10	Energy Consumption of Cooking Oil Using a Calorimeter
Hailey Bacon	10	Acne Medication Effects on E. Coli Bacteria

## 2018 Research Papers (continued)

Name	Grade	Title
Abigail Bauleke	10	Does Breathing Too Much While Swimming Affect the Speed of a Swimmer?
Mitchel Beckett-Groth	10	How stretching effects exam scores
Katherine Berge	10	What is the Fat Percentage in Different Types of Nuts?
Ross Boekhoff Jr.	10	The Importance of the Initial Growth of the Plant
Matthew Bollinger	10	The effect of relative pitch on the decibel levels of a sound
Hannah Bonneville	10	Does gender impact memory?
Bennet Botz	10	Efficiency of Biomass Fuels In a Rocket Stove
Lukas Brinkman	10	The Effects Of Different Genres of Music on Blood Pressure
Tucker Brown	10	Office space vs productivity
Hannah Buchanan	10	Vitamin C in Citrus Fruits
Dalton Burns	10	Best whitening brand
Zoe Chadwick	10	Burning Bio-fuels, Which One Works Best
Savannah Christenson	10	Proteins Breaking Down in Foods
Kiah Christopherson	10	Population Devastation on Microorganism Populations
Sawyer Conrad	10	Does different types of pollution affect the growth of algae
Ryan Crawford	10	The Effects of Wind Erosion on Soil
Arthur Dao	10	Does Music Affect Bacteria Growth?
Samiya Daud	10	How Does Microwave Radiation Affect Living Organisms
Marcus Delius	10	Sound Insulation
Hayden Dempsey	10	Improving Memory Retention and Concentration with Essential Oils
Megan Diggan	10	Effects of Cinnamon and Curry Oil on the Growth of Corynebacterium
Rory Donohue	10	How Light Affects Yeast Growth
Ariana Driscoll-Cherland	10	Do microbeads from facial scrubs water pollute water systems?
Mitchell Drobnick	10	Types of helmet layering that help prevent concussions
Neil Duong	10	The Effect of Osmosis on Pruning Fingers
Audrey Erickson	10	Shoulder Stress
Siri Erickson-Green	10	Lead and Other Substances in Water
Hannah Erkkila	10	Feet Length and Jumping Height
Josie Evjen	10	Oil in the Waves
Michael Finch	10	Leadership: A Study in Political Psychology
Sean Floersch	10	The Effect Bluetooth Phones Have on Driving Versus Handheld Phones
Abigail Fors	10	The Effect of Temperature on Luminol's Brightness
Kathleen Fritz	10	The chew test
Isabella Fuhrer	10	The Stroop Effect
Connor Funk	10	Tennis Racquet Physics: The Effect of Impact Location on Ball Bounce
Kayla Gant	10	Can you remember
Christopher Garritty	10	The Effectiveness of Different Whitening Toothpastes at Removing Teeth Stains
Fatima Garza-Ramon	10	Square Foot Gardening Vs. Normal Gardening
Matthew Gerner	10	Does Aspirin Make Plants Grow Faster
Meagan Haase	10	Electro-Lemon
Daniel Habiger	10	Bernouli's Principle
Makayla Haddorff	10	Effect of Hands-on and Hands-off Cell Phone Conversations on Reaction Time

## 2018 Research Papers (continued)

Name	Grade	Title
Audra Hakanson	10	The Effectiveness of Ultraviolet Light and Iodine Tablets on Natural Water Purification
Simone Hall	10	The Effect of Music on Reading Comprehension
Josie Hanneken	10	LED Lights Promote Plant Growth Experiment
Morgan Hanson	10	Analysis on How Different Type of Salts Affect the Freezing Point of Water
Rebecca Harder	10	Test Your Memory
Najib Hassan	10	Effects Of Age Upon Reaction Time
Emma Heerey	10	Swimming Is Not a Drag
Casey Hennessy	10	Efficiency Improvement of Photovoltaic Solar Cells Using Forced Air Convection
Megan Hjermsstad	10	How Microwave Radiation Affects Germination
Kevin Hoang	10	Memory Madness
Brianna Hoevet Ms.	10	Public Restrooms Versus Shopping Carts
Megan Hopkins	10	How Color Impacts Visual Acuity
Leah Hopperstad	10	Music and Multitask
Marwah Ismail	10	Effects of UV Radiation on Different Types of Cotton
Casey Jensen	10	Drug Solubility
Allyson Keating	10	Harbor Porpoises Travel Routes Based On Environmental Factors
Samuel Keefe	10	Icy Hot Puck
Libby Keller	10	Benefits of Strip-Cropping
Benjamin Keninger	10	The Use of Color in Order to Affect Perception of Taste
Brianna Kieffer	10	What Mouthwash Kills The Most Bacteria?
Konnor Kirchoffner	10	Does music effect level of concentration?
Katelyn Kleiter	10	Mushroom Packaging
Max Kortenhof	10	Are the advertisements true?
Meghan Kuether	10	The effects of Classical Music on Mathematical Abilities
Maia Latvala	10	Which Soap Extracts The Most DNA?
Kent Le-Vu	10	Effects of Hydrogen Peroxide Solution on the Number of Germinated Radish Seeds
Angela Leam	10	Do you like Chocolate?
Sarah Leipnitz	10	Percentage of Sugar in Different Kinds of Sugar
Lyla Lichliter	10	The effect of global warming on brine shrimp
Camron Limberg	10	Does Asthma Affect the Difference in Time Between Runs?
Ruoxin Liu	10	Conductivity In Drinkable Water Of Two Schools
Kali Lorensen	10	Upcakes
Lucas Love	10	Relationship between drop velocity and parachute shape
Nathan Lund	10	Sweet Apples
Mark Lynch	10	Stroop Effect and Gender
Nawal Mahamed	10	The effect of heat on neodymium magnets
Christine Maina	10	Beauty in the Eye of the Beholder
Ryan McCormick	10	WiFi Strengths and Weaknesses
Charlie Mejia	10	The Collection of Bacterial Samples from a Cafeteria
Ella Menke	10	Cooling Vitamin C
Emma Meyer	10	Zapping Zits: Which Acne Medication Kills The Most Bacteria?
Eaden Mezemure	10	How do changes in acidity affect the survival rates of an invertebrate population?
Rachel Miskiewicz	10	Technology War

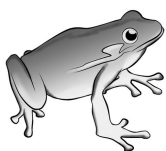


## 2018 Research Papers (continued)

Name	Grade	Title
Madeline Moher	10	Pitch Perfect: Whether or not there is a correlation between relative pitch and gender
Ryan Mokandu	10	The Pressure Is On
Jarett Mosoti	10	Microwave Radiation Affecting Organic Life
Lillianna (Lily) Murphy	10	Texting V.S. Talking While Driving
Greta Nelson	10	Vitamin C in Red Peppers
Zach Nelson	10	The Effect of Worms on the Growth Rates of Plants
Dat Nguyen	10	Time Recorded Based on Metronome
Steven Nguyen	10	Types of Keyboards Effect on Typing Speed
Ryan Nguyen	10	Gross Greywater
Matthew Nguyen	10	Designing Storm Walls to Reduce Wave Erosion
Brianna O'Brien	10	Corrosion on Different Types of Metal
Carter Odegard	10	Is organic produce really cleaner than GMO produce ?
Marwa Osman	10	Effects of Garlic on E. Coli
Manashree Padiyath	10	Pulp Fiction: Lead remediation with biochar made from the Apiaceae (Carrot) plant family (Year 2)
Elianna Panos	10	Repetition and The Brain
Chance Persons	10	UV Light and Bacteria
Naome Peterson	10	Chewing gum and Test Performance
Yodahit Philipos	10	The Affect of Light on Yeast
Austin Phyle	10	Music's Effect on the Brain
Tian Xu Pomonis	10	GMO Soybeans' Resistance Against Weeds and Weed Killers
Allison Portwood	10	Teeth Staining
Ava Raffel, Mary O'Grady	10,10	Facing off with FSHD: Pioneering a cure for muscular dystrophy through gene editing
Shavonnye Rath	10	The Effect of Stretching on Athletic Performance
Mitchell Remarcik	10	How lights affect plants
Samuel Rhode	10	Cooking affect on vitamin C
Rachel Ryan	10	Rehabilitation of Soil with the Use of Polymers
Nathnael Samuel	10	Microwave Radiation vs Living Organisms
Kerrie Schaefer	10	Does irradiated chicken have more bacteria than fresh or frozen chicken?
Austen Scheuneman	10	Effects of different colored lights on yeast's time to activate
Jessica Schmid	10	Dissolution Time for Common Pain Relief Medication
Livia Selby	10	How Does Soil Affect Greenhouse Gas Emissions
Greta Shore	10	Graphical Analysis of Moore's Law
Sam Skonseng	10	Line Breaker
Maxwell Smith	10	Does Prevalence of Good Tonal Memory depend on Music Education?
Sam Stanek	10	The effect of pH on the growth of plants
Laura Stauffer	10	Significance of Musical Background in the Hand/Foot Coordination of students
Katie Struzyk	10	Does Color Affect Reaction Times During Tests?
Joshua Swanson	10	Texting and Driving: An Accident Waiting to Happen
Brayden Taheri	10	Effectiveness of different baseball bats at different temperatures
Mason Teal	10	How The Frequency Of Light Affects The Double Slit Experiment
Zain Thamer	10	Tylenol Vs Different PH Substances
Reed Thoma	10	Methane Production From Manure

## 2018 Research Papers (continued)

Name	Grade	Title
Anna Thompson	10	Calculating the Speed of Light Using a Microwave Oven
Natalie Thoresen	10	Polarity of liquids on water clocks
Alexa Tinder	10	Developing a Renewable, Sustainable Energy Source: Algae Biofuel
Mykie Tizcareno	10	Solar Light vs Artificial Light in Growing Bean Plants
Annette Turcios	10	How to make saltwater drinkable
Madison Turner	10	Wind Beneath My Wings
Timothy Urlaub	10	Solubility of Painkillers
Amy Utter	10	The Effects of Density on Refraction
Daniel Vazquez	10	The Chemistry of Dyeing with Kool Aid
Brandon Vi	10	Microwave Radiation & Its Affect on Growth of Organisms
Dylan Vincent, Nathan Tank	10,11	Cellophane to Sensor: Designing a Low-cost Method for Detecting and Characterizing Oil in Water
Sierra Walker	10	What type of Music causes Best Performance
Emma Wavrunek	10	Color Effect on Emotion
Molly Willmert	10	Different Concentrations of Silver Nanoparticles Effects on E. coli Bacteria
Ryan Wollmuth	10	Affect of Laundry Detergent on Plants
Bereket Wondimu	10	Bernoulli's Principle
Kerui Yang	10	A Simple and Inexpensive Sensor for Glucose and Fluoride Using Boric Acid
Corey Zahm	10	The affects of colour on memorization
Abigail Banks-Hehenberger	11	The Metal at the End of the Rainbow: Using Digital Spectroscopy to Draw Correlations Between Molarity of Solute and Line Intensity of Heavy Metal Ions to Identify Pollutants in Urban Water Sources
Tseyone Bogale	11	Designing a Variable Expandable Shunt Using Thermoplastic Materials
Phillip Bragg	11	Converting from Morphine to Methadone: A Systematic Review
Emma Brown	11	Electrolysis of Ammonia
Andrew Carlson	11	Testing the Use of Copper as an Antibiotic
Christina Cheng	11	A Study of the Nutrient Availability in Different Types of Soil
Isabel Dieperink, Valerie Bares	11,11	Adding Calcium Chloride to Improve Bacterial Adhesion in a Xylem Filter: A Novel Mechanism for Water Filtration
Mayte Draper	11	Raging Rust
Ruqiya Egal	11	Finding the Optimal Release Angle of a Discus Throw
Camryn Franke	11	Optimizing Escherichia coli Energy Usage for Chemotaxis and Reproduction Through Experimental Evolution
Jeffrey Huang	11	Investigating the effects of the light-dark cycle and frequency of light on the length of bioluminescence of P. lunula
Avni Jain	11	Wastewater Treatment: Utilizing hydroponics to develop a novel and sustainable solution to nutrient pollution
Haley Jostes	11	Using Ceratophyllum Demersum as a Water Filter and Fertilizer in an Organic Farming Cycle
Louise Kim, Spencer Yueh	11,11	Unplugged: Quantifying the effect of technology on adolescent sleep and mood
Everett Kroll	11	3D Printable Biocompatible Prosthetic Shank
Annie Lam	11	The Effect of Acute Copper Exposure On Object Recognition Memory in Zebrafish (Danio Rerio)
Samuel Leville, Abigail Roh	11,10	Understanding Empathy in the Digital Age: Characterizing online patient support using a lexical analysis tool



## 2018 Research Papers (continued)

Name	Grade	Title
Madison Lindeman	11	Statistics: Women in the Workforce
Andrew Noecker	11	Fantasy Baseball and New Statistical Measurements
Thomas Peterson, Kylie Spangler	11,11	Engineering a Single Coherent Protocol to Determine Capabilities of the Diphtheria Immunitoxins DT2219 and DT2219(5C+2A) in Killing Non-Hodgkin B-cell Lymphoma
Darlene Radichel, Karthik Papisetty	11,11	Inhibiting Cancer Progression by Removing CSPG4: Bringing New Ideas to Life Using CRISPR Technology
Mayte Rodriguez	11	Hours of sleep and grades
Tristin Schulz	11	Plyometrics
Xee Thao	11	Determining if Methyl IAA is Naturally Present in Arabidopsis thaliana
Lana Trautman, Catherine Pirtle	11,11	Mesenchymal Missiles: Utilizing Stem Cells to Revolutionize Targeted Cancer Treatment
Aarthi Vijayakumar, Michelle Sung	11,11	Validation of Cre Specificity in PCP2-Cre GCaMP6 Transgenic Mice
Diana Zhu	11	Global pattern of solar cycle impacts on nitrogen dioxide levels Loss in Urban Agriculture
David Ahrens, Christiana Wilke, Cassidy Roland	12,11,12	Spilling the Beans: A Ground-breaking Approach to Mitigate Phosphorus
Samuel Aronson, Alex Cheng	12,12	Predicting the risk of chemotherapy-induced cardiotoxicity in breast cancer patients using supervised machine learning
Sorcha Ashe	12	Nerve Cell Distribution Among the Eight Arms of Octopus vulgaris
Aaron Bae	12	Characterizing the Measles Virus: Analyzing Pediatric Hospitalizations from 1997-2012
Emma Carr	12	Sex, Mice, and Alzheimer's: Linking neurodegenerative disease and gender through mouse models
Molly Carroll, Mari Leland	12,12	Breaking the Barrier to Safe Food: Identifying Functions for Disruption of Foodborne Pathogen Biofilms
Luke Chen	12	Freezing Point Depression in Brassica rapa using Methyl Alcohol
Ravi Chepuri	12	Feeding the World: Efficient Soybean Modification with DNA Replicons
Maya Czeneszew, Erica Iliarski	12,12	Terminating Tuberculosis: Creating a Bacterial Model to Determine the Genetic Basis for Rifampicin Tolerance
Justin Duffy	12	Mast Cell Quantity and Localization in the Heart, Quadriceps, and Diaphragm of a Duchenne Muscular Dystrophy Model
Flannery Enneking-Norton	12	Exploring the facilitative relationship between Lumbricidae and Rhamnus cathartica
Felisha Fox, Michael Pupel	12,12	Pain-Averting Device (PAD) for Injections
Tatum Frey, Grace Campbell	12,11	Effects of Fertilizers on Orthophosphate Levels in Fresh Water Lakes
Addison Gleekel, Melinda Samaratunga	12,12	Turning the tide against ocean pollution: Investigating the role of VanK in aromatic acid chemotaxis
Pierson Gruidl	12	Analyzing Cost Effective Personal Computers to Combat the Technological Skills Gap
Michael Hall, Daniel Ellis	12,12	CARL: A Convolutional Neural Network Powered Self-Driving Car
Garrett Johnson, Taylor Hermansen	12,12	Effects of pollution on oxygen production in algae
Rachel Khodursky	12	On the Prevalence of Antibiotic Resistance
Henry Koch, Quinn Ehlen	12,12	Size-Adjustable, Affordable Foot Shell for Lower Extremity Prosthetics
Brandon Lai	12	MyoR Regulation of Skeletal Muscle Regeneration
Sarah Lind-MacMillan	12	There Plants Are Sippin' on LaCroix
Siyuan Ma, Alexander Anderson	12,11	Holding Your Heart in Your Hand: 3D-Printing a Mechanically Accurate Aortic Valve Model

## 2018 Research Papers (continued)

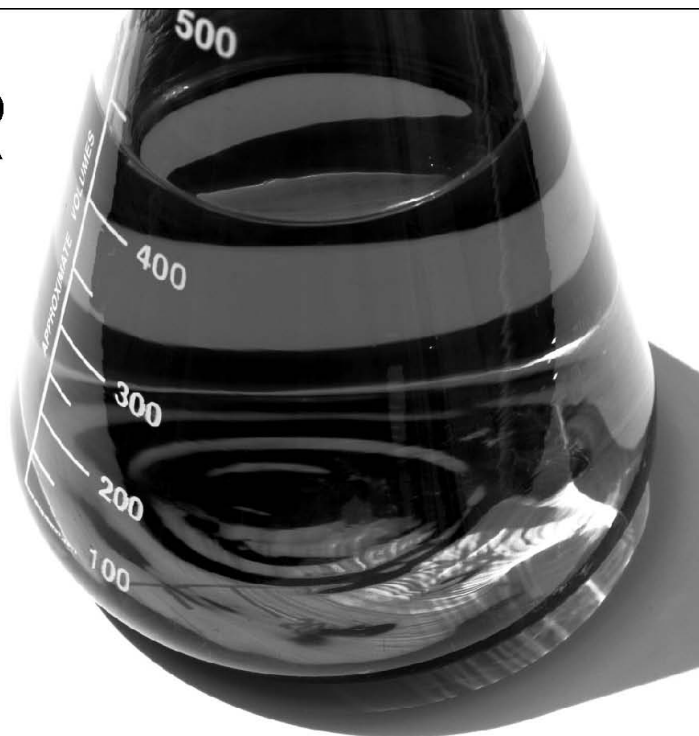
Name	Grade	Title
Cole Maxwell	12	More than skin deep: Deciphering the role of Bartonella henselae infection in melanoma metastasis (Year 2)
Abigail Mundschenk	12	The Effect of Sex Hormones and Mouse Serum on the Growth of E. Coli Bacterial Infections
Sylvi Nord	12	Grapefruit and Catalase
Elizabeth Ostendorf, Isabel Romay	12,11	Hand Therapy App
Alexa Reynders, Benjamin Larson	12,12	Vertical Flow Assay Detection for GM2-AP in Simulated Urine of Non Small Cell Lung Cancer Patients
Elsa Runquist	12	Tardigrade Abundance as a Bioindicator for Water Quality
Veronica Sannes	12	D(O <sub>2</sub> ) You Lake Healthy Aquatic Ecosystems?
Spencer Sweeney	12	Effects of Improved Sleep in High School Teenagers On Test Scores and Confidence
Rachel TerHaar, Arika Robinson	12,12	The Effects of Glyphosate on Pomacea bridges
Emilia Topp-Johnson	12	Behind the Kernels VI: An Identification and Assessment of Potential Endophytic Mutualists
Enrique Vazquez	12	Effects of Lipase on Curd Formation in Cheese
Brandon Weatherly	12	The Implementation of Energy Harvesting Technologies for Power Neutral Prosthetics
Peter Weber	12	Using thermoelectric generators to reduce waste heat
Jason Weng	12	Examining the Role of Neuronal IKKB in the Neuropathology of SCA1
Riley Will	12	A Study of the Effects of a Peptide Derived from BAM on the Growth of Escherichia coli
Mira Zelle	12	Carbon Sequestration and Ocean Acidification in Minnesota Lake

# THE LEADER IN CLEAN

At Ecolab, we use cutting-edge science and technology to continually develop innovative breakthroughs for our customers - earning our reputation as the leader in clean.

To learn more about our innovative solutions, call Ecolab at 1.800.2.ECOLAB or visit us at [www.ecolab.com](http://www.ecolab.com).

**ECOLAB®**



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

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

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

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

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

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

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



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

- 2015 Amrita Mohanty  
Woodbury Sr High School, Woodbury
- 2015 Maxwell Ylitalo  
Stillwater Area High School, Stillwater
- 2015 Aadarsh Padiyath  
Woodbury Sr High School, Woodbury
- 2015 Carolyn Jons  
Eden Prairie Senior High School - Eden Prairie
- 2015 Arush Jain  
Eden Prairie Senior High School - Eden Prairie
- 2015 Emilia Topp-Johnson  
St Paul Academy and Summit School, St. Paul
- 2015 Serena Jing  
Central Senior High School, St. Paul
- 2016 Maxwell Ylitalo  
Stillwater Area High School, Stillwater
- 2016 Nathaniel R Farmer  
Stillwater Area High School, Stillwater
- 2016 Claire E Wentzlaff  
Burnsville High School, Burnsville
- 2016 Prashant Godishala  
Breck School, Minneapolis - Team
- 2016 Brennan Clark  
Breck School, Minneapolis - Team
- 2016 Avni Jain  
Eden Prairie Senior High School - Eden Prairie
- 2016 Jessica Weng  
Wayzata High School, Plymouth
- 2016 Emilia Topp-Johnson  
St Paul Academy and Summit School, St. Paul
- 2016 Serena Jing  
Central Senior High School, St. Paul
- 2017 Alex Li  
Mounds View High School, Arden Hills - Team
- 2017 Rebecca Li  
Mounds View High School, Arden Hills - Team
- 2017 Everett Kroll  
Stillwater Area High School, Stillwater
- 2017 Claire E Wentzlaff  
Burnsville High School, Burnsville
- 2017 Archana Murali  
Breck School, Minneapolis
- 2017 Gauri Binoy  
Wayzata High School, Plymouth
- 2017 Meghana Iyer  
Edina High School, Edina
- 2017 Serena Jing  
Central Senior High School, St. Paul
- 2017 Geeta Rajamani  
Highland Park Senior High, St. Paul



**3M Science. Applied to Life.™**

**Investing in the next generation of scientists.**

Visit us at [3Mgives.com](http://3Mgives.com)

3M and "3M Science. Applied to Life." are trademarks of 3M.



**Custom Automation Equipment**

Madison, WI  
[www.isthmuseng.com](http://www.isthmuseng.com)  
*Isthmus Engineering is a Worker-Owned Cooperative*

## 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 Commercial Solutions Division Award*  
*3M Film & Material Resource Division Award*  
*3M Young Inventor Award*  
*American Chemical Society*  
*American Meteorological Society*  
*American Psychological Association*  
*ASM Materials Education Foundation*  
*Association of Women Geoscientists*  
*ASU Walton Sustainability Solutions Initiatives*  
*Bright Future Award - Carolyn Jons*  
*Broadcom MASTERS (Math, Applied Science, Technology, and Engineering for Rising Stars) Excellence Award*  
*Graduate Women in Science for Excellence in Research*  
*Graduate Women in Science for Excellence in Writing*  
*Inspiring Excellence Award*  
*Intel Excellence in Computer Science*  
*International Science & Engineering Fair (ISEF)*  
*ISEF Alumni Awards – Kyra Zimmerman (2007, 2008)*  
*ISEF Alumni Awards – Dr. Kyrstin Ball (2005)*  
*ISEF Alumni Awards – Timara Underbakke (1973)*  
*I SWEEEP (postponed until 2019 due to Hurricane Harvey)*  
*Joel Wagner Caring Bridge Award*  
*Junior Science & Humanities Symposium*  
*Minnesota Agriculture in the Classroom*  
*Minnesota Chapter of American Fisheries Society*

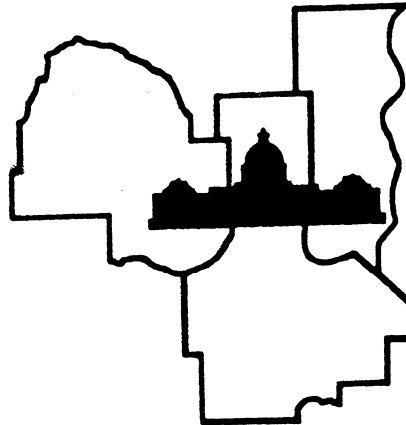
*Minnesota Horticulture Society*  
*Minnesota State Science & Engineering Fair*  
*Mu Alpha Theta Mathematics*  
*NASA EARTH System Science Award*  
*NOAA National Oceanic and Atmospheric Administration*  
*North Central Tri-state Junior Science & Humanities Symposium Research Papers Research Paper trophies*  
*Ricoh Sustainable Development Award Schools trophies*  
*Society for In Vitro Biology*  
*Sponsor: 3M Foundation*  
*Sponsor: Broadway Party & Tent Rental*  
*Sponsor: Dow Water & Process Solutions*  
*Sponsor: Ecolab*  
*Sponsor: Isthmus Engineering & Manufacturing*  
*Sponsor: Mintáhoe Hospitality Services*  
*Sponsor: Orbital ATK*  
*Sponsor: Premier Bank*  
*Sponsor: St. Paul Youth Fund*  
*Stockholm Junior Water Prize*  
*TCRSF Excellence Award*  
*Teacher Excellence Award*  
*USDA-ARS Ag in the Classroom*  
*US Air Force*  
*US Department of Health and Human Services*  
*US Metric Association*  
*US Navy/Marine Office of Naval Research*  
*USDA Research Service*  
*Yale Science and Engineering Association*



**Project presentation hosted by the Minnesota State Fairgrounds**

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

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



### **2017-2018 Twin Cities Regional Science Fair Committee**

<b>Science Fair Director:</b>	Timara Underbakke	<b>Committee At Large:</b>	<b>Scientific Review:</b>
<b>SRC Chair:</b>	Karin Ostrand	Nancy Day	Karin Ostrand, Chair
<b>Facilities:</b>	Amy Stone	Jess Day	Dr. Denise Beusen
<b>Public Relations:</b>	Michael Lohman, Sr.	Dr. Denise Beusen	Dr. Kyrstin Ball
<b>Funding</b>	Michael Lohman, Sr, Karilyn Jons, & Timara Underbakke	Dr. Gary Kwong	Dr. Douglas Erbeck
		Gary Ostrand	Timara Underbakke
<b>Treasurer:</b>	Dr. Gary Kwong	Dr. Caroline Ylitalo	Dr. Jennifer Hugstad-Vaa
<b>Special Awards Chair:</b>	Nancy Day	Dr. Douglas Erbeck	Dr. Caroline Ylitalo
<b>Judging Coordinator:</b>	David & Timara Underbakke	Faye Erbeck	Matthew Weingartz
<b>Website &amp; Databases:</b>	David & Timara Underbakke	Amy Stone	Dr. Gary Kwong
<b>Data Processing:</b>	David Underbakke	Martin Stone	Dr. Steven Jons
<b>Display &amp; Safety:</b>	Anu Jain	Karilyn Jons	Karilyn Jons
<b>IT Department:</b>	Jess Day & David Underbakke	Dr. Steven Jons	David Underbakke
		Dr. Jennifer Hugstad-Vaa	Amy Stone
<b>Board of Directors:</b>	Timara Underbakke	Dr. Kyrstin Ball	Tiffanie Stone
	Michael Lohman, Sr.	Kyra Zimmerman	
	Karin Ostrand	Phill Goldmann	We have additional volunteer openings for those interested. We are currently looking for a Volunteer Coordinator. We are also looking for a Social Media Coordinator. Do you have other ideas or talent to contribute? If you have time to help, we are 100% Volunteer educational non-profit.
	Dr. Gary Kwong	Lynne Tauer	
	David Underbakke	Arthur C. Johnson	
	Nancy Day	Michael Lohman, Jr	
	Amy Stone	Anu Jain	
	Dr. Steven Jons	Christine Kroll	
		Denise Jostes	
		Devi Kyanam	
		Chandra Papisetty	
		Dr. Kenneth (Beau) Farmer	