



2023 Capital Area Science & Engineering Fair

Penn State Harrisburg



PennState
Harrisburg

Greetings,

Welcome to Penn State Harrisburg! We are pleased that you are here and trust that you will have an exciting experience.

We are Penn State in the capital region, offering more than 70 bachelor's, master's, and doctoral degree programs. There are opportunities to extend learning through research, internships, hands-on activities and much more.

Co-curricular activities abound, too. With more than 50 clubs and organizations, ranging from student government to professional societies and from special interest clubs to community service groups, Penn State Harrisburg likely has just what you are looking for. In addition, our 16 varsity sports teams participate at the NCAA Division III level, and we also offer club and intramural sports.

When it comes time to consider college, we hope that you will think about Penn State Harrisburg. Please plan to visit again. We look forward to seeing you!

Sincerely,

John M. Mason Jr.
Chancellor

Awards Ceremony

- Introduction** Valerie Knowles, *CASEF Fair Director*
- Welcome** Vahid Motevalli, PhD, PE, Fellow ASME, Interim Associate Vice Chancellor for Research
Director of School of Science, Engineering, and Technology
Professor of Mechanical Engineering Penn State Harrisburg
- Opening Remarks** Amy Diehl, *CASEF President- Science Teacher, Camp Hill School District*
- Presentation of Awards** Brett Thackara, Master of Ceremonies, *Meteorologist, WHTM abc27*

Special Awards

CASEF Young Scholars' Awards

Junior Placement Awards

The Award Medallions are provided by UGI, Utilities, Inc.

Junior Thermo Fisher Scientific Junior Innovators Challenge Awards

Junior Category Awards

Senior Scholarships

Senior Placement Awards

The Award Medallions are provided by UGI, Utilities, Inc.

Senior Category Awards

Junior Division Finalists

Junior Grand Champions

The Junior Division Awards are provided by Sheetz

Senior Division Finalists

Senior Grand Champions

The Senior High Grand Champions are being honored by Select Medical who is providing the scholarship funding for the trip to the International Science and Engineering Fair in Dallas, TX May 15 to 19, 2023.

*Senior Scholarships and Category Awards are also sponsored by
The Donald B. and Dorothy L. Stabler Foundation.*



LOCAL AND REGIONAL SPECIAL AWARDS

abc27 Meteorologists Award
American Chemical Society, Southeastern PA Section
American Highway Engineers Association Harrisburg Section
American Psychological Association
Appalachian Audubon Society
BELCO Community Credit Union Environmental Award
Biogenius Invitation
CASEF Category Awards
Conodoguinet Creek Watershed Association
Dauphin County Conservation District
Dauphin County Medical Society Alliance
Dr. George Love Judge's Award
Environmental Protection Agency Letter of Encouragement
Farzin Charitable Fund of PA - Bright Mind Award
[Field Conference of Pennsylvania](#)
Harrisburg Chapter of the PA Society for Professional Engineers
Harrisburg University of Science and Technology Material Science Award
Harrisburg University of Science and Technology Scholarship
Highmark
JLG Jerr-Dan Oshkosh Corporation Company
Lemelson Young Inventor's Award
Oakes Museum Messiah University Summer Camps
Modjeski and Masters, Inc. Engineering Award MU Alpha Theta
National Geographic Society That's Geography! Award
NASA EARTH System Science Award
National Oceanic and Atmospheric Administration
Office of Naval Research- U S Navy and Marine Corps
Outstanding Biology Award
Outstanding Botany Award
PA Department of Environmental Resources Water Quality Award
Penn State College of Medicine Award
PSEA Retired
Regeneron Biomedical Award
Rotary Club of Harrisburg
Stephen F Spector Award
Susquehanna Section Institute of Electrical and Electronic Engineers (IEEE)
Sustainable Energy Fund
Thermo Fisher Scientific Junior Innovative Challenge
Thomas M McAuliffe Memorial Award
Regeneron Biomedical Science Award
Society for In Vitro Biology Stockholm Junior Water Prize
U.S. Air Force
U.S. Metric Association
UGI Utilities
Wegmans
Wolfram
Women's Transportation Seminar, Central PA Chapter
Yale Science and Engineering Association
Zoo America North American Wildlife Park

2023 CASEF Young Scholars' Program

For the first time ever, students in grades 5 & 6 are invited to participate in a new CASEF program which will help students understand scientific research as the process by which scientists study various phenomenon using systematic methods of collecting, analyzing, and interpreting data. This year projects were on exhibition during the week of the Capital Area Science & Engineering Fair.

The program will expand in 2024 to allow for more student participation and include a judging component. Students who participate in the Young Scholars' Program will gain experience in science and engineering research problem solving to be better prepared to compete in CASEF when they reach grades 7 through 12.

Congratulations to the inaugural class of CASEF Young Scholars!



The CASEF Story

The Capital Area Science and Engineering Fair (CASEF) began in 1957 with a lesson in character. Dr. Thomas Bowman Jr., a local physician started the fair to teach his 12-year-old son, Tom, a lesson. His son considered himself ‘the smartest person around.’ Dr. Bowman took him to see the Westinghouse Talent Search (now the INTEL sponsored International Science and Engineering Fair) exhibit in Washington D.C. After viewing the displays, Tom admitted, “Dad, there are some people smarter than I am.” This was enough to convince Dr. Bowman of the importance of science fairs and coordinated with the National Science Fair (now Science for Society and the Public) to establish a local affiliated fair. With the sponsorship of the Patriot-News Co., the first local fair was held at the Zembo Mosque. The Patriot- News sponsored the fair until 2008. With the guidance of Dr. Madlyn L. Hanes, Vice President for Commonwealth Campuses and Executive Chancellor, PSU and continued support of Dr. Michael Hanes, President Emeritus, Whitaker Center for Science and the Arts a partnership of several higher education institutions and industry was formed to sponsor the organization as it transitioned into the current Capital Area Science and Engineering Fair. With the support of Harrisburg Campus Dean, Jennie Baar, HACC became the new home for CASEF in 2018. CASEF persevered through COVID-19 and held a virtual fair in 2021 and a hybrid fair at the Colonial Park Mall in 2022. In 2023, with the help of Marie-Louise Abram, M.P.A. Director, International Programs, External Relations and Special Projects, CASEF found a new home at Penn State Harrisburg.

CASEF has been an annual event in the Harrisburg area for more than 65 years. Science education opportunities offered through CASEF help students develop research methods, hone problem-solving skills, and refine both visual and oral presentation techniques through fair preparation and experience. All public and private school students in our 41- county service area are eligible to register to participate in The Capital Area Science and Engineering Fair (CASEF). Senior division grand champions advance to compete in the Regeneron® International Science and Engineering Fair® (Intel ISEF); the highest scoring projects of the junior division enter the Thermo Fisher Scientific Junior Innovators Challenge (JIC). Students attending these prestigious competitions from the Capital Area have had remarkable success and recognition.

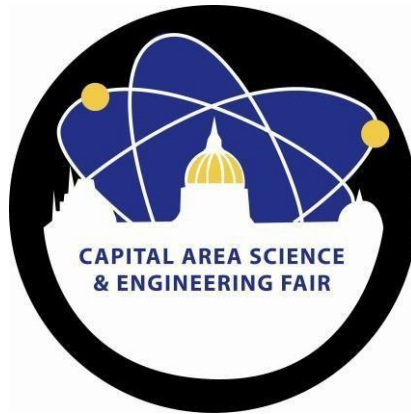
These accolades are only possible through the generous financial resources provided to CASEF by partners and sponsors. In 2018, CASEF became a PA EITC Innovative Educational Program. Donations received through this program qualify for income tax credit. CASEF, a registered 501(c)(3), donations also qualify as federal tax deductions.

We also acknowledge the countless hours of guidance and support from parents and teachers and appreciate the many local businesses and organizations who encourage the student participants by providing judges for the fair and special awards for outstanding projects.

MISSION STATEMENT: Our Mission is to inspire a greater interest in STEM (Science Technology Engineering Math) studies and encourage students to conduct creative research with the opportunity to present their projects for evaluation by the professional STEM community.

VISION: The Capital Area Science and Engineering Fair will become the venue to connect bright and motivated young scientists with this region’s industry, academia and professional organizations to promote economic development within Central Pennsylvania. Introducing students to the science and technology opportunities within our region will facilitate the cultivation and retention of a tremendous resource – our youth.

COVID-19 Statement: ***Recent events confirm that it is very evident that we need to be encouraging young scientists to find solutions to life’s greatest challenges and prepare a healthy and sustainable future. Our fair looked a little different as we have used virtual and hybrid formats to continue offering the program. We are pleased to be back to an in-person format for the 2023 fair. CASEF will continue to be mindful of the stewardship responsibilities to our partners, sponsors and donors.***



CASEF 202-2023 Board of Directors

Marie-Louise Abram – Director International Programs & External Affairs, Penn State Harrisburg

Kathryn Armstrong – Retired Teacher, Central Dauphin School District

Michelle Banks, Retired Teacher, St. Theresa School New Cumberland

Dr. Tricia Britton– Retired Teacher, Upper Dauphin Area Middle School

Michael Corradino – Dean, School of Science and Mathematics,
HACC, Central Pennsylvania's Community College

Amy Diehl – **CASEF President**, Teacher, Camp Hill School District

John Friend – Associate Vice President, Harrisburg University of Science and Technology

Rebecca Hardie –**CASEF Secretary**, Instructional Coach, Harrisburg School District,
Sci-Tech Campus

Jennifer Klemunes – Teacher, West Shore School District, Cedar Cliff HS

Jessica Maguire – Teacher, Halifax School District

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Dr. Indira Purushothaman, Ph.D. Regulatory Scientist at RQM+

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Emilie Tekely, **CASEF Past President** – Microbiology Professor, HACC,
Central Pennsylvania's Community College

Adam Walter - Director of Military and Veteran Affairs, Office of Inclusion, Diversity and Belonging
HACC, Central Pennsylvania's Community College

Valerie Knowles –**Fair Director**

Capital Area Science and Engineering Fair Grand Champions

1958	Sandra Suter Jackson	Lebanon	1993	Melissa Manni	Bishop McDevitt
1958	David Hiber	William Penn	1994	Melissa Manni	Bishop McDevitt
1959	Sheila Forst Ruog	Bishop McDevitt	1994	Donald Kim	Central Dauphin
1959	Dandridge Tomalin	Camp Hill	1995	Christopher Hammond	Bishop McDevitt
1960	Dr. Karen Silver Brown	William Penn	1996	Anthony Cook	Bishop McDevitt
1960	Eugene Diveglia	Central Dauphin	1996	Eric Powers	Bishop McDevitt
1961	Dr. Ann Stuart Moore	Camp Hill	1997	Andrew Stevenson	Susquenita
1961	Allen Burstiner	Cedar Cliff	1997	Agustine Nguyen	Bishop McDevitt
1962	Carol Stricker Dost	Central Dauphin	1998	Andrew Stevenson	Susquenita
1962	Andrew Hatfield	Carlisle	1998	Melanie Stock	Cumberland Valley
1963	Dr. Jill Sunday Bartoli	Cumberland Valley	1999	Bryan Roberts	Carlisle
1963	Dr. Chester Kessler	Lebanon	1999	Sarah Ballard	Hershey
1964	Frances Hefelfinger Russell	Carlisle	2000	Tatia Engelmores	Mechanicsburg
1964	Paul Kaplan	Lebanon	2000	Benjamin Slavin	Cedar Crest
1965	Lorraine Butler Noon	John Harris	2001	Lisa Nguyen	Bishop McDevitt
1965	Dr. Frank Rudy	Susquehanna Twp	2001	Megan Roberts	Carlisle
1966	Dr. Frank Rudy	Susquehanna Twp	2002	Megan Roberts	Carlisle
1966	Pamela Sprengle	Dallastown	2002	Cody Kemble	Central Dauphin
1967	Pamela Sprengle	Dallastown	2003	John Thielmann	Cumberland Valley
1967	Dr. Robert Mitchell	William Penn	2003	Megan Roberts	Carlisle
1968	Dr. Robert Mitchell	William Penn	2004	Benjamin Frison	Carlisle
1968	Patricia Smith Lyford	Lebanon	2004	John Thielmann	Cumberland Valley
1969	Karen Macko	Bishop McDevitt	2005	Ian Johnson	Susquenita
1969	Dr. Galen Weitkamp	Dallastown	2005	Benjamin Frison	Carlisle
1970	Carol Vitz Wells	Dallastown	2006	Michah Toll	Cedar Crest
1970	Dr. Kevin Boran	Nativity BVM	2006	Eli Rosenwasser	Hershey
1971	Barbara Hobbs	Nativity BVM	2007	Michah Toll	Cedar Crest
1971	James Wood	Gettysburg	2007	Rachel Siegel	Cedar Crest
1972	Patricia Huddleston	York Catholic	2008	Mugisha Niyibizi	Hershey
1972	Wayne Downey	Bishop McDevitt	2008	Brad Williams	Bishop McDevitt
1973	Wayne Downey	Bishop McDevitt	2009	Felix Nguyen	Hershey
1973	Deborah Bix Raybuck	Carlisle	2009	Natalie Nguyen	Hershey
1974	Karl Klett	Lebanon	2010	Benjamin Bauchwitz	Hershey
1974	Mara Baird	Cumberland Valley	2010	Tongji Li	Hershey
1975	Mara Baird	Cumberland Valley	2011	Austin Hess	Mechanicsburg
1975	Hoon Won	Cumberland Valley	2011	Benjamin Bauchwitz	Hershey
1976	Paul Sealover	South Western	2011	Felix Nguyen	Hershey
1976	Peter Weaver	Dallastown	2012	Bradley Sloop	Susquenita
1977	Dr. Robert Canby	Carlisle	2012	Anke Wang	Hershey
1977	Dr. James Thomas	South Western	2013	Patrick Myers	Carlisle
1978	Mark Harmon	Carlisle	2013	Hannah Wastick	Palmyra
1978	Harley Hartman	Dallastown	2013	Bradley Sloop	Susquenita
1979	William Kulp	Dallastown	2014	Grace Hwang	Hershey
1980	Arthur Wildasin	South Western	2014	Nancy Wang	Hershey
1980	Lance Williams	Dallastown	2014	Patrick Myers	Carlisle
1981	Lance Williams	Dallastown	2015	Grace Hwang	Hershey
1981	Andrew Seville	Dallastown	2015	Agustey Mongia	Hershey
1982	Steve Stauffer	Dallastown	2015	Connor Lewis	Mechanicsburg
1982	John Hegarty	Bishop McDevitt	2016	Pia Alderman	Trinity
1983	Ray Markey, Jr	Dallastown	2016	Alan Hwang	Hershey
1983	Allison Morgan	Bishop McDevitt	2016	Wesley Sheker	Harrisburg Academy
1984	Donald Pealer	Cumberland Valley	2017	Kaitlyn Galliher	Susquenita
1984	Jonathan Dworkin	Hershey	2017	Michael Miller	Hershey
1985	Jonathan Dworkin	Hershey	2017	Alan Hwang	Hershey
1985	Dr. David Egolf	Carlisle	2018	April Pivonka	Camp
1986	Dr. David Egolf	Carlisle	2018	Alec Warren	Harrisburg Academy
1986	Capt. Brian Miller	Carlisle	2018	Zoe Timothy	Susquenita
1987	Nathan Motich	Northern York	2018	Wyatt Howe	Hershey
1987	Jason Sheehan	Carlisle	2019	Adele Shirmer	West Perry
1988	David Sanders	Carlisle	2019	Dev Lochan	Cumberland Valley
1988	Raymond Meng	East Pennsboro	2019	Christian Gasdaska	Susquenita
1989	Raymond Meng	East Pennsboro	2019	Liam Douglas/Alec Warren	Harrisburg Academy
1989	Laurie Kostelec	Bishop McDevitt	2020	Danielle Miller	East Pennsboro
1990	Raymond Meng	East Pennsboro	2020	Dev Lochan	Cumberland Valley
1990	David Smith	Bishop McDevitt	2020	Taylor Koda	Hershey
1991	Cindy Meng	East Pennsboro	2021	Aditya Kendre	Cumberland Valley
1991	Tippony Scott	Carlisle	2021	Dev Loch	Cumberland Valley
1992	Tippony Scott	Carlisle	2021	Samuel Koda	Hershey HS
1992	Jessica Stoner	Susquenita	2022	Sadie Zehner	Berwick HS
1993	Donald Kim	Central Dauphin	2022	Ian Lentz	Camp Hill HS

Special Thanks

CASEF depends on the generous donation of time from our judges and their employers. Without their support CASEF would not be able to provide this opportunity to area science students.

We appreciate your dedication and support!

CASEF sincerely appreciates Penn State Harrisburg and its many staff members who have helped make this event happen, for use of its facilities and excellent support of CASEF as we begin this new partnership endeavor.



We also want to recognize the volunteers who gave many hours of their time to make this fair happen. Our sincere expression of appreciation goes to Brett Thackara, our ceremony host.

And we would like to recognize the teachers who volunteered on various committees and helping with certification of projects.

We couldn't have done it without your help!

Thank You Judges

Tracy Aichele

Kathryn Barker

Jennifer Armstrong

Paul Bauch

Sarah Beeghley

Kristen Blouch

Janine Borofka

Mary Cambria

Heather Castle

Jessica Cordaro

Curtis Eichelberger

Mike Floreck

Glen Foster

Reema Goel

Todd Gunther

James Harding

Melanie Hensel

Nicole Holland

Denise Hurst

Tracey Jefferson

Jeff Kayer

Gregory Kincheloe

Jennifer Klemunes

Dwayne Lahr

Menglu Liang

Jessica McGuire

Grant Melville

Rajesh Natarajan

Robert Parker

Aayushi Patel

Linda Piscioneri

William Prescott

Mohammad Asif Raza

Richard Riter

Betsy Riter

Karen Russo

Kristine Safford

Asha Sahu

Jim Sarver

Ryan Shaw

Matthew Shrader

Lakshmi Shrikantia

Ilya Shvartsman

Alicia Snyder

Aura Stauffer

Lauren Taylor

Sharon Thomas

Fang Tian

Desiree Weaver

Xingran Weng

Matthew Williard

Marilyn Zenko

2023 Participating Schools and Sponsors

CASEF acknowledges the extra time and effort it takes to mentor students through the science fair process and complete the seemingly endless paperwork. Thank you for making science fair a valuable part of your students' education.

Berwick HS

Matthew Shrader and Todd Gunther

Bishop McDevitt High School

Michelle Corringan and Jack Sipe

Camp Hill Middle and High Schools

Amy Diehl

Carlisle Area High School

Samantha Moyer

Carlisle Wilson Middle School

Allison Thumma

Cumberland Valley – Eagle View

Christopher Irvin and Julie Crum

Cumberland Valley – Mountain View

Heather Castle

Cumberland Valley High School

Mike Floreck

Greenwood Middle/High School

Jonathan Everett

Dauphin County Technical School

Lauren Schaller

Franklin County Science Council

Catherine Myers

Halifax Area High School

Jessica McGuire

Harrisburg Academy

Lakshmi Shrikantia

Harrisburg City – Sci-Tech Campus

Nannette Blank

Harrisburg Christian School

Valerie Knowles

Hershey High School

Jason Ambler and Jason Sibbach

Hershey Middle School

Kaitlyn Moyer

Holy Name of Jesus

Nicole Holland

Mechanicsburg MS

Elizabeth Morrison

Middletown Area High School

Tiffany Lewis and Trevor Davis

Millersburg Area HS

Lynn Mangle

Silver Academy

Susan Gaughan

St. Joseph Mechanicsburg

Jen Carreras

St. Margaret Mary

Faith Peluso

St. Theresa School

Michelle Banks

Susquehanna Township MS

Desiree Weaver

Susquenita High School

Steve Shirmer

Susquenita Middle School

Beth Johnson

Trinity High School

Nicholas Sansone

Project Listings

SENIOR TECHNOLOGY, ENGINEERING, MATHEMATICS

SR-TEEM-011	Sean Murphy	Mobile App to Connect Nonprofit Organizations with Underprivileged Community
SR-TEEM-010-T	Casey Carro	Water Wheel
SR-TEEM-010-T	Mattocks Shultz	Water Wheel
SR-TEEM-010-T	Liam Welch	Water Wheel
SR-TEEM-009	Gabe Hook	Manta Ray Microplastic Filtration Engineering Design
SR-TEEM-008-T	Andy Zhang	A Heated Connection
SR-TEEM-008-T	Kenneth Nguyen	A Heated Connection
SR-TEEM-007	Nolan Mazza	Reverse E-bike
SR-TEEM-006-T	Kylar Cornacchio	Rotating Solar Panels
SR-TEEM-006-T	Kale Morales	Rotating Solar Panels
SR-TEEM-005	Gianna Zanolini	Which Truss Is the Strongest?
SR-TEEM-004	Elizabeth Howard	Preventing Cardiovascular Events Through Environmental Exposure Assessments
SR-TEEM-003	Anshi Paul	Memory Assistive Facial Recognition Device for Dementia Patients
SR-TEEM-002	Matthew Everett	Non-Planar Printing
SR-TEEM-001	Parimala Rajesh	Quadratic Unconstrained Binary Optimization Using Quantum Annealing Algorithm

SENIOR SOCIAL AND BEHAVIORAL SCIENCE

SR-SOBE-008	Gia Susan John	The Effects of Subliminal Messages on Mental Health
SR-SOBE-007	Lilly Robinson-Gilden	Gluten-Free or Not Gluten Free That Is the Question
SR-SOBE-006-T	Ashley Rusnov	The Stress of Junior Year
SR-SOBE-006-T	Tristan Handley	The Stress of Junior Year
SR-SOBE-005	Regan Welch	Comparing Methods to Reduce Misinformation Susceptibility in Students
SR-SOBE-004	Ava Sachs	Creativity: Increased by Classes Taken or Various Extracurriculars?
SR-SOBE-003-T	Royal Biswa	Driving While Distracted
SR-SOBE-003-T	Ethan Hillenbrand	Driving While Distracted
SR-SOBE-002	Deena Korlewitz Under	Pressure: Stress and How It Affects Productivity
SR-SOBE-001	Faryal Aziz	Detrimental Effects of Digital Communication for Adolescents

SENIOR PHYSICAL SCIENCE

SR-PHYS-008	Theodore Cox	Weightlifting with Friction
SR-PHYS-007	Deepti Rao	Technological Advances in Cell Phone Effect on Radiation
SR-PHYS-006	Sophia Jezewski	Sticking to it: The Cling in Cling Wrap
SR-PHYS-005	Gary Godfrey	Windy Ways
SR-PHYS-004	Anthony Cuccia	Paint and Dust VS. Fire sprinkler
SR-PHYS-003	Adrija Rambhatla	Effect of Temperature on the Electrical Potential Generated by Conductive Metals
SR-PHYS-002	Tucker Wise	Ethical Hunting
SR-PHYS-001	Jason Weller	Utilizing Optical Tweezers to Noninvasively Determine the Viscosity of Solutions

SENIOR MEDICINE AND HEALTH

SR-MEHE-002	Olivia Garay	Creating a Heart: How Stem Cells Might Be Used to Bioengineer a Vital Organ
SR-MEHE-001	Isaac Burd	The Natural Cleansing Properties of Patchouli Oil

SENIOR LIFE SCIENCE

SR-LIFE-005	Addison Barnes	The Sports Drink Showdown
SR-LIFE-004	Jasleen Mann	Diabetes
SR-LIFE-003	Ryma Saha	Effect of Concentration of Rhizobia Fertilizer on the Growth Rate of Legume Seeds
SR-LIFE-002	Madeline Galvin	What is the Effect of Salinity on Seed Germination?

SENIOR ENVIRONMENTAL SCIENCE

SR-ENVR-021	Alice Benavides	Recycling Water for Radishes
SR-ENVR-020	Ari Callahan	The Impact of Roads: What can be Done?
SR-ENVR-019	Janai Adelanwa	Are Eco-friendly Laundry Detergent Sheets Truly Eco-friendly?
SR-ENVR-018	Raytel Bryant	Vegetable Oil vs Brine Shrimp
SR-ENVR-017-T	Amya Burrs	The Germination Test of Alfalfa
SR-ENVR-017-T	Sanai Cedeno	The Germination Test of Alfalfa
SR-ENVR-016	Samantha Duncan	Water pH
SR-ENVR-015	Nevaeh Debrick	The Greenhouse Effect Affects Us All!
SR-ENVR-014	Enjalai Baillie	Butts Vs. Brine Shrimp: The study of the Effect of Cigarette Butt Disposal
SR-ENVR-013	Resina Kidane	What Effects Do Flushable Wipes Have on Brine Shrimp?
SR-ENVR-012	Jazielly Sena	Caffeinated Coffee and Decaffeinated Coffee Affect on Brine Shrimp's Survival Rate?
SR-ENVR-011	Karen Caraballo	Growth Comparison of Duckweed and Algae individually vs. In Community
SR-ENVR-010	Ashleigh Rogers	Lett-uce Not Be Salty
SR-ENVR-009	James Quinlan	Affect of Copepods on Controlling Algal Blooms that Results from Fertilizer Runoff
SR-ENVR-008	Rebecca Haas	Hot Tempered Sharks and Other Creatures
SR-ENVR-007	Jasmine Maity	The Oceans Treatment of Alzeihmers
SR-ENVR-006	Darin Toby	Mitigating the Affects of Acid Run-off
SR-ENVR-005	Isaiah Houssou	Novel CNN-RF Model for Classifying A. altissima Using Multispectral and LiDAR Data
SR-ENVR-004	Ryan Chingakham	The Effect of Herbicides and Pesticides on Daphnia
SR-ENVR-003	William Klos	The Effect of pH on Cytoplasmic Streaming
SR-ENVR-002	Rashi Patel	Effectiveness of Different Water Hardnesses on Agricultural Vegetation
SR-ENVR-001	Ian Lentz	Preventing Plastic Plants

SENIOR CHEMISTRY

SR-CHMS-007	Muhammad Choudry	Water vs Electrical Physics
SR-CHMS-006	Deeksha Rajesh	The Efficacy of Different SPFs of Sunscreen in Blocking UV Waves
SR-CHMS-005	Kevin Gilmore	Gasoline Efficiency
SR-CHMS-004	Christine Tang	Rheology of Salad Dressings With Different Thickeners and Their Emulsion Stability
SR-CHMS-003	Skylynn Daughenbaugh	Vitamin C in Fruit Juices
SR-CHMS-002	Alayna Kelly	Your Bleach Ages Too
SR-CHMS-001	Shaunak Dalal	Enhancement of Anodal Biocatalytic Current Production in a Glucose Biofuel Cell

JUNIOR TECHNOLOGY, ENGINEERING, MATHEMATICS

JR-TEEM-029	Benjamin Wierzbicki	Don't Just Wing It
JR-TEEM-028	Bennett Gerhards	Who's Driving This Car?
JR-TEEM-027	Alec Schreffler	Our Modern Lives
JR-TEEM-026	Kevin Azubike	Aerodynamics in Model Vehicles
JR-TEEM-025	Nicholas Leone	Tee Time: Golf Ball Temperature and Distance
JR-TEEM-024	Eleanor Guise	The Fastest Way to Do Your Laundry
JR-TEEM-023	Giovanni deManincor	To Break or Not to Break
JR-TEEM-022-T	Aditya Suresh	Anodic Design of Bryophyte Fuel Cell
JR-TEEM-022-T	Urjit Sau	Anodic Design of Bryophyte Fuel Cell
JR-TEEM-021	Adam Clinkscale	Can 75% of Sediment Be Removed from Flowing Water?
JR-TEEM-020	Aaron Smith	The Effect of Aperture on Depth of Field
JR-TEEM-019	Brenna Myers	Sound of Music: How Types of Liquid Affect the Pitch of a Crystal Glass
JR-TEEM-018	Cameron Crosswell	Saving Water by Farming with Smart Technologies
JR-TEEM-017	Jackson Schwalm	Loop Size VS. Marble Speed
JR-TEEM-016	Rachita Bandi	A Non-Invasive Continuous Glucose Monitor

JUNIOR SOCIAL AND BEHAVIORAL SCIENCE

JR-SOBE-016	Stephanie Pham	Mental vs. Physical
JR-SOBE-015	Divya Chakka	Left Brain vs. Right Brain
JR-SOBE-014	Emma Matter	The Stroop Effect
JR-SOBE-013	Ainesh Paul	Exploring the Relationship Between Early Life Experience and Aggression
JR-SOBE-012	Gretchen Hricak	Terrific Tea
JR-SOBE-011	Christabelle Kirkham	Suggestive Power or the Power of Suggestion
JR-SOBE-010	Elliot Fitter	Reaction Gaming

JUNIOR PHYSICAL SCIENCE

JR-PHYS-031	Adam Brodsky	Cracking the Truth of Egg Strength
JR-PHYS-030	Rebecca Garner	The Effect of the Thickness of Clarinet Reeds on the Pitch of its Note
JR-PHYS-029	Sibi Shanmugam	Temperature and Rubber Band Elasticity
JR-PHYS-028	Quinlin McAllister	The Voice & Food
JR-PHYS-027	Zachery Lowe	Where Is the Best Spot in a Microwave?
JR-PHYS-026	Samuel Sachs	What Is The Rate of Decay of New Pressurized Tennis Balls' Bounce after Fifty Days?
JR-PHYS-025	Advayi Rambhatla	How Chromaticity Affects Heating by Absorption of Light
JR-PHYS-024	Adam Smith	The Effect of Tee Height on Driving Distance
JR-PHYS-023	Grace Kline	Does the Size of a Parachute Affect How Long It is in the Air
JR-PHYS-022	Tanner Bixler	What Metal Makes a Better Electrical Conductor?
JR-PHYS-021	Nathan Weltmer	Will a .22 Rimfire Caliber Go Through More Paper Fired from a Rifle or Pistol?
JR-PHYS-020	Henry Hussey	Up Up and Away
JR-PHYS-019-T	Liam McQuillan	Need For Speed
JR-PHYS-019-T	Chase Clinkscale	Need For Speed
JR-PHYS-018	Brennan Slabonik	Factory Made Cloth vs. Homemade Cloth
JR-PHYS-017	Ava Rooney	Do Certain Eggshells Withstand More Weight?
JR-PHYS-016	Patrick Fetterman	Which Fabric Blocks UV Light the Most?
JR-PHYS-015	Zoe Snyder	Is There a Difference Between Left Twix and Right Twix?
JR-PHYS-014	Samuel LeFevre	How Much Weight are Interleaved Sticky Notes Able to Hold?
JR-PHYS-013	Holden Leer	Potato Battery or Lemon battery
JR-PHYS-012-T	Sahni Allah	Hots Nd Pots
JR-PHYS-012-T	Layla Welsh	Hots Nd Pots
JR-PHYS-011	Sofia Posavec	Keep The Coffee From The Pot Hot

JUNIOR MDEICINE AND HEALTH

JR-MEHE-015	Destiny Perez	Keep It Fresh
JR-MEHE-014	Sneha Arikeri	The Effectiveness of Oral Insulin
JR-MEHE-013	Zephaniah Weaver	Fatty Foods
JR-MEHE-012	Devi Dahal	Wa-ter You Doing to My Teeth?
JR-MEHE-011	Arman Kazi	Creating Brain Computer Interface for Neuromuscular Disease Patients
JR-MEHE-010	Abigail Stevens	How Does Having Different Dubstances in the Stomach Effect Medicine Absorption?
JR-MEHE-009	Inass Moubal	Depressed Daphnia
JR-MEHE-008-T	Ella Murphy	With the Blink of an Eye!
JR-MEHE-008-T	Amanda Babuscak	With the Blink of an Eye!
JR-MEHE-007-T	Gianna Petrou	The Effect of Color Background on Memorization
JR-MEHE-007-T	Stephen Petrou	The Effect of Color Background on Memorization
JR-MEHE-006	Willow Cowan	Analysis of Metals Found in Common OTC Drugs

JUNIOR LIFE SCIENCE

JR-LIFE-016	Sofia Failla	Reaching for the Light
JR-LIFE-015	Katelyn Moslak	Do Different Colors of Light Affect Plant Growth?
JR-LIFE-014	Sierra Yingling	Buggy Decompotion
JR-LIFE-013	Shriyan Kapa	How Does Softened Water Affect Grass
JR-LIFE-012	Tristan Adams	Fertilization of Shiitake Mushrooms
JR-LIFE-011	Frank Barra	Effect of Proximity to Stream Source on Biomass and Biodiversity in Local Creeks
JR-LIFE-010	Sophie vander Velden	What's Your Plant's Favorite Drink?
JR-LIFE-009	Kaitlynn Washington	Shoulder Confirmation In a Horse
JR-LIFE-008	Sophie Hunt	Let It Grow
JR-LIFE-007	Sophia Geller	The Effects of Different Light Sources on Radish Plants

JUNIOR ENVIRONMENTAL SCIENCE

JR-ENVR-044	Ronan Blayney	How Does Detergent Affect the Amount of Dissolved Oxygen in the Water?
JR-ENVR-043	Cameron Reist	Un-bee-lievable Insulations
JR-ENVR-042	Rowan Keiter	"Water" You Doing, Mussels?
JR-ENVR-041	Sai Sri Nidhi Mogilineedi	Is our Water Safe? A Comparative Analysis of Water Quality
JR-ENVR-040	Makenzie Devore	Growing Plants in Garbage
JR-ENVR-039	Adam Hintze	To Kill A Lanternfly
JR-ENVR-038	Matt Zampelli	Melting Frost
JR-ENVR-037	Kailyn Cyphers	Growing Plants On Mars
JR-ENVR-036-T	Maysyn Sauder	Hopping Into Climate Change
JR-ENVR-036-T	Nyelli Rosario	Hopping Into Climate Change
JR-ENVR-035	Claire Finkenbinder	Are Earthworms Affected by Weed Killer in Organic Matter?
JR-ENVR-034	Padraig Gardner	Effect of Terrarium Substrates on Temperature Retention
JR-ENVR-033	Kendall Colgate	Which Homemade Solution is the Most Effective at Killing SLF?
JR-ENVR-032	Emma O'Leary	To Drink or Not To Drink?
JR-ENVR-031	Luke Schreffler	Which Fertilizer Works the Best
JR-ENVR-030	Cecilia Benavides	Soil Fertility
JR-ENVR-029	Lila Powers	The Effect of Agricultural Water Runoff on Nitrate Levels in the Conodoguinet Creek
JR-ENVR-028	Grace Fox	Tricky Trout
JR-ENVR-027	Sehaj Arora	The Effects of Deforestation on the Environment
JR-ENVR-026	Graylee Dobbin	pHing for Solutions

JUNIOR CHEMISTRY

JR-CHMS-031	C'nai Zecharya	The Science of Spherification
JR-CHMS-030	Angel Mathews	The Effect of Temperature on The Conversion of Oral Formulations into Boba Balls
JR-CHMS-029	Xander Gordon	Polymer Cube Water Temperature
JR-CHMS-028	Benjamin Sweger	Kitchen Bottle Rocket Fuel
JR-CHMS-027	Renee Kessler	Does Candle Color Effect the Rate of Burning
JR-CHMS-026	Aishwarya Siddabathini	Fruit pH vs. Voltage Generation
JR-CHMS-025	Allianora Appel	Dissolving of Alka Seltzer
JR-CHMS-024	Alannah Ngo	Rehydrating Dried Fruit
JR-CHMS-023	Alexa Kushner	Amount of Confectioner's Sugar Affect on the Thickness of Marshmallow Crème?
JR-CHMS-022	Emmanuel Gassis	Can the Extract of Butterfly Pea Flowers Change Color?
JR-CHMS-021-T	Aleigha Gruzlewski	Fantastic Filter
JR-CHMS-021-T	Kendall Weaver	Fantastic Filter
JR-CHMS-021-T	Addison Miller	Fantastic Filter
JR-CHMS-020	Patrick Tanney	The Floating Egg
JR-CHMS-019	Maddie Baker	Capillary Action
JR-CHMS-018	Vanessa Trump	Maple Candy
JR-CHMS-017	Evangeline Foster	Electrifying Drinks
JR-CHMS-016	Lily Cusick	What Candy Makes the Best Watercolor Paint?
JR-CHMS-015	Holden Erhard	How Exposure Levels Effect the Quality of a Photo Taken by a Pinhole Camera
JR-CHMS-014	Shreemayi Kumaresan	Control Size of Silver Nanoprisms through LED Irradiation
JR-CHMS-013	Avielle Shienvold	Plop, Plop, Fizz
JR-CHMS-012	Hannah Le	Have an Ice Day
JR-CHMS-011-T	Siri Pachica	Baking Cakes at Different Temperatures
JR-CHMS-011-T	Caroline DeSoto	Baking Cakes at Different Temperatures





CASEF is affiliated with the International Science and Engineering Fair, a program of Society for Science, Washington, D.C. The senior division grand champions will represent CASEF in the international fair May 14-19 in Dallas, TX. They will be honored among the top 1500 pre-college student researcher from 84 countries and territories.

Junior Division Finalists qualifying for BroadcomMASTERS.

Congratulations to our semifinalists (top 5% of over 6000 entries):

2014 Joshua Silverman – Eagle View Middle School, Cumberland Valley Schools

2015 Kimberly Dudding - St. Joseph School, Mechanicsburg

2016 – Zachary Yaninek – Good Shepherd School, Camp Hill

2017 – Melanie Uroda - St. Theresa School

Alexander Seman - Harrisburg Academy

Adam Warren - St. Joseph School, Mechanicsburg

2020 – Anushi Patel – Hershey MS

2021 – Jackson Kane, St. Theresa School

Niharika Shukla, Mountain View, Cumberland Schools

2022 – **NATIONAL FINALIST** (top 30 in the US) Shaunak Dalal, Hershey Middle School



With the generous support of title sponsor and partner Thermo Fisher Scientific, Society for Science is pleased to be running the Thermo Fisher Scientific Junior Innovators Challenge (JIC) in its inaugural year. The Thermo Fisher JIC (previously the Broadcom MASTERS from 2010-2022, the Society's Middle School Program (2008), and the Discovery Channel Young Scientists Challenge (1999-2007), is the nation's premier STEM research competition for middle school students.



Thermo Fisher Scientific
**Junior Innovators
Challenge**

A program of Society for Science

Dr. Laura Johnson Hummell Educator Award



Dr. Laura Johnson Hummell was a Technology and Engineering Education Advisor for the Pennsylvania Department of Education and a member of the CASEF Board of Directors. She passed away December 8, 2018 as a result of injuries sustained in a pedestrian hit and run accident. Laura was a passionate educator and lifelong learner. On her International Technology and Engineering Educators Association (ITEEA) profile, Hummel cited a quote from William Butler Yeats: "Education is not the filling of a pail, but the lighting of a fire." She said the quote had a special place in her life and it guided her approach to teaching. "I often learned the most from those teachers, who helped me find my path and passion, rather than lecturing or berating me," she wrote. She also added, "Over the years, I have worked to become the kind of teacher who inspires my students and leads by example." CASEF would like to honor Dr. Hummell by presenting a cash award to one of our teachers who has been a supporter STEM education through participation in CASEF and exemplifies these ideals.

2019 Recipients: Beth Johnson, Susquenita Middle School
Kathy Becker, Susquenita High School

2020 Recipients: Susan Gaughan, Silver School
Jason Sibbach, Hershey HS

2021 Recipients: Jonathan Everett, Greenwood MS/HS
Jason Ambler, Hershey HS

2022 Recipients: Amy Diehl, Camp Hill HS
Kaitlyn Roberts, Hersey MS

2023 Recipient: Timothy Ritter, Cumberland Valley (ret.) 25 years of CASEF service



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SPECIAL AWARDS

Listed in program and provider invited to present award at ceremony.

Please contact Valerie Knowles, Fair Director at director@casef.org for more information.



Capital Area Science and Engineering Fair Impact

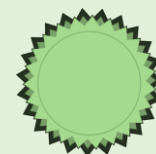
204



Total number of scholarships offered to 2022 presenters from partner organizations totalling

\$464,300

349



Total number of special awards given by 69 scientific, professional, industrial, educational and governmental organizations.

204

Total number of 7-12 grade students who will qualify to participate in the CASEF regional fair.

2023

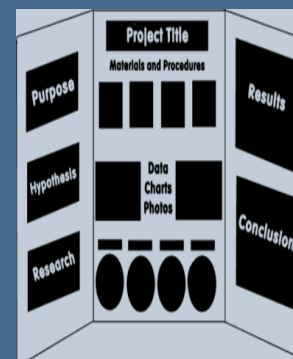
Inaugural year for elementary program

38



Total number of counties serviced by CASEF. All public and private school students are eligible to participated in the 2023 fair.

196



Total number of independent and team projects anticipated to entered into the 2023Capital Area Science and Engineering Fair.



2

Number of students presenting CASEF at the 2022 International Science and Engineering Fair.



1

Number of junior division CASEF students selected as national FINALIST for BroadcommMASTERS. (1800 applicants) CASEF had 3 semifinalists (top 300)

132

Number of volunteer STEM professionals judging the 2022 Capital Area Science and Engineering Fair.





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Phoenix Contact is a proud sponsor of the Capital Area Science & Engineering Fair (CASEF), held this year from March 4-7 at Harrisburg Area Community College. Connecting bright and motivated students with industrial, academic, and professional organizations, CASEF introduces students to science and technology opportunities within our region to facilitate the cultivation and retention of a tremendous resource – our youth.

Learn more at www.casef.org/

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CASEF 2024
March 4 – 7

CASEF is a PA EITC Innovative Educational Program

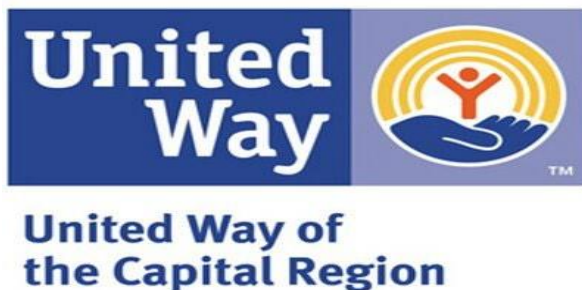
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Capital Area Science & Engineering Fair

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CASEF c/o Knowles
103 Newport Road
Duncannon, PA 17020

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PA EITC Innovative Educational Program

Email to: director@casef.org



I want to begin with a note of sincere thanks. To say the past few years have presented some new challenges is an understatement and the continued support of students, parents, teachers, administrators, mentors, judges, and sponsors is the reason we as a board were able to continue offering students the opportunity to participate in a competitive science fair. CASEF, with the support of many, provided the opportunity for students to share with the judges their passion for their topic and the amazing things they have discovered due to an effort that truly took a village. The ability to take part in this type of experience is invaluable, especially at a time when STEM careers are becoming crucial across many disciplines. Participants build their deductive reasoning and analytical skills as well as their ability to explain their research verbally in a video and in-person interviews. These are skills that will help students to succeed regardless of the career path they select for their future. CASEF provides a unique and challenging platform for students to expand the knowledge they are gaining from their amazing classroom teachers and lets them apply it to solving a problem geared towards bettering society.

CASEF is funded by our partners and sponsors and I ask that you support these businesses and organizations that provide this opportunity for the participating students. There are many avenues available for supporting CASEF from the financial contribution, to serving on a committee, providing a special award or judging the day of the fair. Every one of these is vital to the success of this organization and allows us to continue to serve the students in our 41-county service area. CASEF is the premier STEM experience for the students in Pennsylvania providing prizes and scholarships in excess of \$400,000 as well as the distinction for advancement in state, national, and international competitions. We have continued to offer these opportunities throughout a global pandemic and despite three new venues in as many years.

In closing, I encourage you to support CASEF as a volunteer, financially or as an award provider. We invite you to share the opportunity to invest in our future with individuals, businesses and professional organizations who share our mission. Every year brings new experiences and a fantastic set of projects to the table and I know this year will not be any different. Thank you again to all the parents and teachers who have supported their students in making these projects happen and of course to our partners and contributors who without them the fair would not be possible. I am excited to see where the future will go for many of these students!

Sincerely,

Amy L. Diehl, CASEF Board President - Camp Hill School District

CASEF is proud to partner with Penn State Harrisburg, Select Medical, The Donald B and Dorothy L Stabler Foundation, Harrisburg University, Penn State College of Medicine, Hershey Foods, UGI Utilities, JLG/Jerr-Dan, Foundation for Enhancing Communities, Baker Tilly Virchow Krouse, LLP, Phoenix Contact, acc27 Good Day PA, and Sheetz



Capital Area Science & Engineering Fair

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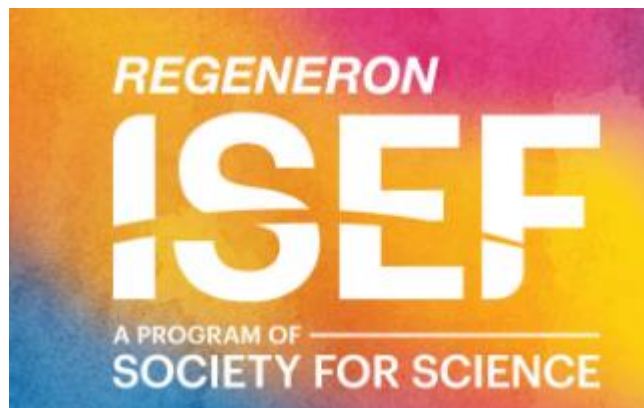
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