College of Science and Technology
TEMPLE UNIVERSITY

City of Philadelphia

US 2020

STEMcityPHL

Greater Philadelphia Regional Junior Science and Humanities Symposium (JSHS)

2019

STUDENT PARTICIPATION GUIDE

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ABOUT JSHS

JSHS is designed to challenge and engage students in science, technology, engineering or mathematics (STEM) fields. Individual high school students compete for scholarships and recognition by presenting the results of their original research efforts before a panel of judges and an audience of their peers. At nationals, opportunities for hands-on workshops, panel discussions, career exploration, research lab visits and networking are planned. By participating in regional and national symposia, students may...

- Participate in a forum honoring individual achievement in STEM;
- Qualify for undergraduate, tuition scholarships and a fully funded trip to the national JSHS symposium;
- Network to enrich understanding of STEM pursuits beyond high school;
- Advance in regional and national symposia
- Develop skills to help prepare for undergraduate and graduate pursuits -- skills in the application of science content to solve a problem or to gain new knowledge, writing a paper, and communicating results.

JSHS is a collaborative effort with the research arm of the Department of Defense and administered in cooperation with nationwide colleges and universities. JSHS aims to prepare and support students to contribute as future scientists and engineers -- conducting STEM research on behalf of or directly for the Department of Defense, the Federal research laboratories, or for the greater good in advancing the nation's scientific and technological progress.

CATEGORIES OF COMPETITION

Student presenters must state on the abstract the major discipline and the sub-discipline of their research. The eight major disciplines students may choose from are below in **bold**. The sub-disciplines are in parenthesis.

- **Chemistry** (alternative fuels, chemical engineering, earth science – geochemistry, energy – alternative fuels, materials, material science, organic chemistry, physical chemistry)
- **Engineering and Technology** (aerodynamics, aerospace, devices, electrical engineering, energy – solar, mechanical engineering, robotics, vehicle development)
- **Environmental Science** (biology, bioremediation, chemistry, ecosystems management, environmental engineering, impact upon ecosystem, land resource management, pollution, toxicity)
- **Life Sciences** (animal science, biochemistry, developmental biology, general biology, general biochemistry, genetics, microbiology, plant science, plant biology, plant physiology, population genetics, systematic, virology)
- **Math and Computer Science; Computer Engineering** (probability and statistics, math – theoretical and/or applied, computer science – algorithms, databases, computer science – networking, computer engineering)
- **Biomedical Sciences; Molecular/cellular** (Biomedical medicine, microbiology, genetics, immunology, pharmacology, virology)
- **Medicine & Health/Behavioral;** (behavioral sciences, bioengineering, biochemistry, disease diagnosis and treatment, epidemiology, genetics, immunology, metabolism, neuroscience, pathology, physiology)
- **Physics and Astronomy; Theoretical Math** (acoustics, astronomy, computational astronomy, nuclear, optics, physics, physics – particle physics, physics – solid state, physics – theoretical, quantum physics, thermodynamics)

ABSTRACT

PURPOSE:

A good abstract is written to summarize the research paper. The abstract should accurately convey the essential nature of the research conducted and the most significant conclusions reached. A further purpose of the abstract is to attract the interest and curiosity of the non-specialist reader and thus encourage exchange, discussion, and elaboration between various authors, as well as between authors and readers.

GUIDELINES:

- The abstract should be a maximum of 200 words
- The format for the abstract includes 1 inch margins, keyed in 12 point font (Times or Times New Roman)
- The header preceding the abstract text includes:
    - Title of the research
    - Competition categories: Major discipline and sub-discipline
    - Your name
    - Name or your high school, high school city, and state
    - Name of your teacher/sponsor/mentor and his or her organization. Preceding this person's name with a subheading (i.e., teacher mentor, sponsor:)
    - Include one line of space between the heading and body of the abstract

JUDGING CRITERIA:

The judges will evaluate the abstract based on the abstract guidelines, provided above. The abstract is with worth 10% of the total score.

RESEARCH PAPER

PURPOSE:

Research results can be presented in a variety of ways, but one of the most popular – and effective – presentation forms is a research paper. The research paper is more than just a regurgitation of facts or an explanation of a topic; a research paper must give a perspective or make an argument using evidence. Ideas in a research paper are organized in a linear, understandable format in order to communicate effectively, and thus further the field in which it is written.

GUIDELINES:

- The paper should be a minimum of 6 pages and a maximum of 20 pages, double spaced, including all sections and appendices.
- Photography, graphs, tables, diagrams, charts, or other graphic representation presented in the paper must be simply presented and comply with the maximum file size limit of 1.8 Mb.
- Graphs, tables, diagrams, charts, or other graphic representation should be simple to allow the judges online access to the research paper. They should also be used appropriately.
- The paper should clearly communicate results to a non-specialized audience.
- The entire paper should be written in past tense.
- Use excellent grammar.
- Use 1 inch margins with Times or Times New Roman and a 12 point font.
- Include definition of terms, as necessary.
- A maximum size limit for the electronic research paper is 1.8 Mb.

SECTIONS:

I. Title Page

The title page should include the student's name, school address, and title of the research. A strong title succinctly describes the contents of the paper using key words.

II. Acknowledgement of major assistance received

You should acknowledge the assistance of those who helped with your study, specifically collaborators, in-kind and monetary donations, mentors, principal investigators, and affiliated organizations.

III. Ethical Statement

If applicable, include the statement: "Research involving non-human vertebrates or human subjects was conducted under the supervision of an experienced teacher or

researcher and followed state and federal regulatory guidance applicable to the human and ethical conduct of such research."

IV. Table of contents

Create a table of contents that reflects the sections of your paper.

V. Introduction

The introduction should include a literature review on the topic being investigated. This background information should lead to the identification of a clearly stated problem, and should consist of citations from reliable sources. The importance of this problem should be made clear so that the reader is engaged and understands why he/she should pay attention to your work. The introduction should include your hypothesis.

VII. Materials and Methods

After reading this section, the reader should be able to replicate your experiment without having clarifying questions about your procedure. Identify the variables, specifically the control, independent, and dependent variables. Be sure to include specific details about your methodology and the materials/equipment. Make an argument about why the procedure you used is appropriate, and (if applicable) make an argument for why your procedure is an improvement over procedures used by other researchers.

In addition to the previous paragraph, students performing experiments in fields related to engineering, computer science, and technology should: Recognize the economic feasibility of their solution, recognize the relationship between design and end product, test for performance under conditions of use, and provide a workable solution that is acceptable to a potential user.

VIII. Results

This section is simple a report of the data; it is not an analysis of the data. You may wish to use tables, figures, and graphs to visually display your data and/or show an observation (such as a trend). These should be numbered, include a brief caption, and be explained in the body of the paper.

IX. Discussion and Conclusions

In this section, you should clearly state the logical conclusion that is relevant to your research problems and the results of your experiment. Be sure to show evidence that you have a deep understanding of the scientific and/or technological principles associated with your research. Recognize and the limits of your experiment, the significance of your results, and the theoretical or practical implications.

X. References

Cite sources using APA format. Plagiarism will result in disqualification of your paper.

XI. Appendices

You may wish to include blank surveys, questionnaires, computer code, or other materials that you used for your research.

JUDGING CRITERIA:

Judges will evaluate the research papers according to the section guidelines above. The research paper is worth 90% of the total score.

Judging Criteria	**Suggested Weight**
Statement and identification of research problem • Is the problem clearly stated? • Does the presenter demonstrate understanding of existing knowledge about the research problem?	1 2 3 4 5
Scientific thought, creativity/originality • Student demonstrates his or her individual contributions to and understanding of the research problem • Appropriate duration of collection and data analysis • Innovation of Original Concept and Scientific Thought/Process - Standard Protocol/Design - Innovative Protocol/Design	1 2 3 4 5
Research design, procedures (materials & methods), results 1. Science • Appropriateness of research design and procedures • Process skills demonstrated by the student in the solution to the research problem and/or the research design • Identification and control of variables • Reproducibility 2. Engineering, computer science, technology • Workable solution that is acceptable to a potential user • Recognition of economic feasibility of solution • Recognition of relationship between design and end product • Tested for performance under conditions of use • Results offer an improvement over previous alternatives	1 2 3 4 5
Discussion/Conclusions • Clarity in stating conclusion • Logical conclusion that is relevant to the research problem and the results of experimentation or testing • Recognizes limits and significance of results • Evidence of student's understanding of the scientific or	1 2 3 4 5

technological principles • Theoretical or practical implications recognized • What was learned?	
Skill in communicating research results-- Oral Presentation and written report • Clarity in communicating research results to non-specialized audience and to judges • Definition of terms as necessary • Appropriate use of audio-visuals • Response to questions from audience and judges	1 2 3 4 5
Includes References/Bibliography and major assistance received	1 2 3 4 5
TOTAL SCORE	

NEXT STEPS

For the most up-to-date JSHS timeline, visit **stemcityphl.org/jshs/timeline-of-events/**

1. Visit stemcityphl.org/jshs for further details on any topic covered in this guide.
2. Begin your research **as soon as possible**. We recommend reaching out to a teacher at your school for additional support.
3. Students who have requested a mentor will receive their mentor's contact information by mid-December. Maintain regular contact with your mentor to gain insight on the direction of your paper.
4. If you are available, meet with your mentor at one (or more) of our designated Mentor/Mentee Meet-Ups in January and February.
5. Revise your research paper with a teacher and/or mentor
6. Submit your final research paper.
7. We will be in contact with you once your research paper has been reviewed. Regional finalists will be notified in late February and be given instructions on how to prepare for their oral presentation.

Please contact STEMcityPHL, the STEM Team in the Department of Commerce for any questions or concerns:

215-683-2121 or stemcityphl@gmail.com

For more information on the Greater Philadelphia Regional JSHS, visit stemcityphl.org/jshs. For more information on the National JSHS, visit jshs.org.

Special thanks to our partner:

Temple University College of Science and Technology