

IT'S MIND ON
MATTER



INTEL STS 2014 Semifinalists





2014 Semifinalists

The Intel Science Talent Search (Intel STS), a program of Society for Science & the Public, is the nation's most prestigious pre-college science competition. Alumni of STS have made extraordinary contributions to science and hold more than 100 of the world's most distinguished science and math honors, including the Nobel Prize and the National Medal of Science. Each year, 300 Intel STS semifinalists and their schools are recognized. From that select pool of semifinalists, 40 student finalists are invited to Washington, DC in March to participate in final judging, display their work to the public, meet with notable scientists, and compete for the top award of \$100,000.

The semifinalists of the Intel Science Talent Search (Intel STS) 2014 were selected from among 1,794 entrants representing 489 high schools in 45 states, the District of Columbia, and seven overseas schools.

Each of the 300 students named a semifinalist in the Intel STS 2014 will receive a \$1,000 award for his or her outstanding research. Additionally, to recognize excellence in teaching and school support of individual student research, every school will receive an award of \$1,000 for each semifinalist named in the Intel STS 2014. This award is used to further excellence in science, math, and/or engineering education.

Colleges and universities regard the Intel STS semifinalist award to be evidence of exceptional academic promise. Each semifinalist is provided with a certificate of accomplishment which may be sent with his or her applications for college admission and scholarships. A listing in this book, as well as official publication at student.societyforscience.org/intel-sts, is also documentation of this honor.

Many Intel Science Talent Search projects are the product of a research environment in which scientist mentors dedicate themselves to the intellectual development and technical training of students. The 2014 semifinalists, Intel, and Society for Science & the Public acknowledge with gratitude the guidance, expertise, and patience of the experienced researchers who supported many of these projects.

From this group of 300 Intel STS 2014 semifinalists, 40 finalists will be chosen to attend the Intel Science Talent Institute in Washington, DC from March 6–12, 2014. During their trip to Washington, these finalists will undergo further judging and share \$630,000 in awards.

ARIZONA

Phoenix

Brakensiek Home School

Brakensiek, Joshua, 17

Bounds on the Size of Sound Monotone Switching Networks Accepting Permutation Sets of Directed Trees

Tempe

Corona Del Sol High School

Cao, Patric Thanh, 17

A Novel Synthesis and Chemotherapeutic Study on a PEGylated Gold Nanorod Lytic Peptide and Its Effects on Prostate and Bladder Cancer Cells

ARKANSAS

Little Rock

Little Rock Central High School

Ji, Nathanael Yongxiang, 17

Engineered Cell-cell Communication Utilizing Exosomes with miRNA and Protein

CALIFORNIA

Cupertino

Cupertino High School

Balakrishna, Ashwin, 17

Optimal Control Strategies for Trajectory Optimization with Applications to Continuous Solar Flight

Lee, Tanya, 17

Emoticon Impact on Sentiment Analysis Precision

Monta Vista High School

Jain, Nishant, 17

Augmented Reality on Mobile Devices: Advancing Globally Accessible Anatomical Education

Narkhede, Pradnya Nitin, 17

Correction of the Delta-F508 Mutation in the CFTR Gene with the Use of Airway Epithelium-Delivered Zinc Finger Nucleases for Homology-Directed Genomic Editing

Ng, Natalie, 17

Advancing Precision Medicine: MicroRNA Prognostic Signatures and Prediction Models for Distant Metastasis Free Survival in Breast Cancer

Shankar, Vishnu, 17

The 3D Structure of Human DP Prostaglandin G-protein Coupled Receptor Bound to Selective Antagonists from GEnSeMBLE Predictions

Folsom

Folsom High School

Zhou, Allan, 17

The Role of Tyrosine Sulfation in Integrin Ligand Binding

Fremont

Mission San Jose High School

Lu, Jonathan, 17

Improved Peak Detection and Deconvolution of Native Protein Complex Electrospray Mass Spectra

Irvine

University High School

Lee, Kevin, 17

Strongly Coupled Electromechanical Modeling of the Heart in Moving Domains Using the Phase-Field Method

Park, Jiho, 17

Molecular Dynamics Simulations of Aromatase: Implications for Novel Drug Design

Los Angeles	<p><u>Marlborough School</u> <i>Collier, Clara, 17</i> Geometric Phases Revealed via Thermo-geometric Effects of Elastomers</p> <p><u>Milken Community High School</u> <i>Bochkur Dratver, Milana Aerial, 17</i> Radiation-Induced Reprogramming of Glioma Cells into Glioma Stem Cells</p> <p><u>Yeshiva University High School of Los Angeles</u> <i>Willner, Moshe Joseph, 17</i> Reconfigurable Orbital-Angular-Momentum and Polarization Manipulation of 100-Gbit/s QPSK Data Channels</p>
Morgan Hill	<p><u>Oakwood School</u> <i>Gopisetty, Divya, 18</i> Novel Treatment of Diabetic Neuropathy Through Interruption of Stress-Activated Pathway in <i>Caenorhabditis elegans</i></p>
North Hollywood	<p><u>Harvard-Westlake School</u> <i>Siddarth, Divya, 17</i> Generation of a Dipeptide Conformational Library and Determination of Protein-Protein Binding Sites for Drug Design</p> <p><i>Srivastava, Megha, 17</i> Building an Optical pH Sensor for PET Probes Using Machine Learning Models</p>
Oak Park	<p><u>Oak Park High School</u> <i>Sun, Cathy, 17</i> Uncovering Complex Feedback Mechanisms in Feather Development</p>
Orinda	<p><u>Miramonte High School</u> <i>Li, Jennifer, 17</i> Engineering Novel Biochips for the Rapid and Sensitive Detection of Biomarkers</p>
Palo Alto	<p><u>Henry M. Gunn High School</u> <i>Goronzy, Isabel Nadine, 17</i> The Key to Pluripotency: Molecular Engineering of the PSpC1 Gene to Optimize Reprogramming Efficiency of Pluripotent Stem Cells</p> <p><i>Liu, Charles Xin, 17</i> Integrated Meta-analysis of 64 Diseases Identifies Novel Relationship Between Systemic Sclerosis and Systemic Lupus Erythematosus</p> <p><i>Wang, Emily S., 17</i> A New Light in Biosensing: Engineering Bright and Photostable Green Fluorescent Protein Mutants for Fluorescence Resonance Energy Transfer (FRET)</p> <p><u>Palo Alto High School</u> <i>Venkatasubramaniam, Sidhanth Grover, 17</i> A Novel Framework for Computer-Aided Detection of Breast Masses in Mammograms Using Unsupervised Feature Learning with Deep Networks</p>
Riverside	<p><u>La Sierra High School</u> <i>Newton, Loren, 16</i> A Novel Approach to Capture Wingtip Vortices</p>

San Diego

Canyon Crest Academy

Chen, Eric S., 17

Computer-aided Discovery of Novel Influenza Endonuclease Inhibitors to Combat Flu Pandemic

Patrick Henry High School

Simpson, Sara Kornfeld, 17

Neuronal Nonlinear Dynamics: From an Optical Illusion to Parkinson's Disease

San Jose

Archbishop Mitty High School

Balasingam, Arjun, 17

Energy-Delay Optimization of Variability-Prone Carbon Nanotube VLSI Circuits

Leland High School

Wong, Courtney, 17

Scattered Light from Quasars: Connecting Observations with Computer Simulations

Lynbrook High School

Kong, Angela Xiangyue, 17

The Transcription Factor Bcl11b Regulates Mammary Stem Cell Self-Renewal and Quiescence Partially Through Cell Cycle Progression Inhibitor CDKN1a/p21

Wei, Jane, 17

Oxidative Stress in Three Species of Anemone: the Estuarine Anemone *Nematostella vectensis*, and Marine Anemones *Edwardsiella lineata* and *Aiptasia pallida*

Presentation High School

Thomas, Anna Teresa, 17

Identification of TNFR1 as a Novel Preventative Target Against Maternal Infection Induced Interneuron Loss in Neuropsychiatric Disorders

The Harker School

Bhetanabhotla, Vikas Chandra, 17

Identification of Satellite Galaxies around Milky Way Galactic Analogs Using Machine Learning Algorithms

Chen, Stephanie, 16

Globular Clusters as Tracers of Dark Matter in Virgo Cluster Dwarf Elliptical Galaxies

Fu, Christopher, 17

Molecular Characterization and Rapid Generation of Human Rotavirus VP6-Specific Monoclonal Antibodies

Gupta, Anika, 17

Novel Drug Delivery Systems Targeting Cancer Stem Cells for Next-Generation Chemotherapy

Jain, Saachi, 17

MicroRNA-223 Promotes Macrophage Differentiation

Misra, Sreyas, 17

Design and Characterization of a Novel Single-headed and Hand-held PET Camera Using 511 keV Photon Collimation via Compton Scatter

Periyakoil, Preethi, 17

A Video-assisted, Time-lapse Analysis of the Effects of the ELF5 Transcription Factor on the Morphology and Proliferation Kinetics of Breast Cancer Cells

Sridhar, Rahul, 17

Understanding the Effect of Hinge Mutations on Domain-swapping in Antiviral Lectin Cyanovirin-N

Sundar, Vikram, 17

Computational Analysis of Novel Drug Opportunities Using Protein-Protein Docking

Zhao, Albert, 17

Oxygen Reduction Activity of Dodecyne-functionalized AuPd Nanoparticles

San Ramon

California High School

Camenzind, Kathy, 17

Quantifying Trapping Forces in a Simplified Optical Tweezers Setup

Li, Charles, 17

Solving the Mysteries of Reversible Messenger RNA Epigenetics

Maiti, Esha, 17

Stochastic Monte Carlo Simulations to Determine Breast Cancer Metastasis Rates and Tumor Distribution from Patient Survival Data

Dougherty Valley High School

Chakicherla, Naveen, 18

Structural Classification of Allergen IgE Epitopes by Hierarchical Clustering

Pang, Emily, 17

The Opposing Roles of Tumor Suppressive cC1qR and Oncoprotein gC1qR as Mechanisms for Inhibiting Cancer Pathogenesis

Santa Cruz

Pacific Collegiate School

Chopra, Sahil, 17

Identification of Genomic, Transcriptomic, Proteomic and Epigenomic Cancer Associations for Discovery of Novel Treatment Targets via Computational Modeling and Dynamic Visual Analysis

South Pasadena

South Pasadena High School

Wang, Jason Ku, 17

Identifying Biomarkers that Predict the Presence or Absence of Cancer in Men with Negative Prostate Biopsies

Westlake Village

Westlake High School

Yin, Cynthia Lucinda, 17

Self-Organization of Complex Spatiotemporal Structures with a Nanoscale Catalyst in the Belousov-Zhabotinsky Reaction

COLORADO

Boulder

Fairview High School

Zhang, Lawrence, 17

Suppression of Malonyl-CoA:ACP Transacylase as a Treatment for Squamous Cell Carcinomas

Durango

Durango High School

Rossi, Rachel Louise, 18

Endocrine Disruptor Remediation in Water: Exploration of Mycoremediation Capabilities of Fungi

Monte Vista

Monte Vista High School

Rocha, Tayler Ann, 17

A Novel Approach to Wetland Management in Arid Regions: Harnessing the Power of the Playa

CONNECTICUT

Greens Farms

Greens Farms Academy

Garfalo, Frankie, 18

Chemosensitization of High-grade Serous Ovarian Carcinoma via Calcium Signaling

Greenwich

Greenwich High School

Anderson, Travis, 18

Intrinsic Laptop Energy Capture via Keyboard Piezoelectric Conversion

Buck, Friederike, 17

Soluble Adenylyl Cyclase and the Intracellular Messenger Cyclic Adenosine Monophosphate (cAMP) Suppress Cancer Development by Enforcing Contact Inhibition

Gusho, Zheni, 17

Sustainable Enhancement of Plant Growth and Disease Reduction Using Biochar Soil Additives

Merrill, Anne, 17

Comparative Suppression of Soil-Borne Pathogens via Earthworm Bioturbation of Natural and Man-Made Biochars

New Canaan

New Canaan High School

Abhiraman, Gita, 17

Plant-like Transcription Factors in *Toxoplasma gondii*

Ridgefield

Ridgefield High School

Armbrust, Natasha Kristin, 17

Regulation and Browning Capabilities of FNDC4 *In Vivo*

Wallingford

Choate Rosemary Hall

Hong, Lawrence, 18

On the Single Facility Location Problem

Windsor

The Loomis-Chaffee School

Jung, Soo Yeon, 18

Spent Tealeaves as an Alternative for the Removal of Artificial Dye from Solutions

FLORIDA

Fort Lauderdale

Pine Crest School

Bhagchandani, Preksha, 17

Elucidating the Molecular Mechanisms Resulting from Acute Lead Exposure in *Saccharomyces cerevisiae*

Herman, Laura Mariah, 17

Frequency-Based Synesthetic Associations Between Letters and Colors

Fort Pierce

Lincoln Park Academy

Bacchus, Robert Mohamed, 17

Targeting "CancAARS": A Novel Therapeutic Target for Melanoma Tumorigenesis

Melbourne

Viera High School

Loeb, Zachary, 17

Preventing the Reproductive Failure of Aquatic Life from the Global Threat of Endocrine Disrupting Compounds Through Catalytic Waste Water Treatment (Year 4)

Miami

Dr. Michael M. Krop High School

Odzer, Jamie, 17

Impact of Predator Distribution and Productivity Levels on Abundance and Feeding Patterns of *Callinectes sapidus*: What Does Blue Crab Behavior Tell Us About Wetlands Restoration?

Palm Harbor

Palm Harbor University High School

Moorthy, Aadith, 17

A Novel Approach for the Encapsulation of Phase Change Materials for High Temperature Thermal Energy Storage Systems

GEORGIA

Evans Lakeside High School
Meixiong, Gerry, 17
 Cell-Cycle Regulated Membrane Association of NuMA: A Novel Pathway for Efficient Chromosome Segregation

She, Edward, 17
 Discovery and Molecular Investigation of a Novel and Potent Drug Candidate Against Cancer Drug Resistance

Lawrenceville Gwinnett School of Mathematics, Science, and Technology
Jin, Willie, 18
 Developing Novel Protein Targets for *Bordetella pertussis* Antibiotics: Understanding Protein Interfaces and Domain-Domain Interactions

Macon Howard High School
Ilan, Teva, 18
 Response of Soil Invertebrates to Electromagnetic Stimuli

Roswell Roswell High School
Srinivasan, Anand, 17
 RNNScan: Eukaryotic Gene Prediction via Recurrent Neural Networks Utilizing Local-Feature Extraction

HAWAII

Mililani Mililani High School
Mocz, Viola, 17
 The Mass Ratio of Elementary Particles from Helicitoroidal Topology

ILLINOIS

Chicago The University of Chicago Laboratory High School
Mehta, Rahul Siddharth, 18
 A New Max-Flow Algorithm for Sparse Networks

Munim, Mohammed, 17
 Directed Synthesis of Gold Nanostructures for Bioelectronic Applications

Hinsdale Hinsdale Central High School
Kanangat, Smriti, 17
 Detection of Soluble Human Histocompatibility Antigens (HLA) in Circulation-Potential Biomarkers for Early Detection of Non-Small Cell Lung Carcinoma (NSCLC)

Naperville Naperville North High School
Liu, Claire, 18
 The Effect of Electron Correlation on Excitonic Energy Transfer in a Synthetic Chromophore System

Normal University High School
Su, Alexander Charles, 17
 Probing the Quantum Vacuum with Electromagnetic Fields

INDIANA

Carmel Carmel High School
Homma, Yushi, 18
 Asymptotics of Two-Point Correlation Functions for the Zeros of Random Polynomials

Liang, Charles, 17
PT-Symmetry Breaking in Periodic Potentials

Indianapolis **Park-Tudor School**
Cohn, Amy Jessica, 17
Detecting Reddening by Dust for Star Clusters in the Andromeda Galaxy

South Bend **John Adams High School**
Han, Raymond, 17
The Application of Hydrophobic Microporous Layers with Graphene-based Substrate in a Portable High Power Density Direct-Methanol Fuel Cell (DMFC)

KENTUCKY
Lexington **Paul Laurence Dunbar High School**
Sarge, Valerie Youngmi, 16
Synthesis of Benzodifuran Derivatives for Solar Cells

LOUISIANA
New Orleans **Benjamin Franklin High School**
Tang, Luke, 17
Finite Range Couplings in a Tensor Renormalization Group Approach to 2D Classical Lattice Models

Shreveport **Caddo Parish Magnet High School**
Leskova, Anna Igorevna, 17
Cellular Thiosulfate Metabolism and Proliferation Response in Regards to Angiogenesis Regulation in Ischemic Responses

MARYLAND
Baltimore **Baltimore Polytechnic Institute**
Khare, Kelly, 17
The Effect of Drainage Channels on the Peeling of a Surface Submerged in Fluid

Winch, Lucas, 17
Origins of Large Igneous Provinces (LIPs)

Bethesda **Walt Whitman High School**
Deng, Lisa, 17
Transcriptome Analysis of Inhibitor of DNA Binding 3-Deficient Naïve CD4⁺ T Cells When Differentiated to Regulatory T Cells or Th9 Phenotypes

Ellicott City **Centennial High School**
Nathan, Anusha, 17
How Completely Did Darwin Paint His Picture? A Study of Phenotypic Plasticity as It Relates to Reproduction in *Drosophila melanogaster*

Frederick **Governor Thomas Johnson High School**
Freed, Benjamin, 17
Identification of Novel Regulatory Mechanisms of the K-Ras Oncoprotein

Ijamsville **Urbana High School**
Xiao, Madelyne, 17
Deep Sequencing and Circos Analyses of Antibody Libraries Reveal Antigen-Driven Selection of Ig V_H Genes During HIV-1 Infection

Owings Mills **Garrison Forest School**
Paseman, Katherine, 17
c # 35H: A New Model Relating Hemoglobin, Hematocrit, and Optical Density

- Poolesville** **Poolesville High School**
Sriram, Vinay, 17
 Quantitative Modeling of Processing Cost and Energy Consumption for Optimization Algorithms in Cryptographically Enhanced Secure Internet Routing Protocol
- Potomac** **Winston Churchill High School**
Liu, Daniel, 17
 PEGylation of Tau-Specific Radioligands Improves PET Imaging Diagnosis for Alzheimer's Disease
- Yau, Jessica, 17***
 Alternative Pathway of Mitophagy Activation in the Absence of Parkin
- Rockville** **Richard Montgomery High School**
Ma, Emily Z., 17
 Investigating the Formation of Adult Intestinal Stem Cells During Vertebrate Development
- Xu, Suzanne, 17***
 Inhibition of Polyamine Synthesis Impairs Axonal Mitochondrial Mobility: A Possible Role of Decrease in Polyamine Levels in Neurological Disorders and Cognitive Decline
- Silver Spring** **Montgomery Blair High School**
Bourzutschky, Alexander N., 17
 New Analytical Solutions to the Time-Dependent Schrödinger Equation for the Quantum Two-Level System
- Datta, Shaun, 17***
 Saturated Nuclear Matter in the Large N_c and Heavy Quark Limits of Quantum Chromodynamics
- Davey, Neil, 17***
 Early Cancer Diagnosis and Treatment Through the Detection of Circulating Tumor Cells Using Drop-based Microfluidics
- Ganelin, Daniela, 17***
 Differences in Word Usage Patterns Between "Well-Recovered" Aphasic Patients and Control Subjects on a Picture Description Task
- He, Yi-Zhi, 17***
 A Software Tool to Assist Genomic N-Glycosite Prediction in Cancer Cells
- Johri, Aanchal, 17***
 Elasticity of Q β Virus Capsids as Malaria Vaccine Carriers Validated via Peak-Force Atomic Force Microscopy
- Shi, Jessica, 17***
 The Speeds of Families of Intersection Graphs
- Shih, Hueyjong, 17***
 The Effects of Oncogenic KRAS and c-Myc on the Transcriptomic Output of the Cell: A Novel Role for a Master Oncogene
- Studt, Gabriella, 17***
 Construction of the Higher Bruhat Orders on the Weyl Group of Type B

MASSACHUSETTS

- Acton** **Acton-Boxborough Regional High School**
Gowravaram, Nihal Reddy, 18
 Enumeration of Subclasses of $(\underline{2}+\underline{2})$ -free Partially Ordered Sets

Saini, Ajay, 17

Predictive Modeling of Opinion and Connectivity Dynamics in Social Networks

Andover

Phillips Academy

Chen, Rosalyn, 17

Injury-induced Proliferation and Differentiation of Epicardial Derived Cells

Belmont

Belmont Hill School

Haigh, Alex, 17

Investigating the Role of Chromatin in Regulating V(D)J Recombination: Designing a Model to Study the RAG Proteins' Preference for Nucleosome Position and Histone Modification

Boston

The Winsor School

Yamada, Jessica Massako, 18

For Want of an Arginine, the Termination Was Lost: Characterizing the Structure and Function of the R169Q MTERF1 Variant

Concord

Concord Academy

Won, Junho, 18

Lower Bounds for the Crossing Number of the Cartesian Product of a Vertex-transitive Graph with a Cycle

Concord-Carlisle Regional High School

Xia, Isaac, 18

Lower Central Series Ideal Quotients over Z and F_p

Falmouth

Falmouth Academy

Bocconcelli, Carlo, 17

In Search of Genomic Dark Matter: A Novel Method for the Global Identification of Active Regulatory Elements

Lexington

Lexington High School

Kuszmaul, William Henry, 17

A New Approach to Enumerating Statistics Modulo n

Seong, David, 18

Novel Use of Mutant Huntingtin Haplotype 3'UTR Sequence to Discover miRNAs Targeting Mutant Huntingtin Gene Causing Huntington's Disease

Sheffield

Berkshire School

Chung, Hyun Suk, 18

CryoEM Structure of MacK, a Novel Mycophage Isolated at Berkshire School

Westborough

Westborough High School

Homberg, Steven Alexander, 17

Finding Enrichments of Functional Annotations for Disease-Associated Single-Nucleotide Polymorphisms

MICHIGAN

Bloomfield Hills

International Academy

An, Guangning Phillip, 17

Sildenafil Promotes Axonal Outgrowth in the Chondroitin Sulphate Proteoglycan Inhibitory Environment

Grand Rapids

Forest Hills Central High School

Damato, Emily Catherine, 17

The Development of Phosphodiesterase 4D Inhibitors with 3D Printing and Molecular Visualization Software for the Treatment of Acrodysostosis

Novi	<u>Novi High School</u> <i>Raina, Raj, 17</i> Minimum Degrees of Minimal Ramsey Graphs
Port Huron	<u>Port Huron Northern High School</u> <i>Mehta, Jay Harshad, 17</i> A Novel In-Clinic Patient- and Cancer-Tailored Targeted Drug Delivery System
Portage	<u>Portage Central High School</u> <i>Sertic, Genevieve, 17</i> Mathematical Modeling of the Benefits and Drawbacks of Rooftop Agriculture
MINNESOTA	
Edina	<u>Edina High School</u> <i>Lu, Kevin Zifeng, 17</i> Charge Carrier Modulation by the Field Effect in Ultrathin Bismuth Thin Films
Minneapolis	<u>Breck School</u> <i>Simpson, Claire Melinda, 18</i> Writing and Applying a Monte Carlo Simulation Code to Examine Aerosol Vapor Pressure— An Important Factor in Climate Modeling <i>Villafana, Elisa Beverly, 17</i> Effects of the Pesticide Thiamethoxam on Vigor, Growth and Development of Soybean (<i>Glycine Max</i>) Crops
Plymouth	<u>Wayzata High School</u> <i>Chen, Emily, 17</i> FANCD2 Induced DNA Repair in Hereditary Fanconi Anemia: Unraveling the Mystery Behind a Cancer-Causing Blood Disease <i>Narayan, Priyanka Rajasree, 18</i> Improving the Oral Absorption of Chemotherapeutic Drugs Through the Use of Novel Nanoparticles <i>Zhang, Sophia Lin, 18</i> Effective Endothelial Cell Differentiation of Human Induced Pluripotent Stem Cells Using a Three-Dimensional Fibrin Scaffold
St. Paul	<u>St. Paul Academy and Summit School</u> <i>Li, Lucy, 18</i> Pretreatment of Switchgrass with White Rot Fungi in Context of Biofuel Production
MISSOURI	
Columbia	<u>David H. Hickman High School</u> <i>Kumar, Ashwath, 18</i> Effect of Bacterial Quorum Sensing Molecule N-3-oxo-Dodecanoyl-L-Homoserine Lactone on Human Pancreatic Carcinoma Cells
St. Louis	<u>Lindbergh High School</u> <i>Hufker, Katherine Emily, 17</i> Sibs of the Spectrum: Evaluating Support Groups for Those Who Have a Sibling with Autism

NEW HAMPSHIRE

Exeter

Phillips Exeter Academy

Fazel-Rezai, Vahid, 17

Equivalence Classes of Permutations Modulo Three-Letter Length-Changing Pattern Replacements

NEW JERSEY

Absecon

Holy Spirit High School

Moffa, Michelle Anne, 18

A Point-of-Use Water Filter for Developing Countries - Year III: Improving Effectiveness, Practicality, and Sustainability of Arsenic-Removing Biosand Filters

Basking Ridge

Ridge High School

Cai, Jeffrey, 17

Orbits of a Fixed-Point Subgroup of the Symplectic Group on Partial Flag Varieties of Type A

Chatham

Chatham High School

Shah, Parth, 17

Underrepresentation of Cytidine Deaminase Hotspots Reveals Key Genes and Tropism for Herpesviruses

Egg Harbor Township

Egg Harbor Township High School

Fulton, Laura Beth, 18

Development of a Novel, Safe Method for *In Vitro* Re-Creation of the Tooth Enamel Layer

Englishtown

Manalapan High School

Xu, Steven, 17

The Optimal Atmospheric CO₂ Concentration for the Growth of Winter Wheat (*Triticum Aestivum*)

Freehold

Freehold High School

Puzon, Liezl, 17

A Kinect-Based, Low-Collision Obstacle Navigation Device for the Blind

Hackensack

Academy for Medical Science Technology

Batarseh, Daniella, 18

A Novel Method to Manipulate the Osteoblast Differentiation Process

Heller, David, 17

Photosynthetic Algae/Insulinoma Cell Fusion Creating Self-Sustaining Insulin Producer

Pereira, Brianna, 17

CXCR4/SDF-1 α Signaling as a Target of Microenvironmental Regulation of Metastasis in NSCLC

Radakrishnan, Ankitha, 17

Changing Cellular Identity: Direct Cell Reprogramming Using Chromatin Remodeling Complexes

Song, Hee Jae, 18

A Novel Approach to Traumatic Brain Injury: Antidepressant Induced Neuroprotection

Academy for the Advancement of Science and Technology

Meier, Joshua Abraham, 18

Control of Induced Pluripotent Stem Cell Aging by Modulation of Mitochondrial DNA Deletions

Academy for Visual and Performing Arts

Gibli, Joseph, 17

COX-2 Inhibition in Non-Small Cell Lung Carcinoma

Hightstown	<u>Peddie School</u> Wang, Mien, 18 From a Geometric Angle: Minimum Triangulation in High Dimension
Kinnelon	<u>Kinnelon High School</u> Vosatka, Karl, 18 The Role of NMDA, IP3 and Ryanodine Calcium Receptors in HIV-1 Tat-induced Neuronal Apoptosis
Martinsville	<u>The Pingry School</u> Kapoor, Amol Jay, 17 The MicroRNA 310/13 Cluster Regulates Cellular Adhesion, Proliferation, and Differentiation in <i>Drosophila melanogaster</i>
Monmouth Junction	<u>South Brunswick High School</u> Ragavender, Ritesh Narayan, 17 Odd Dunkl Operators and q -nilHecke Algebras
NEW YORK	
Armonk	<u>Byram Hills High School</u> Cawkwell, Samuel, 18 Hypoxia Alters Exosome Release in Lung Cancer Cells
	Giardina, Jonathan, 18 Necroptosis: A Novel Mechanism of Cytotoxicity by Bacterial Toxins
	Isichenko, Andrei Michael, 17 Quantum Cryptography: Quantum Optical Entanglement and the Next Generation of Practical Quantum Key Distribution
	Occhiogrosso, Jessica Faith, 17 Inflammation Alters the Intervertebral Disc's Response to Load
	Percello, Matt, 17 Emotional Arousal From Music Listening in Post-Exercise States
	Tantleff, Amanda Sydney, 17 Allergic Children Don't Use Their EpiPens: Determining Allergic Children's Ability and Willingness to Use Epinephrine Auto Injectors during an Anaphylactic Reaction
	Zhang, Helena, 17 Biochemical and Biophysical Characterization of PlyGRCS Against Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA)
	Zimmerman, Brian D., 17 Refining the Evolutionary Path of Hadrosaurinoformes: An Analysis of the <i>Caudofemoralis</i> Muscle Retractor
Bedford	<u>Fox Lane High School</u> Herber, Charlotte Sophia, 17 Evidence of Toll-Like Receptor Nine-Mediated Amelioration of Amyloid Pathology in a TgSwDI Mouse Model of Alzheimer's Disease
Bellmore	<u>John F. Kennedy High School</u> Abramowitz, Rachel, 17 Why Innocent People Comply with Police Requests: The Role of Just World Beliefs and Public Self Consciousness

Jellinek, Rebecca, 17

The Effects of Barbie Dolls and Their Wardrobes on Body Dissatisfaction

November, Ben, 17

Measurement of Leaf Properties to Improve the Parameterization Used by Earth System Models to Estimate the Maximum Capacity for CO₂ Uptake in the Arctic

Bronx

Bronx High School of Science

Gould, Alexander, 17

A New Foundational Approach for Analysis and Prediction of Endemic Processes in Social Networks

LaGrassa, Alexandra Licari, 17

Using Ligands to Control the Growth Kinetics of Cadmium Selenide Clusters

Moore, Michael Ross, 18

Improvements in the Efficiency of Mitochondrial Biofuels Through the Modeling of the Thermodynamic Efficiency of the Electron Transport Chain

Orelowitz, Gidon, 17

A Fundamental Theorem in the Reduction of Two-Dimensional Additive Systems

Rozenberg, Felix, 17

Mitochondrial Dysfunction Caused by Cholesterol-Induced Cytochrome C Damage is Attenuated by Mitochondrial Protective Peptides

Wang, Yuqing, 17

New Quantitative Methodology for Identification of Drug Abuse Based on Feature-Based Context-Free Grammar

Yao, Jingyu, 18

Empirical Modeling of Fault Regions with Natural Erosion and Fault Uplift

Bronxville

Bronxville High School

McGough, Elizabeth, 18

Sound Improves Appetitive Olfactory Conditioning in *Drosophila melanogaster*

Brooklyn

Edward R. Murrow High School

Germash, Mariya, 17

The Effect of Withdrawal from Chronic Dopamine Stimulation on Surface GluA1 Levels in Pyramidal Hippocampal Neurons

Cedarhurst

Lawrence High School

Packin, Edan, 17

Procrastination and Academic Level as Factors Influencing Academic Integrity

Chappaqua

Horace Greeley High School

Guha, Anubhav, 17

Discovery of Rare Earth Oxide Nanoparticles as Agents for Prolonging Fluorescence Imaging in Biological and Other Systems: Fluorescence Studies from Single Molecules and Dispersions

Commack

Commack High School

Zweig, Joshua Michael, 17

Detection and Classification of Abnormalities in 3-Dimensional Mammograms via an Artificial Neural Network

Dix Hills

Half Hollow Hills High School East

Devarajan, Alex, 16

Ethyl Pyruvate Attenuates Systemic Inflammation via Inhibition of Inflammasome Activation

East Setauket**Ward Melville High School****He, Luran, 17**

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Li, Harrison, 16

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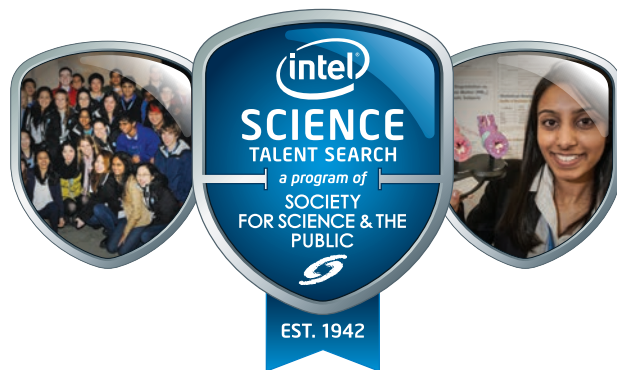
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