37th Georgia Junior Science & Humanities Symposium

The University of Georgia
March 4-6, 2012

Academic Special Programs
Tel. (706) 542-3537 / Email: oasp@georgiacenter.uga.edu
Applications available online - www.georgiacenter.uga.edu/oasp

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U.S. Army, Navy & Air Force Sponsored
National Junior Science and Humanities Symposium
Program Fact Sheet and Guidelines for Students

Important Dates

January 13, 2012	Extended Abstract, Research Paper, Student Application (with required signatures), and Project Information Sheet must be received by this date. Email documents using Microsoft Word to oasp@georgiacenter.uga.edu. Student Application may be scanned and emailed. Student Application and Project Information Sheet may be mailed, but must be received by January 13, 2012. * *See the rulebook for detailed information about how to submit your paperwork.*
February 10, 2012	Approximate date by which the list of selected students (presenters and observers) will be posted on the Symposium website at http://www.georgiacenter.uga.edu/oasp/Jr_science_human.phtml
March 4-6, 2012	Georgia Junior Science and Humanities Symposium, University of Georgia Center for Continuing Education, Athens, GA
May 2-6, 2012	50th National Junior Science and Humanities Symposium Bethesda, MD

Foreword

Each year over 12,000 talented high school students and their teachers participate in JSHS at each of forty-eight regional symposia held on university campuses nationwide by presenting the results of their scientific, engineering, or mathematics research. Progressing from the regional symposia, 240 student delegates advance to the National JSHS and may compete for significant military-sponsored scholarships and other awards.

The primary aims of JSHS are to promote original research and experimentation in the sciences, engineering, and mathematics at the high school level, and to publicly recognize students for outstanding achievement. By involving talented students and their teachers in affiliated symposia, and by recognizing students' research endeavors through scholarships and other awards, JSHS aims to encourage continued interest and participation in the sciences and ultimately to widen the pool of trained scientific and engineering talent prepared to conduct research and development vital to our nation.

Sponsorship

The Junior Science and Humanities Symposia (JSHS) Program has been sponsored by the United States Department of the Army since its inception in 1958, and additionally joined by the Departments of the

Navy and Air Force after 1995. Resulting from this sponsorship and the cooperative efforts of universities throughout the nation, JSHS encompasses forty-eight regional symposia reaching high schools throughout the United States, Puerto Rico, and in cooperation with the Department of Defense Schools of Europe and the Pacific, and the annual National JSHS.

The Academy of Applied Science, a non-profit educational organization in Concord, New Hampshire, administers the National JSHS Program in cooperation with universities or other educational institutions.

The Georgia Junior Science and Humanities Symposium (GJSHS) is administered by the University of Georgia's Office of Academic Special Programs. It is a program in which high school students present and defend original scientific research. Eighth grade students are invited to submit their work for selection in the Poster presentation category.

Objectives

Promote	research and experimentation in the sciences, mathematics and engineering at the high school level.
Recognize	the significance of research in human affairs, and the importance of humane and ethical principles in the application of research results.
Search out	talented youth and their teachers, recognize their accomplishments at symposia, and encourage their continued interest and participation in the sciences, mathematics and engineering.
Expand	the horizons of research oriented students by exposing them to opportunities in the academic, industrial and governmental communities.
Increase	the number of adults capable of conducting research and development.

The Symposium Features

At regional and national symposia students and their teachers may…

- Gain self-confidence not only through the experience of the research investigation but also through networking among participants of similar interests
- Participate in a forum honoring exceptional work and encouraging personal and academic growth.
- Participate in a student science poster session (observers selected and 8th graders)
- Participate in a scientific conference, take field trips, and have their work published.
- Opportunity for laboratory and/or campus visits
- Interact with practicing researchers who offer a look beyond high school to opportunities in post secondary education and to academic and career development in the sciences, engineering, and mathematics, and presentations by guest speakers
- Develop higher-order thinking skills and integrated learning across disciplines through the process of scientific inquiry, writing a scientific paper, and delivering a presentation
  --- all skills that will benefit future post secondary and graduate pursuits.

Awards

Significant awards are available to JSHS regional and national student finalists. University contributed scholarships or other awards are sponsored by many regional symposia. The availability of these additional awards, type of award, and value vary by region. The Departments of the Army, Navy, and Air Force jointly sponsor the following awards (subject to the availability and release of government funding):

For students who participate in regional and national symposia:

- Public recognition and certificates, honoring achievement and interest in research pursuits
- Attain a sense of achievement and self-confidence resulting from interaction with students from other schools and regions and with professional researchers and educators. To quote a former JSHS alumnus, [At JSHS] "I learned a tremendous amount of science, got to meet other high school students who shared my interests in science, and learned that I could succeed at any program that I chose to pursue."

For 48 teachers...

A $500 award to one teacher at each of the 48 regionals, honoring the individual teacher's and his or her school's contributions to advancing student participation in research

For the regional finalists...

- ***An expense-paid trip to the National JSHS***, awarded to five finalists at each regional symposium. The National brings together over 360 participants in a program of educational and scientific exchange.
- ***An invitation to present their original research investigation at the National JSHS***, awarded to two finalists at each regional symposium.
- ***A total $4,500 undergraduate, tuition scholarships***, awarded at $2000, $1500, and $1000 to each of three regional symposium finalists. (scholarship payable upon matriculation and upon meeting the JSHS scholarship conditions)

For the national finalists…

- ***Seven $12,000 undergraduate, tuition scholarships***, awarded to each of the 1st place finalists in the National research paper competition.

- ***Seven $8,000 undergraduate, tuition scholarships***, awarded to each of the 2nd place finalists in the National research paper competition.

- ***Seven $4,000 undergraduate, tuition scholarships***, awarded to each of the 3rd place finalists in the National research paper competition.

An expense-paid trip to the London International Youth Science Forum, an exchange program bringing together over 400 participants from 60 nations. The London trip is awarded to each of the 1st place finalists; the runner-ups are alternate winners.

How to Apply - The Regional Symposia

GJSHS invites the participation of all high school students who have completed an original research investigation in the sciences, engineering, or mathematics. All students in grades 8 -12, enrolled in a public, private, or home school within the area served by the Georgia JSHS regional symposium are eligible. Experimental research, field research, observational research, and applied research are eligible. While review or library research is a part of the research process, these investigations alone are not appropriate. (See www.jshs.org, Guidelines section, for additional descriptive reviews of the types of research.)

50 Georgia students in grades 9 - 12 are selected by science professionals to present their work in front of judges at the Georgia regional competition in Athens. ***Approximately 20 additional students** (8th graders are selected for poster presentations only) are invited to participate as observers and to present their science research in a poster presentation. Students are selected for competition based on submitted paperwork.

Students will:

(1) **Submit electronically** a written RESEARCH PAPER prepared in accordance with the Georgia Regional Symposium's guidelines;

(2) Deliver a concise oral presentation to the symposium;

(3) Complete registration and/or application materials; and

(4) Comply with regional and national rules and policies that apply to the preparation of the written reports and the oral presentations.

The electronically submitted written and oral reports should present the results of original research carried out by the student. Students are encouraged to obtain assistance from teachers, mentors, parents, or other students. How can students best demonstrate original work? Through oral and written research presentations made at JSHS, students report on their unique, innovative, and creative contributions to the research problem and their approach to undertaking the investigation. Students must also demonstrate their understanding of the scientific principles underlying the research problem.

Teachers

Approximately 10 teachers from Georgia are also selected to attend GJSHS as chaperone/sponsors based on applications submitted. An application must be received for teachers to be considered.

Expenses

All expenses for the hotel and meals (except Monday dinner) are covered for all participants (students and teachers) selected to attend, funded by the GJSHS Grant provided by the Sponsors. Travel & Monday Dinner expenses are the responsibility of the participant.

Required materials for entry

Must be received by January 13, 2012

A. **Extended Abstract** - Electronically submit in Microsoft Word one (1) copy (no longer than 1 typewritten page double spaced).

B. **Research Paper** - Electronically submit in Microsoft Word one (1) copy detailing the original scientific research done. Your name, address, and school information should be included on the title page. Work must be that of the student, not the mentor. **The maximum number of pages is twenty (20)** which includes:

   1. Title page
   2. Synopsis Abstract - 200 words
   3. Body of paper
   4. All illustrations, appendices

C. **Student Application and Project Information Sheet** – completed with the requested signatures to be considered for competition. Either fax, mail or scan and email.

The University of Georgia
Academic Special Programs
Attn: GJSHS
1197 S. Lumpkin Street
Athens, GA 30602-3603

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Email: oasp@georgiacenter.uga.edu

The Categorization Process

The organization of the sessions is based upon a review of all abstracts and the area of research suggested by the student. Each session will have professionals who represent that particular category. Student presenters must state on the abstract and application one of the categories listed below.

- Chemistry (including chemistry-physical, organic, inorganic; earth science-geochemistry; materials science, alternative fuels)
- Engineering; technology (including renewable energies, robotics)
- Environmental science (pollution and impact upon ecosystems, environmental management, bioremediation, climatology, weather)
- Life sciences (general biology—animal sciences, plant sciences, ecology; cellular and molecular biology, genetics, immunology, biochemistry)
- Mathematics and Computer science/computer engineering; applied mathematics-theoretical computer science
- Medicine and Health; Behavioral and Social Sciences
- Physical Sciences – physics; computational astronomy; theoretical mathematics

Preparing an Extended Abstract

Extended Abstracts and Papers are due in the Office of Academic Special Programs by **January 13, 2012**. **No exceptions will be made to this deadline**. Entries not received by the deadline will not be considered. The Extended Abstract must **NOT** exceed one double-spaced typed page in 12-point font size.

Extended Abstracts are prepared to serve either or both of the following purposes:

(a) To enable the reader to decide whether this topic is of sufficient interest to warrant taking the time to read the entire paper or to go hear the presentation.

(b) To acquaint the reader with recent research results in a concise manner.

Extended Abstract Instructions: *Please read carefully before preparing your Extended Abstract.*

1. An Extended Abstract is an extended **summary** of the research written in narrative (story) form. It is not merely a general description about the research.
2. The following elements should be included and written in narrative form without subtitles:

   a) The **title** should be brief and descriptive.

   b) The **statement of the problem** tells the reader what specific questions are addressed in the study. The variables and limitations are identified. The intent and objectives of the research effort are made explicit in this statement.

   c) The **purpose** states the usefulness of the study. It answers the question as to why the project was undertaken.

   d) The **hypothesis** is an educated guess that shows the relationship between a set of observed facts and a theory. The hypothesis limits the scope of the investigation and unifies the research design. **Please note that engineering, math, computer science and sometimes physics projects don't have a hypothesis**.

   e) The **procedure** provides a brief summary of what was done.

   f) The **conclusions** provide a concise statement of the outcomes of the investigation. They should be written in non-technical language and be related directly to the hypothesis. The conclusions should identify unsolved aspects of the original problem or any new problems identified.

   There is no "standard" or required arrangement for the parts of an abstract (suggestion of a format is listed above). Its statements may be in any sequence that enables the most information to be conveyed in the fewest words. Its sequence can be, and frequently is, totally different from that of the paper. A good abstract usually must be drafted and re-drafted ---- eliminating, adding, rearranging the words. Financial sponsorship mentioned in the paper must be concisely credited in the abstract: "Research supported by . . " *Note: This is different from science fair rules.*

Research Paper

A paper describing your research is required of all applicants and must be **electronically** submitted along with your extended abstract and application by **January 13, 2012**. The research paper will be used to select participants and again during the judging process. Keep a copy of all of your papers.

- Must use 12 point font.
- Research papers should be written in third person.
- Your research paper will be used to break ties.
- Please refer to the suggested format. The paper should be a minimum of 5-6 pages and a maximum of 20 pages, including appendices. Any paper longer than the maximum of 20 pages will be disqualified.
- Photography may not be used in the electronic research paper. Photography may be used in the oral presentations. Graphs, tables, diagrams, charts, or other graphic representation should be simple to facilitate the judges' on-line access to the research paper

Suggested Format for the Research Paper

Cover Page: The cover page must contain the title of the research, category student's name, school, and school address. Make sure your title is concise but also descriptive. Only one of the electronic copies should include the student's name, sponsor, and school address. These should be removed from the electronic version that will be sent to the readers/judges.

Synopsis - Abstract: Write a concise 200 word or less summary of your research. Include: Title, purpose, problem, hypothesis, results, and conclusions in narrative form. Please note: This is included in the paper and is not separate. Your "Extended Abstract" is a separate document.

Table of Contents: List the topics and sub-topics in order and the page numbers on which they start (i.e., this would be page 3). Add to the table of contents, a list of all graphs, tables, and other representative figures. These should have a title and page number.

Introduction: Write the introduction to provide background, details, or the setting of your specific research problem. Assume that the reader will be scientifically literate, but he or she may not be familiar with the details. First in the introduction, state the purpose of the research study. Secondly, state the hypotheses that you are testing. Describe what is already known about the research.

Materials, methods, and procedures: State the materials, methods or procedures used to conduct the research in a step-by-step manner. This section should be written specifically enough so that the research could be replicated.

Results (Data or Findings): Present the results of your research finding in logical order. Use graphs, tables, and/or other representation. Tables and graphs should be numbered separately and include captions. Numbering will enable you to refer to them in text quite easily. Explain in text the important features of each table, graph, etc. Report the results of statistical analyses of your data and the type of statistical test used.

Discussion and Conclusions: In this section interpret your results. First, restate the hypotheses, and explain how the data either supported or rejected the initial research questions. Discuss your research findings in relationship to what is already known about the research problem (reported in the introduction

section). Draw conclusions based upon your research findings. The conclusions can include relevant, subjective observations or comments, but do state that these are speculation.

Acknowledge any limitations which affect the research results. For example, what further experiments need to be performed? Statistical techniques used to manipulate the data may have limitations. Some of the treatment effect might have been caused by a random, uncontrolled intervening variable. Again, acknowledge these limitations and other factors over which the researcher had no control, and state how these might have influenced the study outcomes.

Literature cited: This is a list of citations for every article cited in your text. Endnotes are needed for all direct quotations and for all-important statements of facts or opinions that are taken from written sources. Figures, dates, descriptions of situations, scientific data, opinion, representations and the like which are presented to advance the subject of the paper need a stated source. Check with your teacher or other advisors if you need further assistance in the format for endnotes.

Appendices*:* In some cases, you may wish to include large tables of raw data in your report. You should include such items in an appendix at the very end of your research report. Label and paginate your appendices.

Acknowledgment of major assistance: Include a statement on where and when the research was done and acknowledge those who assisted you with the study.

Helpful Hints for Abstracts and Papers

- Use past tense and third person in describing completed research and present tense when stating existing facts and what is in the paper.
- Incorrect spelling and sentence structure will discourage interest in your project.
- Assume that the reader has a good general technical vocabulary but try to avoid use of highly-specialized words or abbreviations.
- In an abstract, if reference to procedure is essential, try to restrict it to identification of method or type of process employed. In the research paper, discuss the details of procedures and equipment.
- State results, conclusions, or findings in a clear, concise fashion.
- Have your teachers read your abstract and paper to make sure it communicates well.
- Use the Judging Criteria to see that all parts of your abstract and your paper are present.

References for Abstracts and Research Papers

1. Kathryn, Geese & Rezba, Students and Research (ISBN 0-8403-7766-5)
2. Matthews, Bowen & Matthews, Successful Scientific Writing (ISBN 0-521-55948-0).
3. Rezba, Sprague, Fiel, Funk, Learning and Assessing Science Process Skills (ISBN 0-8403-8430-0).

Oral Presentation

If you are selected as a PRESENTER for the Georgia Junior Science & Humanities Symposium, you will prepare an oral presentation of your science research. For this presentation, you may use slides, overhead transparencies, or a computer-projected presentation, such as with *PowerPoint* or other presentation software.

Session timing :

The research presentation may not exceed 12 minutes, followed by a maximum 5-minute question period. A session moderator will aid the student speaker in maintaining this schedule and in fielding questions from the audience. The procedure for maintaining the time includes a 10-minute signal for the student. At the 12-minute point, the student speaker must stop the presentation even if he or she has not finished. Following the presentation, the session moderator will ask for judges questions. The speaker should repeat a question before answering so the audience may understand the entire dialogue. The speaker may entertain questions if time permits from the audience while the exchange appears interesting and relevant. Questions intended to harass the student speakers will not be allowed by the session moderator.

Computer Usage :

A LCD projector will be in each room.

If using computers, students must…

a. Provide their own computer equipment.
b. Convert illustrations and other graphical representations into PowerPoint slides or 2x2 slides for presentation during the symposium.
c. Save the PowerPoint presentation to an IBM-compatible CD, and use the CD on their PC-based computer and LCD systems.
d. Prepare for any equipment problems by bringing back-up overheads or slides.
e. Start computer equipment that may be brought to the symposium prior to the designated presentation time. No additional presentation time will be allowed to cue up a presentation.

If using videos, students must comply with the following ground rules…

- The video component cannot make up more than two (2) minutes of the presentation.
- No audio or background music is permitted other than sounds that are an integral part of the research.
- Recorded or mechanically produced narration is not permitted. Narration must come from the speaker.
- Videos (and audio, if any) may be used only for those aspects of the presentation that cannot adequately be presented by slides or overheads. Video material presented must be an integral part of the research and should not be a substitute for presentation of data. Videos must not be used for presentation of common procedures, illustrating equipment or showing laboratory facilities. Videos should illustrate work that was done and should not be used for stimulation or aesthetic value.

Available equipment:

Use of Audio Visuals - Available equipment. Available audio-visual equipment in each session at the GJSHS includes: (1) overhead projector; (2) LCD projector; (3) projection screen. Slide projectors will be provided on a request basis. Students should bring their own laptop computer for use during their presentation. Equipment operators will not be available in each session. Students may enlist the help of a teacher or fellow student, especially when using overhead projectors. Students should number visuals in sequence so an assisting operator or the presenter can easily reshow one. Many times, visuals are re-shown during the questioning period.

Aids to the presentation:

No written handouts are permitted. Research apparatus may be used if it is integral to the presentation and **only if the apparatus is hand-held.** Software such as PowerPoint may be used to prepare or drive slides or overheads.

Tips for Oral Presentations

Source: Pacific Symposium for Science and Sustainability and Hawaii Junior Science & Humanities Symposium. Symposium Handbook, June 28, 2002. http://www.hawaii.edu/acadsci. Accessed July 2007.

Communicating Research Results
Tips for Preparing and Making Oral Presentations

Sidney B. Westly, Senior Editor
Program on Population, East-West Center

It's useful to think of an oral presentation as a cross between a written report and a newspaper article. An oral presentation should give the most important information first, leaving the details for last (in case the audience is asleep by then). This format is called an "inverted (or upside down) pyramid." A presentation should tell a story, keeping in mind the journalist's check-list — "Who? What? When? Where? and Why?"

Who is your audience?
The only measure of a good presentation is the reaction of the audience. Will they manage to stay awake during your presentation? Two days later, will they remember anything you said? Will they be convinced? Find out as much as you can about your audience, think carefully about their needs and preferences, and tailor your presentation to them as precisely as you can. Are they already interested in your topic? This determines what and how much you have to say to introduce your research. What do they already know about your topic and what is their general level of scientific/technical expertise? What are their attitudes/preconceptions about your topic: will they go along with whatever you say, or will you have to convince them to change their minds? What sources do they listen to: do you quote an article from Nature or from the New York Times? What state are they likely to be in: are you the last speaker on a long day's program? Do they understand English easily?

What do you want to say?
Two rules apply: (1) Your audience determines what you say and how you say it, and (2) You shouldn't say very much. Imagine you're meeting a typical member of your audience who happens to be an old friend. You sit down over lunch to tell her about your research. An outline might look something like this:

1. My research in a nutshell. Why I did it, what I did, and what I found out... all in about six sentences.

2. Why this research? What was the problem? Why was it important? What other work has been done? If another researcher or two has done important work on your problem or your methodology, you should acknowledge them.

3. Here's what I found out.

4. And here's why it's important. Want a quick trick to detect whether you've dropped out of story-telling mode?

Look for sentences in the passive voice: "The sequence of amino acids 1-7 was obtained from a partial cDNA clone."

Remember: a presentation is talking, not writing. No one talks like this.

How do you prepare?
There are three key ingredients for making a good presentation: preparation, preparation, preparation.

For starters, you must know your material thoroughly, which means knowing a lot more than you actually present. Think of your presentation as the tip of an iceberg: the submerged part of the iceberg, which is the much larger part, as everything you leave out. The better you know your material, the more relaxed and confident you will feel in front of a group.

Many good speakers write their notes on 4x6" index cards. Put one line of your outline at the top of each card, and then jot down everything you want to say in that section of your talk. If you're having trouble thinking of a good beginning, start in the middle or the end, perhaps by telling about your methods or conclusions.
Now try speaking one or two sections out loud. How long did it take? For the Symposium, you will have 10 or 15 minutes to present your research. Here's a hint: a 15-minute presentation is equivalent to about six typed pages doubled spaced; a 10-minute presentation is equivalent to about four pages. Not very much, is it? Just the tip of the iceberg.

This is not to suggest that you should type your presentation out word for word. Rather, you should write it as notes, or cues, on those index cards, just to remind yourself of the points you want to talk about.

After practicing out loud, cross out what you didn't have time for. Leave your cards overnight and then go through them again. You'll probably think of new and better ways to get your points across, a more logical sequence for your ideas, even important points you forgot. Make a new set of cards (buy a big package, you'll probably go through a lot of sets).

Try your speech out on a teacher or friend. You're so close to your subject that you might go on and on (boring!) or leave something important out (confusing!) that another person can easily spot. Be prepared to cut, cut, cut.

Preparing your audiovisuals
You will want a maximum of one overhead per minute of your talk. For a 15-minute presentation of experimental research, your overheads might be as follows: (1) title/author, (2-3) key points (equivalent to an abstract; putting the most important information first); (4-5) background and importance of problem (introduction), (6-9) what you did (methods and materials), (10-13) what you found out (results) and (14-15) importance of your findings (discussion).

To give your presentation a polished, professional look, you should prepare all your overheads in the same style: same type fonts, same spacing, same use of color. Text should be at least 28 points in size (one-half cm high). Titles should be larger. Follow the 6 x 6 rule: a maximum of six lines per overhead and six words per line. Think in terms of a title followed by a bulleted list. Use short, active phrases only, not complete sentences— the complete story is what you say, the overhead is just for emphasis.

Each chart should make one simple point. You may use line charts for continuous data (such as time-series), but bar charts are more dramatic. Even scatter charts can tell a dramatic story: Are all points on a curve except for two outliers? Are the points all over the chart with no pattern at all? Use a maximum of four lines per line chart (three is better), six bars per bar chart (four is better). Keep labels to the minimum necessary, and keep all your charts in two dimensions (no cute, but misleading, perspective effects).

Charts are better than tables; but, if you must use a table, the 6 x 6 rule applies: A maximum of six columns and six rows. This includes the column and row with labels, so you have five columns and five rows for data.

Now you're up there

You will feel a lot more relaxed and confident in front of your audience if you figure out the logistics of your presentation before hand. Arrive early and check the podium where you will be standing (Where should you put your speaker cards?). Check the facilities for showing your overheads (Will someone else help you? Try to practice ahead of time. Where will your overheads be stacked before they are presented…and afterwards?) (Hint: You may need to go back to an overhead during the question period so don't just drop them in a heap when they come off the projector.) Check the microphone. (Hint: Be sure to wear clothes with a lapel or patch pocket in case the auditorium has clip-on microphones.)

When you come up to the podium to begin your speech, take your time. Take a few good, deep breaths, look out at the audience, and find some smiling, friendly faces. Look into their eyes and let their smiles encourage you. Tell them about your project as you would to a friend over lunch.

Then they ask questions

After your presentation, the audience will have 5 or 10 minutes to ask questions. This may be the most important part of your presentation, and you should prepare for the question-and-answer period just as thoroughly as you prepare for your talk.

Have some extra points ready to bring up at this time—some of the material you cut from your speech, such as problems you encountered and how you solved them, or additional items you didn't have time to mention. You may even bring up further implications from your work and ideas as to what you would like to do next. To present additional results, have one or two extra overheads ready to show.

Above all, take your time (remember to breathe!) and don't let the questions fluster you. If someone asks a question straight from outer space, buy yourself some time while you think of a response: "That's a very interesting question. As I understand it, you are asking… [restate their question in your own words]."

Practice making a smooth transition from their question to one of the good answers you have prepared: "I don't know the answer to your question, but a related issue that we encountered was…" or "I'm so glad you asked about the methods we used for handling our cultures because we actually tried a second nutrient system and got some rather interesting results. As you can see from this slide, which I didn't have time to show you during my talk…" or "That's a really good question. Perhaps we can come up with an answer in the next stage of our work."

Remember, you're not expected to know all the answers. Don't be afraid to learn something from your audience. Above all, try to convey a sense of excitement about your work. If you can do this, your audience may just surprise you and stay awake.

Suggestions

Remember, you are the expert. No one in the audience knows as much about your research investigation as you. Therefore, remember to explain your research in enough detail so the audience will understand what you did, how you did it, and what you learned. Whenever possible, avoid jargon or unnecessary terminology. If it is essential to use specialized terms, remember to explain the specialized term briefly. Give your audience enough time to understand what you are trying to convey.

Graphs, tables and other representation help explain your results.
Keep them simple and uncluttered. Focus on important information; for example, remember to name the variables on both axes of a graph, and state the significance of the position and shape of the graph line. Deliver your presentation at a comfortable pace. It helps to practice your presentation before a non-specialized audience.

Practice will help perfect the presentation and the timing. Do listen to the advice of your non-specialized audience but also get help from a teacher or other advisors as needed.

The Georgia Junior Science and Humanities Symposium (GJSHS) is modeled after the National Junior Science and Humanities Symposium (NJSHS). The purpose of the research presentations at the GJSHS is to afford selected students the opportunity and experience of reporting their research and experimentation to an assemblage of their peers, teachers, and other symposium attendees, and to allow judges to select those presentations that merit special recognition.

Poster Presentation

If you are selected as an **OBSERVER** for the Georgia Junior Science & Humanities Symposium, you will be ***required to prepare a poster of your science research*** for competition.

1. The poster must be limited in size to 24 inches by 36 inches and must be light enough to hang on a wall using poster adhesive.

2. Each poster presentation should show the complete scientific process of your work along with final results presented by use of graphs, charts and/or illustrations. Observers are required to attend all Symposium presentations and all other scheduled events.

3. If the research was a **team project** and one team member has been selected as a presenter, the other member(s) may or may not be selected to attend the symposium. If selected they are not allowed to participate in the poster contest. They will be required to attend the activities that their team member attends.

4. **NOTE: Your team member may or may not be invited to come to the Symposium based on space availability. If they are invited to participate in the events, it will be as an observer(s) only.**

Judging

Student research presentations will be organized in concurrent sessions by discipline. Military-sponsored scholarships and other awards will be made to 1st place finalists and runner-up finalists from each of six (6) final sessions. Each of the 1st place finalists will be invited to participate in the London International Youth Science Forum.

At the State/Regional symposia, the first round of judging will occur when the students' written reports are reviewed by a scientist or expert in the field. Resulting from this review, selected students are invited to orally deliver their research before the State/Regional Symposium. Selected presentations will represent the finest efforts of high school students in the state or region toward either original laboratory research, field research, or applied research. Judging of the oral presentations on Monday will be used to select approximately12 students for the run-off on Tuesday. The selection of the student delegates who will advance to the National JSHS will be chosen from the 12 finalists.

In the evaluation of the presentations, judges should keep in mind that a key element of the GJSHS program is the intellectual development of the individual student as an experimenter and researcher. The student presentation should clearly demonstrate in its quality and content that it is an appropriate example for the major objectives of the U.S. Army, Navy and Air Force Research Offices NJSHS Program.

Judging criteria

Regional and national judges evaluate the oral presentations using the below criteria. National judges will use a total score of 30 points for each of the six criteria with each criteria weighted on a scale from 1 to 5. The scores are tallied for each presenter and used as the basis for discussion among judging team members where each criterion is considered.

- Statement and identification of research problem
- Scientific or engineering thought; Creativity and originality
- Research or engineering design, procedures, results
- Discussion/conclusions
- Skill in communicating the research results -- Oral presentation and written reports
- Acknowledgement of sources and major assistance received

The Georgia JSHS Judging Team and Process

The Georgia JSHS Judging Team includes individuals 1) who hold either a Ph.D. or equivalent experience, or 2) who are actively engaged in research. Judges will have experience in the general fields of research that are represented by the Georgia JSHS student presenters. Specialized experience in each field delivered at the Georgia JSHS may not be represented by each and every one of the judges. Therefore, student presenters are reminded of their responsibility to communicate their results so that they may be understood by both the non-specialized audience and by the judges. Judges are selected also for their interest in encouraging the students' interests and future development in the sciences, engineering, or mathematics.

The judges review the Georgia student presentations as follows...

- All of the written reports (e.g. abstract and paper) are read. The paper is used as supporting documentation during the judging process.
- The oral presentations are evaluated by each member of the assigned session judging team.
- The questioning period which follows the oral presentations aids judges in clarifying the student's depth of understanding, the amount of work and level of effort, and the individual contributions to the research problem.
- Following the sessions, the individual session judging teams meet and deliberate to select finalists from each session.
- Judges utilize the "National JSHS Judges Score Sheet" as a tool and consider the weight of each factor during their deliberations.

The Georgia JSHS Office, Academy of Applied Science; and the Judging Panel recognize the enormous effort that students undertake in conducting their research. Therefore, our objective is to ensure an equitable competition by selecting qualified judges and by communicating the rules of competition to both students and judges. We realize that in any competition of this nature, differences of opinion about the judges interpretations may occur. **It is the policy of the sponsors of the JSHS Program (e.g. the Army, Navy, and Air Force) to support the interpretations and final decisions of the judges panel.**

Scholarship Eligibility

• Students must be a citizen or permanent resident of the United States or U.S. territory to be eligible for the government-sponsored scholarship awards.

• Regional symposia directors are responsible for monitoring citizenship status of student applicants. Foreign nationals may present their research at the regional symposium level for recognition of excellence and may be eligible to attend the National symposium. However, students not meeting the above citizenship requirement may not be eligible for further competition at the National symposium and for the government-sponsored scholarship awards.

• The total scholarship awards available through JSHS are capped at a maximum total of $30,000 per individual student winner.

• Scholarships are awarded to only one student. Student presenters who are part of a team must notify the JSHS of which student finalist will receive scholarship funding should the team presentation earn regional or national awards.

Scholarship Conditions

Student scholarship recipients must…

• Demonstrate full-time enrollment as an undergraduate student at an accredited institution;

• Pursue an undergraduate degree in a science, technology, engineering or mathematics discipline, as defined by the National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council in their combined directory titled Organization and Members;

• Maintain at least a B (3.0) equivalent grade average;

Team projects

Students may present a report on work done as part of a class project, or as a science fair project or summer research project. However, students should report on their individual contributions to research. If students are part of a larger group, the presentation should focus on the individual contributions in the larger research project and properly acknowledge the contributions of other students, mentors, and/or teachers. For team research that cannot be divided into individual presentations, a team leader should be selected to present the results of the group work. In this case, all JSHS directives applying to individual research investigations will apply to group research investigations. In the event the group presenter of the winning regional group is unable to present at the National level, this opportunity will be passed on to the next ranking project. This decision is made since the judges' evaluations and scores pertain to the individual presenter.

Research involving non-human vertebrates or human subjects

Research involving non-human vertebrates or human subjects must be conducted under the supervision of an experienced teacher or researcher and follow state and federal regulatory guidance applicable to the humane and ethical conduct of such research. This must be acknowledged in the students' **electronically submitted written report.**

Sample Extended Abstract: *Your extended abstract must be on one page, double-spaced and at least 12 point font size. Submit one (1) with name and school information and one (1) copy without name and school information on a CD. All copies should include Title and Scientific Field (Category).*

What occurs during germination in lima beans (Phaseolus lunatus, L.)?
BIOCHEMISTRY

The process of germination is a complex series of events beginning with the emergence of the root and stem. During this period, messenger RNA (mRNA) which has been stored during the dormant stage of the seed becomes active and new proteins are made for the new structures that arise from the seed. This project has progressed through several stages and has demonstrated that the lima bean must take up at least two and one-half times its weight in order for germination to successfully occur. The seed does not require all of its stored food reserves and germination will occur if an entire cotyledon is removed provided the embryo is not damaged. In studies to determine what goes on inside of the seed, several studies have been done at different time periods during germination. Changes in proteins can be seen at different times using denaturing and non-denaturing polyacrylamide gel electrophoresis. Most of the RNA's present in a seed is ribosomal which is what is expected in cells where there might be a lot of protein synthesis. Using magnetic beads with poly-T tails attached to them, it was possible to separate mRNA from the total RNA and see some differences at different time periods. Recent work has focused on cloning complementary DNA's (cDNAs) made from mRNA of dormant seeds (HRC) and from seeds at the end of one hour of germination (HR1). Dormant seeds are dry seeds and are considered the controls in which genes are not active and protein synthesis is not occurring. cDNAs have been cloned into the bacterial plasmid pGEM-3Z. When cDNAs are inserted into this plasmid the LACZ gene is inactivated and bacterial colonies containing them are white. When there is no insert, the LACZ gene produces a protein which can use XGAL and IPTG to form a blue pigment and those bacterial colonies are blue. Colonies have been isolated which have inserts. These inserts are being used to hybridize to RNA from HRC and HR1 to determine if there is a difference in the expression of the mRNAs during these periods. My results already show that one protein known as actin and which is an abundant protein in eukaryotes might be slightly more in HRC than HR1. If this is true, after repeating the experiment it might mean that actin mRNA is being used up a little faster than it is being made in early seed development. This project should find several cDNAs which will be good to determine the nucleotide sequence of and then find out what the gene is using a computer search. The goal of this work is to find out more about what goes on during germination when the seed forms a root and stem from stored food reserves.

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Burnham, Gayle, Georgia Junior Science and Humanities Symposium Guidelines

Hundreds of volunteers, including teachers, mentors, university faculty, representatives of the Army, Navy,
Air Force, and others contribute their time and talent to JSHS and
the encouragement of science among the nation’s best and brightest secondary school students.

If we can be of assistance, please contact the Georgia Junior Science and Humanities Symposium Director at Karen.Shetterley@georgiacenter.uga.edu or the National JSHS Director.