BIOTECHNOLOGY DESIGN

OVERVIEW

Participants select a contemporary biotechnology problem that relates to the current year's published area of focus and demonstrate understanding of it through documented research, the development of a solution, a display, and an effective multimedia presentation. A model or prototype of the solution must be included in the display. Participants may choose to recreate or simulate research that previously has been performed within the scientific community.

The topic for the current school year will be posted on the TSA website under Competitions/Themes and Problems.

☑ Biotechnology is defined as "any technique that uses living organisms, or parts of organisms, to make or modify products, improve plants or animals, or to develop microorganisms for specific purposes." from *Standards for Technological Literacy*, ITEEA/ITEA, p.149.

PURPOSE

Participants are encouraged to explore and gain an understanding of an area of biotechnology—a field of biology that involves the use of living things in engineering, technology, medicine, etc.

ELIGIBILITY

A. Participants are limited to three (3) teams per state, two to six (2-6) members per team.

B. The semifinalist presentation is given by two (2) members of the team.

TIME LIMITS

A. Entries must be started and completed during the current school year.

B. Semifinalists are given up to ten (10) minutes to give a presentation, which is followed with a few minutes for questions from evaluators.

ATTIRE

Competition attire, as described in National TSA Dress Code (www.tsaweb.org/Dress-Code), is required for this event.

PROCEDURE

A. Team members select and research a contemporary biotechnology issue related to the current year's designated area of focus. Resources may include, but are not limited to, books, interviews, websites, magazines, professional journals, etc. Team members then prepare their documentation, display, and multimedia presentation according to the regulations below.

B. Participants check in their entries at the time and place stated in the conference program. No more than two (2) team members set up the display.

C. Entries are reviewed by evaluators. Neither students nor advisors are present at this time. A semifinalist list in random order is posted.

D. Two (2) representatives from each semifinalist team, with their multimedia presentation, report to the event area at the time and place stated in the conference program.

E. Semifinalist team representatives give a brief presentation and answer questions from evaluators. Up to ten (10) minutes will be provided for the presentation, with a few minutes more for questions from evaluators.

F. No more than two (2) team members pick up their entry from the display area at the time and place stated in the conference program.

It is essential that students and advisors routinely check the TSA website (www.tsaweb.org) for updated information about TSA general rules and competitive events. This information is found on the website under Competitions/Updates and Clarification. When students participate in any TSA competitive event, they are responsible for knowing of updates, changes, or clarification related to that event.

☑ Read the General Rules and Regulations in the front of this guide for information that applies to all of TSA's competitive events.

REGULATIONS

A. All work must be completed during the current school year.

B. Students must understand the fundamental concepts and principles of the contemporary biotechnology issue the team has selected. Research should focus on significant impacts (opportunities *and* risks) on the environment, economy, and society, as well as any important ethical considerations.

C. Documentation materials (comprising "a portfolio") are required and should be placed and secured in a clear front report cover. The report cover must include the following single-sided, 8½" x 11" pages, in this order:

1. Title page with the title of the project/problem, event title, the conference city and state, and the year; one (1) page
2. Table of contents; pages as needed
3. Definition and explanation of the problem; one (1) page
4. An explanation of the chosen solution, and other possible solutions and why they were rejected; maximum three (3) pages
5. A scenario of possible real-life applications; one (1) page
6. Supplementary information such as logs, graphs, sketches, drawings, illustrations, photographs, etc.; maximum four (4) pages
7. A print-out of the accompanying multimedia presentation (printed with three [3] slides per page, recommended); pages as needed
8. Plan of Work log that indicates preparation for the event, as noted by date, task, time involved, team member responsible, and comments (see Plan of Work log); one (1) page
9. References and resources (a minimum of three [3], e.g., books, interviews, professional journals, websites, magazines); all MUST be cited using Modern Language Association (MLA) style; pages as needed
10. A CD or DVD of the team's multimedia presentation. The CD/DVD and the multimedia presentation become the property of TSA.

☑ Don't forget! Your documentation must not include any identifying information beyond your conference ID number.

D. Display guidelines are as follows:

1. The size of the display may not exceed 15" deep x 3' wide x 4' high.
2. A model or prototype is required.
3. AC electricity may not be used. Dry cell or photo-voltaic cells may be used for power, if desired. Any power source used must fit within the maximum display area.
4. If operating instructions are necessary, they must be clearly displayed.
5. **No harmful or illegal substances, viruses, live plants, or animals may be used as a part of the display. No potentially dangerous processes may be demonstrated or included as part of the display.**

E. Each team must be prepared to send two (2) representatives to a semifinalist interview in which the representatives give a brief multimedia presentation. The presentation explains the team's

selection of the problem and its solution and is not to exceed ten (10) minutes. Evaluators then ask questions.

F. The two (2) semifinalist team representatives MUST bring a laptop computer to show their multimedia presentation. Projection equipment will not be permitted. Only power will be provided.

EVALUATION

Evaluation is based on the documentation, the display, and the presentation/interview (semifinalists only). For more specific information, please refer to the official rating form.

STEM INTEGRATION

This event aligns with the STEM educational standards noted below. Please refer to the STEM Integration section of this guide for more information.

Science, Technology, Engineering, Mathematics

COMMON CORE STATE STANDARDS (CCSS) INTEGRATION

Please refer to the Common Core State Standards (CCSS) Integration section of this guide for more information.

PRIMARY LEADERSHIP SKILLS

Leadership skills promoted in this event:

- CRITICAL THINKING — Students analyze biotechnology problems. Suggested leadership lessons: *Critical Thinking Tips* and *Put Yourself in Their Shoes*
- PROBLEM SOLVING — Students will choose a problem and develop a solution. Suggested leadership lessons: *Debate It* and *Lend a Hand*
- COMMUNICATION — Students communicate within a group and to an audience. Suggested leadership lessons: *Listening Skills* and *Promote It.*

Additional leadership skills promoted in this event: creative thinking, decision making, evaluation, ethics, organization, teamwork

TSA AND CAREERS

This competition connects to one or more of the career areas featured in the TSA AND CAREERS section of this guide. Use *The 16 Career Clusters* chart and the *TSA Competitions and The 16 Career Clusters* grid as resources for information about careers.

CAREERS RELATED TO THIS EVENT

Bioinformatics processor
Food scientist
Microbiologist
Radiographer
Quality control analyst

TECHNOLOGY STUDENT ASSOCIATION PLAN OF WORK

Date	Task	Time involved	Team member responsible	Comments
1				
2				
3				
4				
5				
6				

Advisor signature _____

BIOTECHNOLOGY DESIGN
EVENT COORDINATOR INSTRUCTIONS

PERSONNEL

A. Event coordinator

B. Assistants for check-in, two (2)

C. Evaluators for displays, two (2) or more

D. Evaluators for semifinalist interviews, two (2) or more

MATERIALS

A. Coordinator's notebook, containing:
   1. Event guidelines, one (1) copy for the coordinator and for each evaluator
   2. Official rating forms
   3. List of entries with finalist report
   4. List of evaluators/assistants
   5. Stick-on labels for numbering entries
   6. Marking pens for evaluators
   7. Semifinalist list for posting
   8. Results envelope

B. Tape measure for evaluators

C. One (1) calculator for each evaluator

D. Stopwatch

E. Display tables for entries (minimum width 18")

F. Table and chairs for evaluators and two (2) semifinalist team representatives

G. A 50' extension cord AND a power strip (for semifinalist interviews)

RESPONSIBILITIES

A. Upon arrival at the conference, report to the CRC room and check the contents of the coordinator's notebook. Review the event guidelines and check to see that enough evaluators/assistants have been scheduled.

B. Inspect the area in which the displays are being placed for appropriate set-up, including appropriate number and size of tables.

C. Check in the entries at the time stated in the conference program. Anyone reporting who is not on the entry list may check in only after official notification is received from the CRC chairperson. Late entries are considered on a case-by-case basis and only when the lateness is caused by events beyond the participant's control. Requirements for attire do NOT apply during check-in.

D. Place an entry number in the lower right-hand corner of each portfolio and display. Position entries for evaluation and viewing. Secure the entries in the designated area.

E. Meet with your evaluators to review time limits, procedures, and regulations. If questions arise that cannot be answered, speak to the event manager before the event begins.

F. Evaluators independently assess the entries.

G. For participants who violate the rules, the decision either to deduct 20% of the total possible points or to disqualify the entry must be discussed and verified with the evaluators, event coordinator, and a CRC manager; all must initial either of these actions on the rating form.

H. Evaluators average their scores to determine the twelve (12) semifinalists.

I. Prepare a list of the twelve (12) semifinalists in random order and submit it to the CRC chairperson for posting.

J. Inspect the area in which the presentations are to take place. Ensure that there is a table and seating for the interviews.

K. Meet with your semifinalist evaluators to review time limits, procedures, and regulations. If questions arise that cannot be answered, speak to the event manager before the event begins.

L. Conduct semifinalist presentations/interviews using the same official rating forms used by the first set of evaluators. Evaluators should be sure to ask questions.

M. Evaluators average their scores to determine the ranking of the ten (10) finalists. Evaluators discuss and break any ties.

N. Complete and submit the finalist report, which includes a ranking of the ten (10) finalists, and all related forms in the results envelope to the CRC room.

O. If necessary, manage security and the removal of materials from the event area.

Participant/Team ID# _____

BIOTECHNOLOGY DESIGN

2015 & 2016 OFFICIAL RATING FORM — HIGH SCHOOL

Documentation (50 points)

CRITERIA	Minimal performance 1-4 points	Adequate performance 5-8 points	Exemplary performance 9-10 points	Record scores in the column spaces below.
Evaluators: Using minimal (1-4 points), adequate (5-8 points) or exemplary (9-10 points) performance levels as a guideline, record the scores earned for the event criteria in the column spaces to the far right. The X1 or X2 notation in the criteria column is a multiplier factor for determining the points earned. (Example: an "adequate" score of 7 for an X1 criterion = 7 points; an "adequate" score of 7 for an X2 criterion = 14 points.)				
Portfolio components See Regulation C (X1)	The portfolio is unorganized and/or is missing three or more components.	The portfolio is missing two components, and/or it is loosely organized.	The portfolio has one or no components missing and is clearly well organized.	
Definition and explanation of problem and solution (X1)	The definition and explanation of the problem and/or the solutions to the problem are unclear; major grammatical errors are evident.	The definition and explanation of the problem, and/or the solutions to the problem are overgeneralized and/or not concise; some grammatical errors are present.	The definition and explanation of solutions to the problem are clear and concise, with few or no grammatical errors.	
Research base (X1)	The research is inadequate and/or very few credible sources are cited.	The research is conducted appropriately, with some credible sources cited.	There is a comprehensive research base with fully credible sources cited.	
Supporting graphics and materials (X1)	The graphics and supporting materials do not clarify the documentation, and/or they do not relate to the problem, and/or they may not be properly cited (MLA format).	The graphics and supporting materials are appropriate, properly cited (if needed), and supplement the documentation by providing clarity to the problem.	The graphics and supporting materials are of excellent quality; graphics clearly clarify abstract concepts and, if not original, are properly cited.	
Quality and effectiveness (X1)	The work is sloppy and disorganized, as if thrown together.	The work is mostly organized and of sufficient quality.	The work is well organized and of exceptional quality.	
			SUBTOTAL (50 points)	

Display (40 points)

CRITERIA	Minimal performance 1-4 points	Adequate performance 5-8 points	Exemplary performance 9-10 points	
Communication of problem (X1)	The problem is difficult to understand as communicated and is presented in an illogical manner.	The problem is communicated, and thoughts are somewhat organized and/or concise.	The problem is communicated in an organized, clear, and concise manner.	
Communication of solution (X1)	The solution is difficult to understand as communicated and is presented in an illogical manner.	The solution is communicated, and thoughts are somewhat organized and/or concise.	The solution is communicated in an organized, clear, and concise manner.	
Creativity (X1)	The work lacks creativity, with little or no integration of design principles.	Some creative elements are included, and essential design principles and elements are used somewhat effectively.	The work exudes creativity, and essential design principles and elements are integrated.	
Aesthetics and artisanship (X1)	The work is unorganized and sloppy, and the display seems to be an afterthought.	The work is organized, with essential design principles given in a logical format.	The work reflects an exemplary use of layout and design principles to logically communicate important data.	
			SUBTOTAL (40 points)	

BIOTECHNOLOGY DESIGN (continued)

Rules violations (a deduction of 20% of the total possible points) must be initialed by the evaluator, coordinator, and manager of the event. Record the deduction in the space to the far right.

Indicate the rule violated: _____

Semifinalist Presentation/Interview (60 points)			
CRITERIA	Minimal performance 1-4 points	Adequate performance 5-8 points	Exemplary performance 9-10 points
Organization (X1)	The team is unorganized in its presentation and seems unprepared for the interview.	The team is prepared for the interview, and the presentation is somewhat organized.	The team's presentation and interview are logical and well organized.
Knowledge (X2)	Team members seem to have little understanding of the concepts in their project and provide vague answers to the interview questions.	Team members have a generalized understanding of the concepts discussed and answer most questions well.	It is clear that team members have an equally thorough understanding of the concepts discussed; they answer questions expertly.
Articulation (of the project) (X1)	The presentation/interview is full of illogical thoughts that lack understanding and clarity.	For the most part, the presentation/interview is logical and/or easy to understand and follow.	There is a clear, logical explanation of the topic, and pertinent issues are provided.
Delivery (X1)	The team provides verbose and illogical interview responses that include many "uhs, ums, hmms," etc.	The team provides logical and well-spoken interview responses with few "uhs, ums, hmms," etc.	The team is well spoken and gives clear, logical interview responses, with no or very few "uhs, ums, hmms," etc.
Team participation (X1)	Only one team member communicates with the evaluators.	Team members participate somewhat equally and generally seem to understand the concepts.	Team members seem to fully understand the concepts and share an equal role in the presentation/interview.
			SUBTOTAL (60 points)

Rules violations (a deduction of 20% of the total possible points) must be initialed by the evaluator, coordinator, and manager of the event. Record the deduction in the space to the far right.

Indicate the rule violated: _____

(To arrive at TOTAL score, add any subtotals and subtract rules violation points, as necessary. Check your math twice!) **TOTAL (150 points)**

Comments:

I certify these results to be true and accurate to the best of my knowledge.

Evaluator

Printed name: _____ Signature: _____