Atlanta Public Schools District & Regional
Science and Engineering Fair
2018 – 2019

     Scientific research is an exciting way to explore the surrounding world as well as solve real world problems. Scientific and engineering methods are necessary to adequately investigate these real world problems. The Atlanta Public Schools District & Regional Science and Engineering Fair will provide students in grades 3-12 the opportunity to develop experimental research for public presentation.

     The science fair guide is for teachers, students, and parents to assist in the development of student projects. Remember to have fun processing, experimenting, facilitating, and finding out answers to real world problems! For additional information, please go to:

http://science349.wixsite.com/gcsec/grades-k-5-competition

Important Dates

Atlanta Public Schools - District Science & Engineering Fair Timeline/Due Dates	
	Dates
Last Day to Submit Approval forms to your teacher	**October 15, 2018**
School Science and Engineering Fair – Projects Due	**November 30, 2018**
Atlanta District Science and Engineering Fair (for projects that progress from the school fair)	**January 23, 2019**
Georgia College K-5 State Science Fair (for projects that progress from the district fair)	**March 14, 2019**

Project Types and Components

Science Process Project
Define the Problem
Find a Purpose
Construct a hypothesis and identify variables
Write a research plan and complete necessary forms
Test hypothesis by conducting experiment(s)
Analyze Results
Draw a conclusion(s); Ask a new question

Engineering Process Project
Define the Problem
Find a Goal
Develop Design Criteria
Write a research plan and complete necessary forms
Build and test a prototype
Analyze Results
Draw a conclusion(s); Ask a new question

<u>Elementary Projects – Grades 3-5</u>

Elementary projects are required to have completed Forms 1, 2, 3, 4 and abstract. Form 3 approval date must be prior to experimentation. Projects using human subjects, animal subjects, and/or possible hazardous substances must submit forms to the district prior to experimentation for approval.

Required Forms

- All projects complete the following forms.
    - Form 1 Adult Sponsor Checklist   Form 2 Student Checklist
    - Form 3 Approval Form   Form 4 Risk Assessment   Abstract

# Student Display and Safety Regulations

Display:

Maximum Size of Project
- **Depth** (front to back): 30 inches or 76 centimeters
- **Width** (side to side): 48 inches or 122 centimeters
- **Height** (floor to top): 72 inches or 182 centimeters.

*Projects must be exhibited on the table top. No part of an exhibit may be placed on the floor or under the table.

A completed, unaltered Official GSEF Abstract must be displayed vertically on the front edge of the table.

ABSTRACT
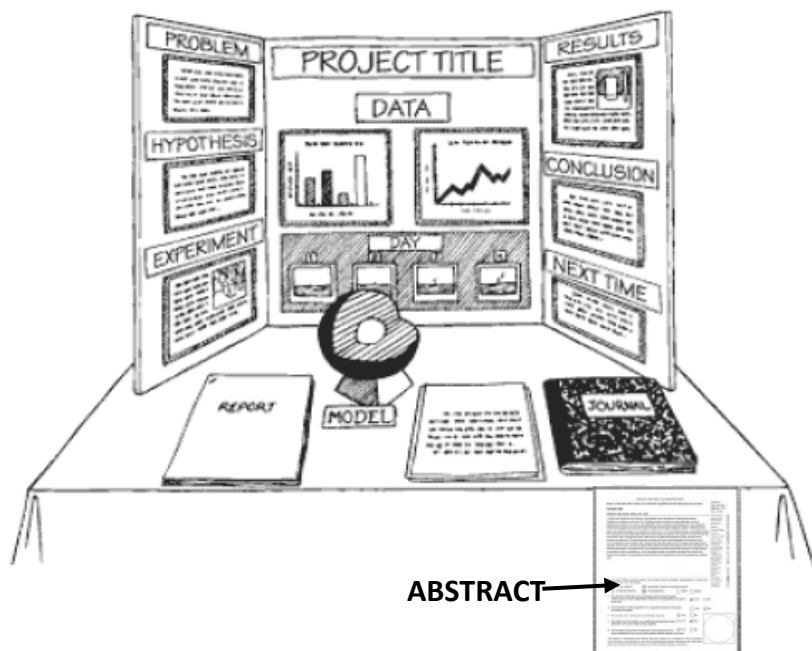
You must have your required forms in numeric order in a three-ring binder on the table:
1. Checklist for Adult Sponsor Form 1
2. Student Checklist Form 2
3. Research Plan/Project Summary
4. Approval Form 3
5. Research Paper (suggested)

* It is suggested that your logbook be displayed on the table but this is not required per ISEF.

Safety:

The following items *cannot* be displayed during the fair: awards, medals, business cards, flags, logos, CDs, DVDs, flash drive, brochures, booklets, pens, key chains, living organisms, soil, sand, rock, and/or waste samples, specimens and preserved animals.

Note: Georgia College K-5 State Science Fair Rules and Guidelines are located on https://tinyurl.com/y8c43uhy **.**

THE FOLLOWING ITEMS ARE <u>NOT ALLOWED</u> AT PROJECTS

NOT ALLOWED PER SAFETY REGULATIONS

- **Living or dead organisms**, including fungi, animals, plants and microorganisms

- **Taxidermy specimens, parts, pelts**

- **Preserved vertebrate or invertebrate animals** or animal parts, including cells

- Human or animal **food** of any kind

- Human or animal **parts or body fluids** (including bones, urine, bloodstains)

- **Plant materials** including potpourri, grain, birdseed, spices, leaves, flowers, logs, branches, etc. Plastic or other inorganic replicas or photographs should be used instead. (Exception: manufactured construction materials used in building the project or display)

- **Soil, sand, rock, minerals, or waste** samples, even if fully encased in acrylic

- **All chemicals**, including water.

- **All liquids, gels, powders, and creams**, such as shampoo, sunscreen, salt, soap, agar, etc.

- **Dry ice** or other sublimating solids

- **Hazardous substances or devices**, including poisons, drugs, firearms, weapons, martial arts weapons, ammunition, etc.

- **Sharp items**, including syringes, needles, pipettes, nails, knives

- **Flames or highly flammable materials**

- **Glass** or glass objects unless deemed by the Display & Safety Committee to be an integral and necessary part of the project (e.g., glass that is an integral part of a computer screen)

- **Hammering, pinching, or pounding devices** that are not fully immobilized, pulleys or hinges with pinch points, etc.

- **Batteries** with open-top cells**, Drones, or 3-D Printers**

- Any apparatus or item deemed unsafe by any member of the SRC, the Display & Safety committee, judges, or the GSEF staff (e.g., vacuum tubes or dangerous ray-generating devices, pressurized or empty tanks that previously contained combustibles, etc.)

NOT ALLOWED PER DISPLAY REGULATIONS

- **Acknowledgments**, endorsements, thanks.

- **Awards**, medals, flags, logos (including school and university logos).

- **Give-away items** such as flyers, pens, postcards, CDs, business cards, etc. You may give out unaltered copies of your Official Abstract Form.

- **Contact information** of any finalist or their school: email or postal address, social media address, QR code, telephone, business card, fax number, or contact URL (URLs used solely to cite the sources of photos are permitted).

- **Active Internet** or email connections.

- For Continuation projects, no prior years' written material or visual depictions on the display board. However, previous years' logbooks and binders may be on the table if desired and if clearly marked, e.g. "Year I." The project title should mention which year the project is, e.g., "Year Two".

Your abstract and research notebook must be displayed with your project. All other forms must be in a 3-ring binder and easily available for judges to review.

UNACCEPTABLE FOR DISPLAY
(where possible, use photos or drawings instead)
• NO RESEARCH INSTITUTION LOGOs ALLOWED
• No formal Project Summaries are allowed for distribution (only the Abstract may be distributed)
• All liquids, including water
• Human or animal food (ex. popcorn, M&Ms, etc.)
• Living organisms (including plants, fungi, and bacteria)
• Soil or waste samples, toxic waste samples
• Dried plant materials
• Taxidermy specimens or parts
• Preserved vertebrate or invertebrate animals or their parts
• Human/animal parts or body fluids (blood, urine)
• Laboratory/household chemicals
• Batteries with open-top cells
• Poisons, drugs, controlled substances, hazardous substances or devices (for example: firearms, weapons, ammunition, reloading devices, model rockets)
• Dry ice or other sublimating solids (solids that vaporize to a gas without passing through a liquid phase)
• Sharp items (for example: syringes, needles, pipettes, knives)
• Any flames, open or concealed, or highly flammable materials
• Gases or empty tanks that previously contained combustible liquids or gases, including butane and propane
• Awards, medals, business cards, flags, endorsements or acknowledgements from previous fairs.
• Photographs or other visual presentations depicting vertebrate animals in surgical techniques, dissections, necropsies, other lab techniques, improper handling methods, improper housing conditions, procedures, etc.
• Photographs of people other than student presenter(s) unless signed Form 4 is available.

2019 Georgia and Engineering Fair Rubric

Teachers and students in Georgia should consider the following judging criteria when planning to complete science fair projects. These guidelines are based on the Intel ISEF criteria. ISEF and GSEF offer a second set of criteria that may be applied to projects in engineering, mathematics and computer science. The judging process places special emphasis on the student's ability to discuss the project effectively during the oral interview. Other criteria include the originality, creativity, imagination, discovery, and inventiveness of the projects.

Displays serve two primary functions: 1) Communicate the research clearly when the student is not present, and 2) Promote in-depth discussions of the projects. Judges may examine the student notebook (three-ring binder), which are required to include ISEF Forms 1, 1A and 1B, the Research Proposal, any additional forms/permissions required by the specific research being conducted, and optional items such as a research paper.

Most Projects	*Engineering Projects* *(may be applied to some projects in mathematics and computer science)*
I. Research Question (10 pts.) • Clear and focused purpose • Identifies contribution to field of study • Testable using scientific methods	**I. Research Problem (10 pts.)** • Description of a practical need or problem to be solved • Definition of criteria for proposed solution • Explanation of constraints
II. Design and Methodology (15 pts.) • Well-designed plan and data collection methods • Variables and controls defined, appropriate and complete	**II. Design & Methodology (15 pts.)** • Exploration of alternatives to answer need or problem • Identification of a solution • Development of a prototype/model
III. Execution: Data Collection, Analysis & Interpretation (20 pts.) • Systematic data collection and analysis • Reproducibility of results • Appropriate application of mathematical and statistical methods • Sufficient data collected to support interpretation and conclusions	**III. Execution: Construction & Testing (20 pts.)** • Prototype demonstrates intended design • Prototype has been tested in multiple conditions/trials • Prototype demonstrates engineering skill and completeness

IV. Creativity (20 pts.)
- Project demonstrates significant creativity/originality/inventiveness in one or more of the above criteria

V. Presentation (35 pts.)

Poster (10 pts.)
- Logical organization of material
- Clarity of graphics and legends
- Supporting documentation well selected and displayed

Interview (25 pts.)
- Clear, concise, thoughtful responses to questions
- Understanding of basic science relevant to project
- Understanding of interpretation and limitations of results and conclusions
- Degree of independence in conducting project
- Recognition of potential impact in science, society and/or economics
- Quality of ideas for further research
- For team projects, contributions to and understanding of project by all members

science349.wixsite.com/gcsec/grades-k-5-competition

Project Categories and Subcategories

ANIMAL SCIENCES
- Animal Behavior
- Cellular Studies
- Development
- Ecology
- Genetics
- Nutrition & Growth
- Physiology
- Systematics & Evolution

BEHAVIORAL & SOCIAL SCIENCES
- Clinical and Developmental Psychology
- Cognitive Psychology
- Physiological Psychology
- Sociology & Social Psychology

BIOCHEMISTRY
- Analytical Biochemistry
- General Biochemistry
- Medicinal Biochemistry
- Structural Biochemistry

BIOMEDICAL & HEALTH SCIENCES
- Disease Diagnosis
- Disease Treatment
- Drug Development & Testing
- Epidemiology
- Nutrition
- Physiology & Pathology

BIOMEDICAL ENGINEERING
- Biomaterials & Regenerative Medicine
- Biomechanics
- Biomedical Devices
- Biomedical Imaging
- Cell and Tissue Engineering
- Synthetic Biology

CELLULAR & MOLECULAR BIOLOGY
- Cell Physiology
- Genetics
- Immunology
- Molecular Biology
- Neurobiology

CHEMISTRY (CH)
- Analytical Chemistry
- Computational Chemistry
- Environmental Chemistry
- Inorganic Chemistry
- Materials Chemistry
- Organic Chemistry
- Physical Chemistry

COMPUTATIONAL BIOLOGY & BIOINFORMATICS
- Biomedical Engineering
- Computational Pharmacology
- Computational Biomodeling
- Computational Evolutionary Biology
- Computational Neuroscience
- Genomics

EARTH & ENVIRONMENTAL SCIENCES
- Atmospheric Science
- Climate Science
- Environmental Effects on Ecosystems
- Geosciences
- Water Science

EMBEDDED SYSTEMS
- Circuits
- Internet of Things
- Microcontrollers
- Network & Data Communications
- Optics
- Sensors
- Signal Processing

ENERGY: CHEMICAL
- Alternative Fuels
- Computational Energy Science
- Fossil Fuel Energy
- Fuel Cells and Battery Development
- Microbial Fuel Cells
- Solar Materials

ENERGY: PHYSICAL
- Hydro Power
- Nuclear Power
- Solar
- Sustainable Design
- Thermal Power
- Wind

ENGINEERING MECHANICS
- Aerospace & Aeronautical Engineering
- Civil Engineering
- Computational Mechanics
- Control Theory
- Ground Vehicle Systems

- Industrial Engineering-Processing
- Mechanical Engineering
- Naval Systems

ENVIRONMENTAL ENGINEERING
- Bioremediation
- Land Reclamation
- Pollution Control
- Recycling, Waste Management
- Water Resources Management

MATERIALS SCIENCE
- Biomaterials
- Ceramics & Glasses
- Composite Materials
- Computation & Theory
- Electronic, Optical & Magnetic Materials

MATHEMATICS
- Algebra
- Analysis
- Combinatorics, Graph Theory, and Game Theory
- Geometry and Topology
- Number Theory
- Probability and Statistics

MICROBIOLOGY
- Antimicrobials & Antibiotics
- Applied Microbiology
- Bacteriology
- Environmental Microbiology
- Microbial Genetics
- Virology

PHYSICS AND ASTRONOMY (PH)
- Astronomy and Cosmology
- Atomic, Molecular, and Optical Physics
- Biological Physics
- Computational Physics & Astrophysics
- Condensed Matter & Materials
- Instrumentation
- Magnetics, Electromagnetics, & Plasmas
- Mechanics
- Nuclear & Particle Physics
- Optics, Lasers, Masers
- Quantum Computation
- Theoretical Physics

PLANT SCIENCES

- **Agronomy**
- **Development & Growth**
- **Ecology**
- **Genetics/Breeding**
- **Pathology**
- **Physiology**
- **Systematics & Evolution**

ROBOTICS & INTELLIGENT MACHINES

- **Biomechanics**
- **Cognitive Systems**
- **Control Theory**
- **Machine Learning**
- **Robot Kinematics**

SYSTEMS SOFTWARE

- **Algorithms**
- **Cyber Security**
- **Databases**
- **Operating Systems**
- **Programming Languages**

TRANSLATIONAL MEDICAL SCIENCE

- **Disease Detection and Diagnosis**
- **Disease Prevention**
- **Disease Treatment and Therapies**
- **Drug Identification and Testing**
- **Pre-Clinical Studies**

* *All Categories can include other as a subcategory