

Metro Richmond  
**SCIENCE FAIR**

**MARCH 20, 2004**



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AND ITS FOUNDATION**



Metro Richmond  
**SCIENCE FAIR**

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INFINEON TECHNOLOGIES  
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## **FAIR DAY SCHEDULE FOR STUDENTS & GUESTS**

### **JUNIOR DIVISION**

8:15 - 8:45 am	Students in 9:00 Judging Group arrive, register, & report to the auditorium.	Auditorium
9:30 - 9:45 am	Students in 10:00 Judging Group arrive (see above)	
10:30 - 10:45 am	Students in 11:00 Judging Group arrive (see above)	
9:00 am - 12:00 pm	Student Interviews and Evaluation of Exhibits Group 1: 9:00 - 10:00 Group 2: 10:00 - 11:00 Group 3: 11:00 - 12:00	Commons
12:00 pm - 1:00 pm	Judges Complete Evaluation of Projects	
1:00 pm - 3:30 pm	Exhibits Open to the Public	Commons
3:30 pm - 5:00 pm	Presentation of Awards	Auditorium
5:00 pm - 5:30 pm	Awards Reception	

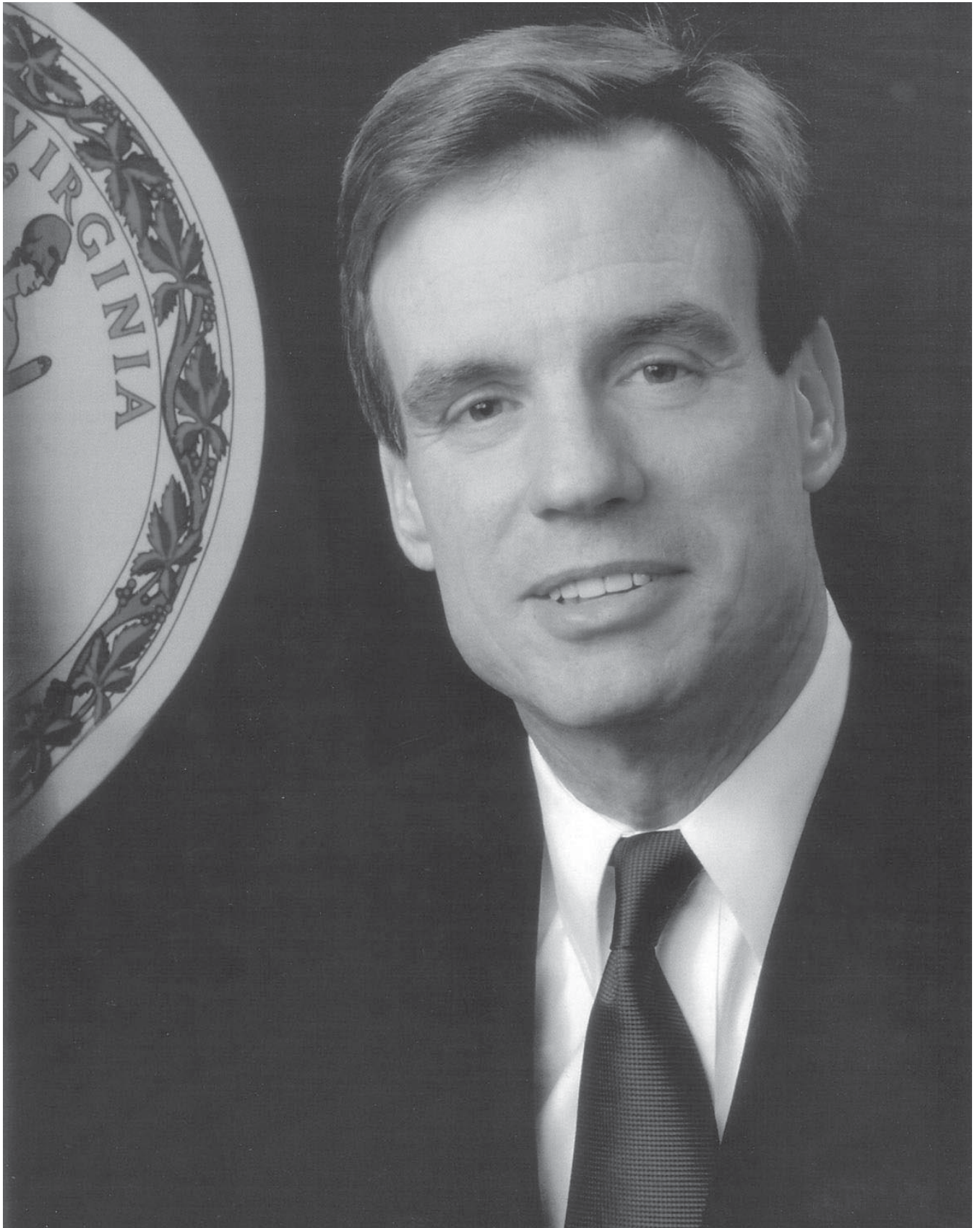
While the interviews are being conducted, the exhibit area is closed to all except the judges and the students being judged.

Einstein Bros. Bagel will have lunch available for purchase at the Fair site.

Students may leave as soon as their project has been judged and return for exhibit viewing and the Awards Assembly.

### **SENIOR DIVISION**

8:15 - 8:45 am	Students arrive, register, & report to the auditorium.	Auditorium
9:00 am - 12:00 pm	Student Interviews and Evaluation of Exhibits	
12:00 pm	Announcement of Intel ISEF Finalists	Auditorium
1:00 pm - 3:30 pm	Exhibits Open to the Public	
1:00 pm - 3:00 pm	Judging of Intel ISEF Finalists Senior Division	
3:30 pm - 5:00 pm	Presentation of Awards	Auditorium
5:00 pm - 5:30 pm	Awards Reception	





**COMMONWEALTH of VIRGINIA**  
*Office of the Governor*

Mark R. Warner  
Governor

March 20, 2004

Dear Students, Teachers and Parents:

Welcome to the 12<sup>th</sup> annual Metro Richmond Science Fair. As Honorary Chairman of this event, I congratulate students for their hard work and success at being chosen to be a part of this exciting event.

This event provides a wonderful avenue for middle and high school students to research and present their projects. Coupled with the possibility of advancing to state, national and international competitions, the Metro Richmond Science Fair is a prestigious annual event that attracts not only our student stars, but also businesses through sponsorship and volunteerism.

Congratulations to those teachers whose students have advanced to this level. Your stimulation and guidance of these bright minds is a critical part of their success. I would be remiss if I did not recognize the family support behind these students. Involved parents have involved children. Involved families make a stronger community. Thank you for your involvement.

It is my honor to promote this level of science and math competition throughout Metro Richmond. Good luck in today's competition and thank you for representing Metro Richmond and Virginia.

Sincerely,

A handwritten signature in black ink that reads "Mark R. Warner".

Mark R. Warner

## ADVISORY COMMITTEE

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& Environmental Sciences, & Science Fair  
Mathematics & Science Center

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Ms. Shelli Stepp

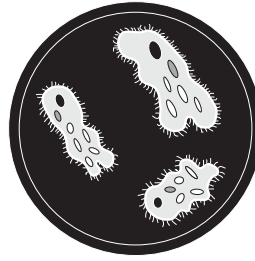
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Mrs. Kristina Poitras

Ms. Tawana Gilyard

Ms. Rachel Mead

Ex Officio:  
Dr. Julia H. Cothron  
Executive Director, Mathematics & Science Center



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Special Awards

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Scoring

Science Fair Admin. Assistant

James River H. S. Liaison

## MSC FOUNDATION BOARD SCIENCE FAIR SPONSORSHIP COMMITTEE

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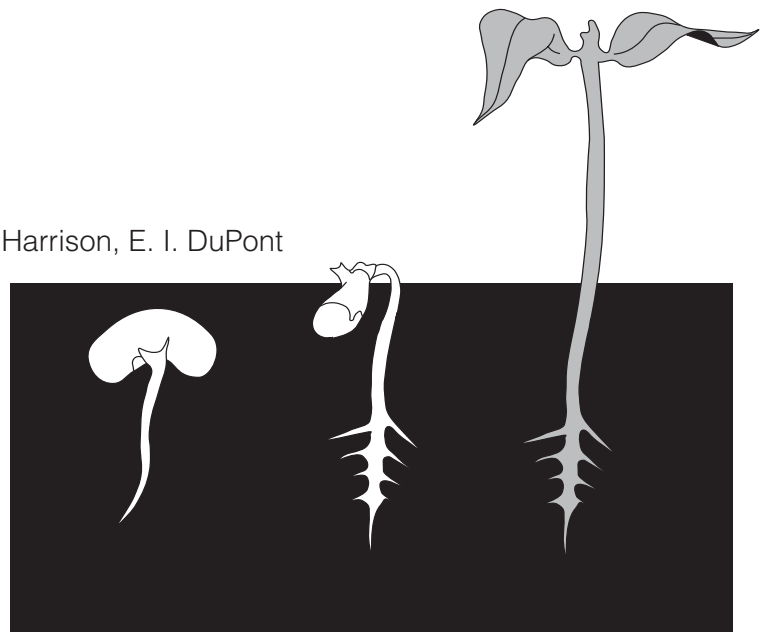
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Ethyl Corporation

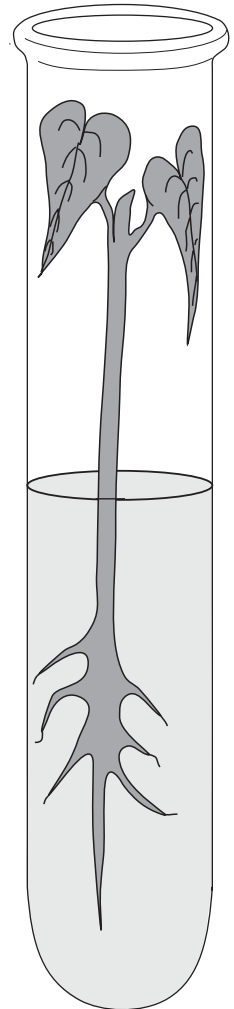
Mrs. Robin H. Newton  
Director, Mathematics & Science  
Center Foundation

Special thanks to our Photographer, William A. Harrison, E. I. DuPont



## PROJECT SCREENERS

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Dr. Bruce King	Randolph-Macon College
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Mr. H. V. Le	Dominion Virginia Power
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Mr. Roy Yamamoto	Ethyl Corporation, ret.
Mr. Rick Zaronas	Ethyl Corporation



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F. Lamar Brandt

Teresa Summers

Math & Science High School at Clover Hill

Gisela Ramsdell

Ryan Templeton

## **Hanover County Public Schools**

Atlee High School

Cathy Burke

Ed Squires

Chickahominy Middle School

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Hanover High School

Joshua Just

Britt Smithson

Lee-Davis High School

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Ed Kidder

Liberty Middle School

Terry Cornett

Kris DuBrasky

Elizabeth Lucas

Oak Knoll Middle School

Kelli Shust

Patrick Henry High School

Jessica Haines

Peggy Whitlock

Stonewall Jackson Middle School

Katherine Boggs

Kori Kapataidakis

Tracey Wood

## **Henrico County Public Schools**

Byrd Middle School

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Nancy Smith

Deep Run High School

Amy Lavender

Grant Odell

Freeman High School

Suzanne Kaminski

Godwin High School

Dana Embrey

Peter Hill

Jim Lehman

JoAnn Mulvany

Anna Shore

Henrico High School

Frank Lane

Julie Scott

Highland Springs High School

William Batkins

Moody Middle School

Joy Butler

Marivic Mitchell

Russell Mollenauer

Timothy Nye

Short Pump Middle School

Dale Bradshaw

Patricia Fernandez

Amy Moore

Kathy Richardson

## **Richmond Public Schools**

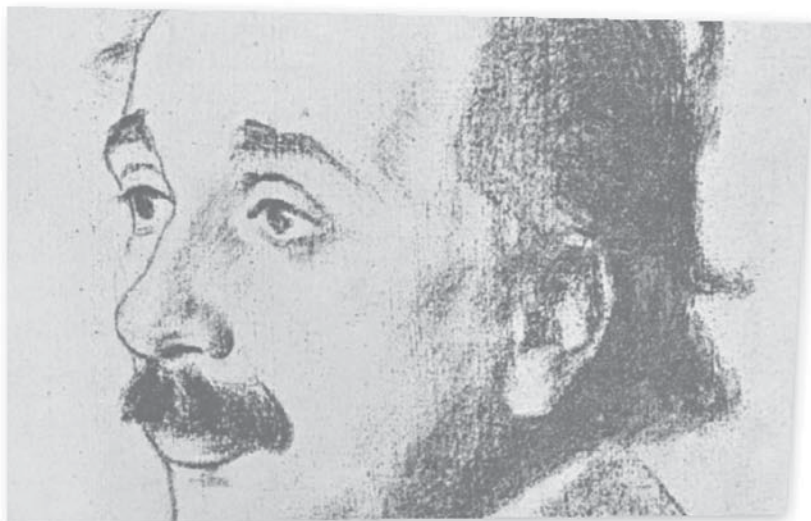
Maggie Walker Governor's School

Joy Ross

## **Private Schools**

Millwood School

Carol Lenti



Aim high  
and you  
will never  
miss.



Future scientists are also our future.  
We know. We've been in the  
science business for over 200 years!



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STUDENT COMPETITORS

# **JUNIOR DIVISION CATEGORY SPONSORS**

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## **Botany**

Food Lion

## **Chemistry**

Kraft

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## **Environmental Science**

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## **Medicine and Health**

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## **Microbiology**

Food Lion

## **Physics**

Infineon Technologies Richmond

## **Zoology**

Dominion

# JUNIOR DIVISION

## Behavioral & Social Sciences A

- 04-1276 The Effect Of Colors Seen From A Distance On The Visibility Of The Color  
Chris Baber • Byrd Middle School • Henrico
- 04-1307 The Effect Of Lunar Phases On Student Absenteeism  
Charlotte Campbell • Byrd Middle School • Henrico
- 04-1144 The Effect Of Scrambled Text On The Rate Of Detecting A Specific Letter  
Alyssa Connifey • Byrd Middle School • Henrico
- 04-1499 The Effect Of Temperature On A Subject's Ability To Study And Learn  
Ben Dessart • Moody Middle School • Henrico
- 04-1300 The Effects Of A Dominant Color On A Spinning Color Wheel On A Person's Ability To Recognize It  
Matthew Gizzi • Moody Middle School • Henrico
- 04-1438 The Effect Of Socioeconomic Status On Reading Skills At Age 10 Or 11  
Jonathan Goff • Moody Middle School • Henrico
- 04-1175 The Effect Of Birth Order On Career Interest  
Ellen Graham • Moody Middle School • Henrico
- 04-1089 The Effect Of Different Female Age Groups On The Use Of The Non-Dominant Hand  
Catherine Hamner • Moody Middle School • Henrico
- 04-1091 The Effect Of Visual Concentration On Ping-Pong Players  
Drew Jacobsen • Moody Middle School • Henrico
- 04-1411 The Effect Of Physical Activity Before Mental Work On Test Results  
Sammy Kirk • Byrd Middle School • Henrico

## Behavioral & Social Sciences B

- 04-1644 The Effect Of Distractions On Ability To Complete An Assignment  
Katherine Kraft • Moody Middle School • Henrico
- 04-1433 The Effect Of Age On The Extent Of The Stroop Effect  
Amber Kunkel • Moody Middle School • Henrico
- 04-1172 The Effect Of A Person's Age On Their Ability To Recall Information  
Hannah Lentz • Byrd Middle School • Henrico
- 04-1167 The Effect Of Gender On The Ability To Judge Volume  
Julie Nicol • Byrd Middle School • Henrico
- 04-1312 The Effect Of The Presentation Of The Food On Desirability  
Adarsh Ramakrishnan • Byrd Middle School • Henrico
- 04-1334 The Effect Of Different Colors Of Light On The Difficulty Of Transfer From Light To Dark  
Sam Rosenkrantz • Byrd Middle School • Henrico
- 04-1602 The Effect Of Video Gaming On Short-Term Memory  
Jacob Satin • Moody Middle School • Henrico
- 04-1299 The Effect Of Age On The Size Of Personal Space  
Sean Schultz • Moody Middle School • Henrico
- 04-1543 The Effect Of Distracting Noises On Reading Comprehension  
Rowan Sprague • Moody Middle School • Henrico
- 04-1113 The Effect Of Gender On The Accuracy Of Predicting Gender From Pictures Of Bare Feet  
Kaitlyn Winston • Byrd Middle School • Henrico

## Biochemistry

- 04-1148 The Effect Of Hypoxia On Foam Cell Formation  
Martha Fisher • Stonewall Jackson Middle School • Hanover
- 04-1287 The Effect Of The Type Of Liquid On The Fluffiness Of Eggs  
Robert Harriston • Byrd Middle School • Henrico
- 04-1425 The Effect Of Different Wrapping Materials On The Browning Of Apple Slices  
Mary Hubbard • Moody Middle School • Henrico
- 04-1248 Optimization Of Cut Flower Treatment To Extend Flower Life  
Alex Mait • Manchester Middle School • Chesterfield
- 04-1181 The Effect Of Blood Glucose On The pH Of Saliva  
Kathryn Morgan • Moody Middle School • Henrico
- 04-1458 The Effect Of Temperature On The Color Of A Banana's Skin  
Shruti Shankar • Moody Middle School • Henrico
- 04-1157 The Effect Of Yeast On Sugar To Produce Carbon Dioxide  
Eric Thornton • Moody Middle School • Henrico
- 04-1024 Ice Cream Crazy  
Chris Weber • Short Pump Middle School • Henrico
- 04-1408 The Effect Of The Environment On The Extraction Of DNA  
Natalie Zhao • Moody Middle School • Henrico

## Botany

- 04-1278 The Effect Of Fertilizer On Fescue Grass  
Michael Baxter • Moody Middle School • Henrico
- 04-1173 The Effect Of Different Angles On The Growth Of Lima Bean Plants  
Kelly Borkey • Oak Knoll Middle School • Hanover
- 04-1043 The Effect Of Certain Kinds Of Fertilizer On The Growth Of Grass  
Evan Cantor • Short Pump Middle School • Henrico
- 04-1044 The Effect Of Different pH Levels On The Growth Of Tall Fescue  
Zi Chen • Short Pump Middle School • Henrico
- 04-1639 The Effect Of Different Fertilizer Compounds On Grass Growth  
Bernice Chu • Moody Middle School • Henrico
- 04-1291 The Effect Of The Amount Of Cotyledon Removed On The Germination And Viability Of The Plant  
Kelly Hotchkiss • Stonewall Jackson Middle School • Hanover
- 04-1033 The Effect Of Different Types Of Soils On *Calendula* And Bush Bean Growth  
Rebecca Hunt • Short Pump Middle School • Henrico
- 04-1038 The Effect Of Colored Light On Plant Growth  
Huma Khatri • Short Pump Middle School • Henrico
- 04-1187 The Effect Of Ultraviolet Radiation On The Height Of Annual Rye Grass (*Lolium rigidum Gaudin*)  
Gregory Nye • Byrd Middle School • Henrico
- 04-1156 The Effect Of Different Types Of Medicine On Plant Growth  
Mary Perkins • Byrd Middle School • Henrico
- 04-1646 The Effect Of Artificial Light On The Growth Of A Great Northern Bean Plant  
Milena Petkov • Moody Middle School • Henrico
- 04-1208 The Effect Of Ultraviolet Light On *Spirogyra*  
Nitya Rao • Manchester Middle School • Chesterfield
- 04-1162 The Effect Of The Amount Of Water Received On The Height Of Fescue Grass  
Sarah Katie Thomas • Moody Middle School • Henrico

## Chemistry A

- 04-1145 The Effect Of Different Liquids On The Rate Of Oxidation  
Emma Buck • Moody Middle School • Henrico
- 04-1236 The Effect Of The Amount Of Rust On The Conductivity Of Steel  
Andrew Burks • Byrd Middle School • Henrico
- 04-1099 The Effect Of Water Temperature On Crystal Growth  
Truong Do • Moody Middle School • Henrico
- 04-1262 The Effect Of Temperature On The Growth Of Crystals  
Whitney Friend • Byrd Middle School • Henrico
- 04-1093 The Effect Of Different Densities Of Wood On The Rate At Which Wood Burns  
Daniel Gordon • Moody Middle School • Henrico
- 04-1406 The Effect Of Different Types Of Antacids On The pH Of Simulated Gastric Fluid  
Erik Haley • Moody Middle School • Henrico
- 04-1054 The Effects Of Saline Solution On The Corrosion Of Different Types Of Metals  
Gibson Haynes • Byrd Middle School • Henrico
- 04-1060 The Effect Of The Storage Location On The Useful Life Of Alkaline Batteries  
Luke Howard • Short Pump Middle School • Henrico
- 04-1356 The Effect Of The Brand Of Dishwashing Liquid On Its Cleaning Power  
Heather Jaros • Short Pump Middle School • Henrico
- 04-1430 The Effect Of Water Temperature On The Dissolving Time Of Effervescent Tablets  
Sydney Kastner • Moody Middle School • Henrico
- 04-1487 Does The pH Of Cosmetics Vary With The Cost Of Different Brands?  
Connor Kerr • Moody Middle School • Henrico

## Chemistry B

- 04-1189 The Effect Of Various Substances On The Weight Of An Apple After Decomposition  
Molly Luginbuhl • Byrd Middle School • Henrico
- 04-1090 The Effectiveness Of Various Household Materials On The Prevention Of Rust  
Manasa Muthu • Moody Middle School • Henrico
- 04-1454 The Effect Of Temperature On A Baseball's Height  
Rebecca Palmer • Moody Middle School • Henrico
- 04-1524 The Effect Of The Price Of A Battery On How Long A Flashlight Shines  
Matthew Raines • Stonewall Jackson Middle School • Hanover
- 04-1656 The Effect Of Various Flower Preservatives On Flower Freshness  
Virginia Rudd • Moody Middle School • Henrico
- 04-1495 The Effect Of Different Types Of Ice On Their Ability To Keep An Area Cold  
Jordan Salyers • Moody Middle School • Henrico
- 04-1460 The Effect Of A Sugar-Coated String Versus Uncoated String On The Formation Of Sugar Crystals  
Courtney Stephens • Moody Middle School • Henrico
- 04-1652 The Effect Of The Amount Of Grease Absorbed By Fried Chicken On Different Types Of Oils  
Courtney Strickland • Moody Middle School • Henrico
- 04-1241 The Effect Of Various pH Levels Of Acid On The Mass Of Marble  
Jessica Watkins • Byrd Middle School • Henrico
- 04-1649 The Effect Of The Amount Of Dye In A Piece Of Candy On Chromatography  
Amelia Wood • Moody Middle School • Henrico

## Earth & Space Sciences

- 04-1115 The Effect Of Soil From Different Regions In Virginia On The Rate Of Decomposition Of A Piece Of Paper  
Pritchett Aubrey • Byrd Middle School • Henrico
- 04-1146 Where Have All The Stars Gone? The Effect Of Light Pollution On The Night Sky  
Mary Kathryn Dickinson • Short Pump Middle School • Henrico
- 04-1311 The Effect Of The Velocity Of Marbles On Impact Craters In Sand  
Jennifer Giuffrida • Moody Middle School • Henrico
- 04-1238 The Effect Of Weather On pH Levels In A Lake  
Charles Hearn • Moody Middle School • Henrico
- 04-1240 The Effect Of Particle Size Of Soil On The Sample's Shear Strength  
Katie Hunold • Byrd Middle School • Henrico
- 04-1349 The Effect Of The Strength Of Underwater And Near-Shore Earthquakes On The Height Of Tsunamis  
Elyse Kimbriel • Manchester Middle School • Chesterfield
- 04-1317 The Effect Of Solar Storms On Earth's Magnetic Field  
Jessica Lofgren • Moody Middle School • Henrico
- 04-1192 The Effect Of Grain Size On Water Absorption  
Izabella Pinchuk • Byrd Middle School • Henrico
- 04-1139 The Effect Of Wind On The Amount Of Sand Build-Up  
Faith Walker • Byrd Middle School • Henrico
- 04-1459 The Filtering Abilities Of Soil  
Kathryn Yob • Moody Middle School • Henrico

## Engineering

- 04-1130 The Effect Of The Bridge Design On The Amount Of Mass Supported  
Katie Blow • Byrd Middle School • Henrico
- 04-1124 The Effect Of The Robot Gripper On The Length Of Time Taken To Move Three Objects  
Robert Brik • Byrd Middle School • Henrico
- 04-1492 The Effect Of Nozzle Shape On The Efficiency Of A Rocket Sled  
Bain Bronner • Moody Middle School • Henrico
- 04-1180 The Effect Of Bridge Type On The Amount Of Weight It Holds  
Steven Brown • Byrd Middle School • Henrico
- 04-1119 The Effect Of Venting A Container Of Vortex-Induced Water On The Time To Drain  
Emily Campbell • Byrd Middle School • Henrico
- 04-1619 The Effect Of Shape Of Structural Support On Weight Held By Support  
Brandon Kelley • Moody Middle School • Henrico
- 04-1464 The Effect Of Different Types Of Artificial Reefs On Preventing Erosion  
Mary Cate McCue • Moody Middle School • Henrico
- 04-1160 The Effect Of Wing Shape On Lift  
Carolyn Pelnik • Moody Middle School • Henrico
- 04-1265 The Effect Of Bridge Capacity On Design Choice  
Sara Williams • Byrd Middle School • Henrico
- 04-1179 The Effect Of Different Locations On Power Quality  
Seth Zhai • Moody Middle School • Henrico

## Environmental Science A

- 04-1479 The Effect of Packing Peanut Composition on Solubility in Water  
David Adkins • Manchester Middle School • Chesterfield
- 04-1203 The Effect Of pH On The Dissolving Of An Eggshell  
Farooq Ausma • Byrd Middle School • Henrico
- 04-1398 The Effect Of Vegetation Growth On Soil Erosion  
Marie Bertonneau • Moody Middle School • Henrico
- 04-1371 The Effect Of Acid Rain On The Growth Of Pond Plants  
Jessica Conratt-Eberlin • Moody Middle School • Henrico
- 04-1183 The Effect Of *Branta canadensis* Manure On Algae Blooms In The University Of Richmond Pond  
Natalie Davis • Moody Middle School • Henrico
- 04-1532 The Effect Of Root Growth On Cadmium Absorption Bu The Azolla Water Fern  
Leaf Elhai • Moody Middle School • Henrico
- 04-1708 The Effect Of Different Kinds Of Recycled Paper On The Amount Of Output Of Usable Writing Paper  
Virginia Essex • Moody Middle School • Henrico
- 04-1479 The Effect of Packing Peanut Composition on Solubility in Water  
David Adkins • Manchester Middle School • Chesterfield
- 04-1496 The Long-Term Effect Of Airplane Emissions On Soil Lead Levels  
Thomas Harless • Moody Middle School • Henrico

## Environmental Science B

- 04-1049 The Effect Of Weather Conditions On The Amount Of Pollution In The Form Of Airborne Particles  
Courtney King • Short Pump Middle School • Henrico
- 04-1176 The Effect Of Rapids And Wetlands On The Biodiversity Of A Heavily Urbanized Stream  
Kelly Lugbill • Moody Middle School • Henrico
- 04-1463 The Effect Of A Reservoir On Water Quality  
Emily Mathews • Moody Middle School • Henrico
- 04-1154 The Effect Of Plant Type On Soil Erosion  
Kendall Serpe • Byrd Middle School • Henrico
- 04-1293 The Effect Of Building Age On Water Quality  
Maura Stephens • Moody Middle School • Henrico
- 04-1114 The Effect Of Agricultural Practices On The Reduction Of Tomato Spotted Wilt Virus  
Burke Strang • Stonewall Jackson Middle School • Hanover
- 04-1359 The Effect Of Population Density On Nitrate Concentrations In Falling Creek  
David Woodward • Manchester Middle School • Chesterfield

## Medicine & Health

- 04-1647 The Effect Of Regular And Diet Soft Drinks On Teeth  
Bailey Britt • Moody Middle School • Henrico
- 04-1136 Astringent Analysis  
Devon Chenette • Millwood School • Private
- 04-1266 The Effect Of Different Sports Players On Lung Capacity  
Melissa Conner • Moody Middle School • Henrico
- 04-1475 The Effect Of The Amount Of Sugar Substitution On The Sheer Compressibility Of Cupcakes  
Arielle Efron • Byrd Middle School • Henrico
- 04-1185 The Effect Of Sleep Quantity On Blood Pressure  
Luke Gergoudis • Byrd Middle School • Henrico

- 04-1315 The Effect Of High Density Lipoprotein On Removing Cholesterol From Cells  
Shoma Ghosh • Short Pump Middle School • Henrico
- 04-1453 The Effect Of Herbs Versus Antacid Pills On Heartburn  
Michael Hoke • Moody Middle School • Henrico
- 04-1529 The Effect Of Sugar Content On Test Performance  
Suzi Lindquist • Moody Middle School • Henrico
- 04-1137 The Effect Of Age On Lung Function  
Sara Small • Byrd Middle School • Henrico
- 04-1118 The Effect Of Gender And Age On Resistance To Cold Pain  
Logan Smith • Byrd Middle School • Henrico
- 04-1184 The Effect Of Alcohol On B16F10 Cell Growth  
Yu Zhao • Byrd Middle School • Henrico

## Microbiology

- 04-1201 Battling Bacteria: The Effect Of Antiseptics On Germ Growth  
Corinne Hoogakker • Moody Middle School • Henrico
- 04-1073 The Effect Of The Different Kinds Of Food On Which Food Mold Grows The Fastest  
Olivia Jeffords • Short Pump Middle School • Henrico
- 04-1140 The Effect Of Time And Temperature On The Production Of Lactic Acid In Yogurt By *Streptococcus thermophilus* Microbe  
Suraj Mishra • Moody Middle School • Henrico
- 04-1432 The Effect Of Water Type On Bacterial Growth After Saliva Inoculation  
Elena Palesis • Moody Middle School • Henrico
- 04-1376 The Effect Of Different Brands Of Hand Sanitizer On Their Ability To Kill Aerobic Bacteria  
Lauren Taylor • Moody Middle School • Henrico

## Physics A

- 04-1330 The Effect Of Different Insulation Materials On How Fast A Piece Of Ice Melts  
Abigail Addison • Byrd Middle School • Henrico
- 04-1071 Most Absorbent Paper Towel  
Meliha Aljabar • Short Pump Middle School • Henrico
- 04-1190 The Effect Of The Distance A Magnet Is Dropped On The Mass Of The Iron Fillings It Attracted  
Chelsea Ambrose • Byrd Middle School • Henrico
- 04-1654 The Relation Of The Angle Of A Propeller Blade To The Force Produced  
Riley Arthur • Moody Middle School • Henrico
- 04-1121 The Effect Of Different Core Materials On The Strength Of An Electromagnet  
Jennifer Barker • Short Pump Middle School • Henrico
- 04-1442 The Effect Of Tire Pressure On Rolling Resistance Of 2 Bicycle Wheel  
Melissa Bearden • Moody Middle School • Henrico
- 04-1207 The Effect Of Temperature On The Viscosity Of Different Oils  
Jingnan Bu • Byrd Middle School • Henrico
- 04-1481 The Effect Of Molecular Bonding Type On The Conductivity Of Compounds In A Water Solution  
Emily Cothran • Moody Middle School • Henrico
- 04-1067 Deflection Connection  
Tyler Froelich • Short Pump Middle School • Henrico

## Physics B

- 04-1237 The Effect Of Heat On The Viscosity Of Ketchup  
Kaitlan Lawrence • Moody Middle School • Henrico
- 04-1092 The Effect Of The Length Of A Baton On Its Speed Of Rotation  
Allison Lehman • Moody Middle School • Henrico
- 04-1081 The Effect Of Color On Heat Absorption  
Jonathan Leibovic • Moody Middle School • Henrico
- 04-1197 The Effect Of Light Bulb Color On Temperature  
Malcolm McConnell • Moody Middle School • Henrico
- 04-1450 The Effect Of Reflective Material On The Heating Of Water In A Solar Cooker  
Bradford Miller • Byrd Middle School • Henrico
- 04-1128 The Effect Of Different Color Lighting On The Speed Of A Solar-Powered Car  
Patrick Oley • Byrd Middle School • Henrico
- 04-1866 The Effect Of Mutes On The Pitch Of A Note Played On A Trombone  
Anna Pecht • Liberty Middle School • Hanover
- 04-1068 The Effect Of Salt On A Liquid's Boiling Time  
Yifeng Qin • Short Pump Middle School • Henrico
- 04-1424 The Effect Of Different Types Of Apples On Their Ability To Conduct Electricity  
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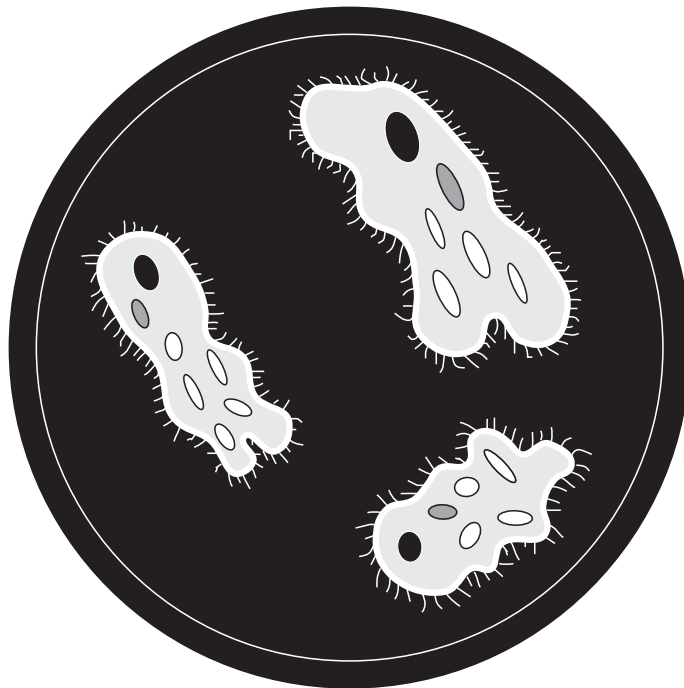
## Physics C

- 04-1325 The Effect Of Pressure Of A Size Five Soccer Ball On The Flight Distance  
Lindsey Rowe • Byrd Middle School • Henrico
- 04-1235 The Effect Of Different Surfaces On How High A Basketball Bounces  
Samay Sappal • Moody Middle School • Henrico
- 04-1048 The Effect Of Salt On The Melting Of Ice In Water  
Marcus Smith • Short Pump Middle School • Henrico
- 04-1029 The Effect Of Type Of Beverage On The Amount Of Stain On Eggshells  
Izumi Suzuki • Short Pump Middle School • Henrico
- 04-1329 The Effect Of Wing Shape On The Amount Of Lift Generated By A Wing  
Nathaniel Wallace • Byrd Middle School • Henrico
- 04-1488 The Effect Of Foot-Starting Position And Shoe Wear On Vertical Leap In Adolescent Dancers  
Rachel Wheeler • Moody Middle School • Henrico
- 04-1178 The Effect Of Type Of Thread On Amount Of Weight Held Before Breaking  
Ben White • Moody Middle School • Henrico
- 04-1333 Want A Lift? The Effect Of An Airfoil's Angle Of Attack On The Amount Of Lift Produced  
Ben Whitehouse • Manchester Middle School • Chesterfield
- 04-1131 The Effect Of Different Solutes On The Freezing Point Of Water  
Michelle Woo • Moody Middle School • Henrico

## Zoology

- 04-1261 The Effect Of Insecticides On Controlling Bagworms And How Long It Will Take  
Kimberly Cummings • Stonewall Jackson Middle School • Hanover
- 04-1483 The Effect Of Ginkgo On A Mouse's Memory  
Melanie Eldred • Byrd Middle School • Henrico
- 04-1177 The Effect Of Music On The Time A Mouse Goes Through A Maze  
Katherine Hopwood • Byrd Middle School • Henrico

- 04-1150 The Effect Of Different Types Of Food On The Activity Of Guppies  
Kristen Johnson • Stonewall Jackson Middle School • Hanover
- 04-1536 Calming The Beast: The Effect Of Grooming On A Horse's Pulse Rate  
Tyler Luck • Moody Middle School • Henrico
- 04-1323 The Effects Of Temperature On The Metabolism Of Madagascar Hissing Cockroaches  
Christina Mollenauer • Chickahominy Middle School • Hanover
- 04-1098 The Effect Of Sound On A Mouse's Ability To Learn A Maze  
Marian Neal • Moody Middle School • Henrico
- 04-1462 The Effect Of The Approach Of Winter On Bird's Preference To Fat Content In Their Food  
Anita Puerto • Moody Middle School • Henrico
- 04-1153 The Effect Of Exercise On The Intelligence Of A Dog  
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- 04-1455 The Effect Of The Key In Which A Song Is Played On The Ability Of A Student To Answer Simple Math Problems  
Mary Migliarese • Godwin High School • Henrico

## Behavioral & Social Sciences B

- 04-1595 The Effect Of The Addition Of Random Music Notes In A Song On The Brain's Ability To Recognize The Melody  
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Megan Wichser • Godwin High School • Henrico
- 04-1205 The Effect Of Different Time Signatures Of Background Music On Subjects' Performance On A Verbal Memory Test  
David Wise • Godwin High School • Henrico

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- 04-1257 Evidence For Differential Gene Expression Of Antifreeze Proteins Throughout The Life Cycle Of The Mealworm *Tenebrio molitor*  
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- 04-1808 The Effect Of Inducible Nitric Oxide Synthase Gene Silencing On Hypoxia Inducible-Factor 1 Alpha Levels In Human Endothelium  
Daniel Fisher • Lee-Davis High School • Hanover
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- 04-1316 The Effect Of Different Types Of Hair On Its Ability To Insulate Heat  
Richa Khanna • Godwin High School • Henrico
- 04-1863 The Effect Of Temperature On The Amount Of Vitamin C In Orange Juice  
Connor Miles • Hanover High School • Hanover
- 04-1622 The Effect Of Banana Ripeness On Amylase Activity  
Katie Peng • Math & Science High School at Clover Hill • Chesterfield
- 04-1500 The Effect Of Temperature Inversion On The Rate Of Diffusion Of A Nerve Cell  
Vanessa Remmers • Math & Science High School at Clover Hill • Chesterfield
- 04-1282 The Effect Of Different Concentrations Of Saline On Red Blood Cell Form  
Peter Zhao • Godwin High School • Henrico

## Botany A

- 04-1306 The Effect Of Various Dilutions Of Naphthalene Acetic Acid On The Phototropism Of Bean Plants  
Tiffanee Brown • Math & Science High School at Clover Hill • Chesterfield
- 04-1620 The Effect Of The Type Of Cool Season Grass Seed On Its Germination In Various Concentrations Of The Deicing Salt Sodium Chloride  
Kathryn Christian • Math & Science High School at Clover Hill • Chesterfield
- 04-1675 The Effect Of Caffeine On Plant Growth  
Tim Dietz • Math & Science High School at Clover Hill • Chesterfield
- 04-1627 The Effect Of Various Growth Environments On The Quality Of Lettuce Leaves  
Shannon Grosse • Math & Science High School at Clover Hill • Chesterfield
- 04-1655 The Effect Of Various Levels Of Salinity On The Height Of *Phaseolus lunatus*  
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- 04-1848 The Effect Of Different Substances On The Growth Of Chickweed  
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- 04-1739 The Effect Of Amount Of Magnesium In Growing Solution On The Level Of Chlorophyll Produced By Kale And Collard Plants  
Jennifer Joyce • Math & Science High School at Clover Hill • Chesterfield
- 04-1855 The Effect Of Electromagnetism On The Growth Of Duckweed  
Mani Kamineni • Godwin High School • Henrico
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Amanda Lee • Godwin High School • Henrico
- 04-1749 The Effects Of Magnetic Fields On Basil Plant Growth And Germination Speed  
Max McCall • Math & Science High School at Clover Hill • Chesterfield

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John Poma • Henrico High School • Henrico
- 04-1461 The Effect Of Nutrient Availability On The Ratios Of Leaf, Stem, And Root Mass In *Vigna radiata*  
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- 04-1436 The Effect Of Various Wavelengths Of Light On The Presence Of Peridinin In *Amphidinium carterae*  
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William Rimell • Math & Science High School at Clover Hill • Chesterfield
- 04-1141 The Effect Of The D-zeta Gene On The Water Conservation Of *Arabidopsis thaliana* In Different Soil Types  
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- 04-1575 Evaluating The Ability Of A Genetic Algorithm To Find An Optimal Investment Portfolio  
Jordan Wilson • Math & Science High School at Clover Hill • Chesterfield

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- 04-1800 The Effect Of Particle Size On The Wave They Produce  
Jonathan Davis • Math & Science High School at Clover Hill • Chesterfield
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- 04-1217 The Effect Of Different Annual Precipitation Extremes On The Average Annual Growth Of *Quercus alba*  
Lane Van Arsdale • Godwin High School • Henrico

## Engineering

- 04-1309 The Effect Of Exposure To Chloride Solution On Stress Corrosion Cracking In Different Metals  
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- 04-1571 The Effect Of Different Wing Lengths Of Glider On A Glider's Stability In A Wind Tunnel  
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- 04-1351 The Effect Of Fin Size On The Height A Model Rocket Reaches  
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- 04-1489 The Effect Of Wire Composition On The Strength Of An Electromagnet  
Omer Shahab • Math & Science High School at Clover Hill • Chesterfield
- 04-1308 Compression Testing Of Acid Rain-Resistant Concrete  
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- 04-1439 The Effect Of Varying Galvanic Corrosion Couples On Salinity Level  
Karli Younger • Godwin High School • Henrico

## Environmental Science A

- 04-1383 The Effect Of Various Water Purification Techniques On The pH Of Creek Water  
Danielle Casselton • Godwin High School • Henrico
- 04-1606 The Effect Of The Source Of Fuel On The Amount Of Carbon Produced  
Olivia Hallihan • Math & Science High School at Clover Hill • Chesterfield
- 04-1737 The Effect Of De-Icing Road Salts On The Height Of Lima Bean Plants  
Lindsey Harris • Patrick Henry High School • Hanover
- 04-1107 The Effect Of Corroding Metal On The Marine Environment  
Emily Hesaltine • Godwin High School • Henrico
- 04-1288 The Effect Of Polyacrylamide On The Growth Of Grass  
Ryan Kelley • Godwin High School • Henrico
- 04-1835 The Effect Of The Turbulence of Water On The Efficiency Of Petrolock  
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- 04-1321 The Effects Of The Hanover Courthouse Landfill On The Water Quality Of The Immediate Water Shed  
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- 04-1870 The Effect Of Sediment And Erosion Control Fencing On Controlling Erosion  
Roxanne Moore • Atlee High School • Hanover

## Environmental Science B

- 04-1786 The Effect Of Different Environments On The Rate Of Bioremediation By A Bacteria  
Cortney Newell • Godwin High School • Henrico
- 04-1337 What's In The Can?  
Holli Reeves • Godwin High School • Henrico
- 04-1142 Is Plan Columbia Worth It?  
Andrew Schukman • Godwin High School • Henrico
- 04-1626 The Effect Of Varying Types Of Degradation On The Diversity Of Macroinvertebrates With Dissolved Oxygen Levels As An Underlying Comparison  
Rachel Smith • Math & Science High School at Clover Hill • Chesterfield
- 04-1624 The Effect Of Old Coal Mines On The pH Of Surface Water  
Avinash Sridhar • Godwin High School • Henrico
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Matthew Walker • Godwin High School • Henrico
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- 04-1314 The Effect Of Different Bivalve Mollusk Shells On Their Ability To Neutralize A Low pH  
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## Mathematics

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- 04-1414 How To Say “Invest” In Any Language  
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- 04-1249 The Influence Of GNP Per Capita On The Prevalence Of Atopy In Developing  
And Developed Countries  
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Different Professional Sports Leagues  
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- 04-1216 Murphy’s Law: A Statistical Analysis Of The World’s Most Aggravating Occurrence  
Ilya Zlatkin • Godwin High School • Henrico

## Medicine & Health

- 04-1724 The Effect Of Different Liquids On The Concentration Of Urine  
Elliott Burris • Math & Science High School at Clover Hill • Chesterfield
- 04-1194 The Effect Of Lighting, Physical Encumbrances, And Visual Reference Points On Balance  
Jennifer Downs • Godwin High School • Henrico
- 04-1486 Insoles...Shocking  
Jordan Effron • Godwin High School • Henrico
- 04-1387 How To Kill West Nile Before It Kills You  
Masengo Kapanga • Godwin High School • Henrico
- 04-1803 The Effect Of Time Length Of Meditation Exercise On A Subject’s Pulse And Blood Pressure  
Anoop Kochar • Math & Science High School at Clover Hill • Chesterfield
- 04-1268 The Effect Of Different Types Of Fabrics On UV Protection  
Nikki Kumar • Math & Science High School at Clover Hill • Chesterfield
- 04-1849 The Role Of Bradykinin Receptors In The Delayed Myocardial Protection Elicited By  
Whole Body Hyperthermia  
Swati Mishra • Godwin High School • Henrico
- 04-1617 The Effect Of Playing A Musical Instrument On A Person’s Mean Blood Pressure  
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- 04-1864 An Association Study Of SNP rs27388 And rs27652 On Chromosome 5, 23q With Schizophrenia  
Sohini Sircar • Maggie Walker Governor’s School • Richmond
- 04-1865 Japanese Medaka As An Alternative Vertebrate Model Of Aging And Cancer  
Suravi Sircar • Godwin High School • Henrico

## Microbiology

- 04-1125 The Effect Of Ultraviolet Light On Yeast Fungus  
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- 04-1872 Comparison Of Resistant Hand Bacteria To Penicillins In Hospital Nurses And Sanitation Workers And Social Implications Of Bacterial Resistance  
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- 04-1304 The Effect Of Polyphenols On *Streptococcus mutans*  
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- 04-1281 The Effect Of Different Concentrations Of *Azadirachta indica* On The Growth Of Rhizopus  
Rahul Menon • Godwin High School • Henrico
- 04-1676 The Effects Of Different Compositions Of Carbohydrates On The Acceleration Of Fermentation In *Saccharomyces cerevisiae*  
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- 04-1610 The Effect Of Adaptation To A Lower Than Optimum pH On *Serratia marcescens*' Ability To Survive Under Oxidative Stress And At Higher Than Optimum Temperatures  
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- 04-1219 The Effect Of *Zingiber officinalis* And *Allium sativa* On *Escherichia coli* Bacterial Growth  
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## Physics

- 04-1821 The Estimation Of Speed Of Light Based On The Hot Spots In Chocolate  
Saira Ahmed • Math & Science High School at Clover Hill • Chesterfield
- 04-1744 The Effect Of Altering A Baseball Bat On The Speed At Which A Baseball Travels  
Matthew Brown • Math & Science High School at Clover Hill • Chesterfield
- 04-1587 The Effect Of Increasing Draw Weight Of A Bow On The Amount Of Energy Absorbed By The Arrow Fired  
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- 04-1516 The Effect Of Different Engines On Altitude Reached And Parachute Deployment  
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- 04-1200 If The Blade Is Of A Composite Hockey Stick, Then The Puck Will Travel Farther Than If The Blade Was Wood Or Plastic  
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Brian Hills • Godwin High School • Henrico
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- 04-1802 The Effect Of Blood Droplet Impact Angle And Surface Struck On The Size And Shape Of Bloodstains  
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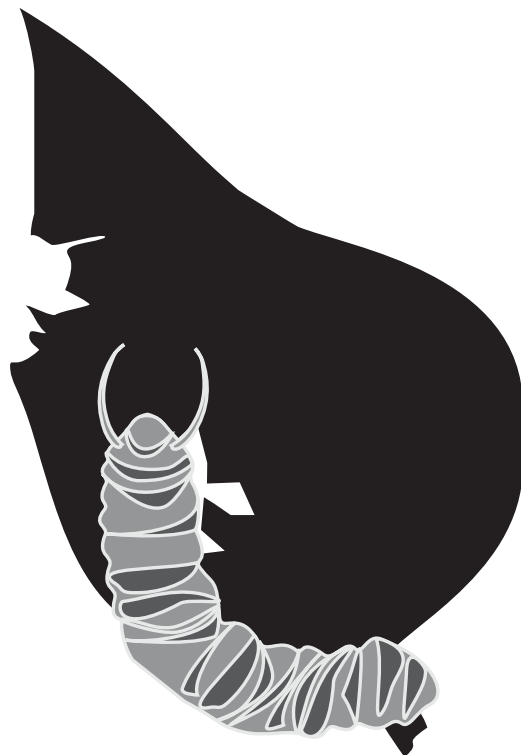
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- 04-1757 The Effect Of Varying Levels Of Capacitance On The Time It Takes For A Capacitor To Charge  
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- 04-1230 The Effect Of Different Brands Of High Energy Drinks On Taurine Spectrophotometric Absorbance  
Ben Sowers & Garreth Mitchell • Godwin High School • Henrico
- 04-1634 The Effect Of Insulated Clothing On Temperature Change  
Eric Welander & Jason Baumgartner • Deep Run High School • Henrico

## Senior Team Projects B

- 04-1787 The Effect Of Different Water Sources On Cloud Mass  
Meredith Howard & Kara Noble • Deep Run High School • Henrico
- 04-1599 The Effect Of Music On The Performance Level Of Fourth Graders On A Simple Timed Math Test  
Kendra Grinnage & Kate McGowan • Math & Science High School at Clover Hill • Chesterfield
- 04-1666 The Effect Of The Amount Of Salt On Water's Heat Retention  
Lauren Kowal & Kendall Meyer • Deep Run High School • Henrico
- 04-1704 How Clean Is Clean? The Effectiveness Of Cleaning Solutions On *Escherichia coli* Bacteria  
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- 04-1576 The Effect Of Hydration On Hardening Rate And Strength Of Concrete  
Esther Kraines & Meredith Carpenter • Math & Science High School at Clover Hill • Chesterfield
- 04-1279 The Effect Of Light Pollution Reduction Filters On Photographing The Ring Nebula  
Myles Glancy & Olga Sherman • Godwin High School • Henrico
- 04-1401 Alternative Treatments For Onychomycosis  
Steven Terner & Zhiyuan Xu • Godwin High School • Henrico

# Zoology

- 04-1274 The Effect Of Natural Materials On Imported Cabbageworms  
Michael Cao • Godwin High School • Henrico
- 04-1630 The Effect Of High Frequency Noises On The Development Of A Praying Mantis' Auditory Organ  
Anthony Hendricks • Godwin High School • Henrico
- 04-1753 The Effect Of *Ginkgo biloba* And Strattera On The Ability Of Mice To Learn A Maze  
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- 04-1233 Brain Food  
Christopher Lee • Godwin High School • Henrico
- 04-1547 The Effect Of Shape And Color Conditioning On Adaptive Fish Behavior  
Morgan Pierce • Henrico High School • Henrico
- 04-1727 The Effect Of Environmentally Safe Methods On The Reduction Of *Frankliniella occidentalis*  
Erin Strang • Lee-Davis High School • Hanover
- 04-1346 The Effect Of The Method Of Aeration On The Yield Of Hatching *Artemia salina* Cysts  
Loni Tang • Godwin High School • Henrico
- 04-1418 A Comparison Of Ethyl Alcohol And Cocaine At The Circadian Level  
Grace Wang • Godwin High School • Henrico
- 04-1384 The Effect Of Foreign Objects On Neophilia Or Neophobia In Domestic *Rattus norvegicus*  
Laura Wilson • Godwin High School • Henrico
- 04-1837 The Effect Of Light On A Mouse's Ability To Travel Through A Maze  
Victoria Wood • Henrico High School • Henrico



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