



**Pennsylvania Academic Standards
Relating To The
Technology Student Association (TSA)**

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Agriculture and Biotechnology Challenge (MS)

Agriculture and Biotechnology Design (HS)

Participants conduct research on a contemporary agriculture or biotechnology problem of their choosing, document their research, and create a display. The steps used in the solution of the problem may be student-performed research or a re-creation or simulation of research performed by the scientific community. If appropriate, a model or prototype of the solution may be included in the display.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.1.12B Apply concepts of models as a method to predict and understand science and technology.
- 3.1.12C Assess and apply patterns in science and technology.
- 3.1.12E Evaluate change in nature, physical systems and man made systems.
- 3.2.12A Evaluate the nature of scientific and technological knowledge.
- 3.2.12B Evaluate experimental information for appropriateness and adherence to relevant science processes.
- 3.2.12D Analyze and use the technological design process to solve problems.
- 3.3.12A Explain the relationship between structure and function at all levels of organization.
- 3.3.12B Analyze the chemical and structural basis of living organisms.
- 3.6.12A Analyze biotechnologies that relate to propagating, growing, maintaining, adapting, treating and converting.
- 3.8.12A Synthesize and evaluate the interactions and constraints of science and technology on society.
- 3.8.12B Apply the use of ingenuity and technological resources to solve specific societal needs and improve the quality of life.
- 3.8.12C Evaluate the consequences and impacts of scientific and technological solutions.

Reading, Writing, Speaking and Listening Academic Standards

- 1.4.11B Write complex informational pieces (e.g., research papers, analyses, evaluations, essays).
- 1.6.11C Speak using skills appropriate to formal speech situations.
- 1.6.11F Use media for learning purposes.
- 1.8.11A Select and refine a topic for research.
- 1.8.11B Locate information using appropriate sources and strategies.
- 1.8.11C Organize, summarize and present the main ideas from research.

Animatronics (HS)

Participants will demonstrate knowledge of mechanical and control systems by designing, fabricating, and controlling an animatronics device that will communicate, entertain, inform, demonstrate and/or illustrate a topic, idea, subject or concept. Sound, lights and a surrounding environment must accompany the device.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.6.12B Analyze knowledge of information technologies of processes encoding, transmitting, receiving, storing, retrieving and decoding.
- 3.7.12A Apply advanced tools, materials and techniques to answer complex questions.
- 3.7.12B Evaluate appropriate instruments and apparatus to accurately measure materials and processes.
- 3.8.12B Apply the use of ingenuity and technological resources to solve specific societal needs and improve the quality of life.
- 3.2.12D Analyze and use the technological design process to solve problems.

Reading, Writing, Speaking and Listening Academic Standards

- 1.4.11B Write complex informational pieces (e.g., research papers, analyses, evaluations, essays).

Mathematics Academic Standards

- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
- 2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

Architectural Model (HS)

Participants develop a set of architectural plans and related materials for an annual architectural design challenge and construct an architectural model to accurately depict the design. In 2007, participants design a single family residential home for a family of four, following the principles and guidelines for affordable housing in America.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.6.12B Analyze knowledge of information technologies of processes encoding, transmitting, receiving, storing, retrieving and decoding.
- 3.6.12D Analyze physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, marketing, research and design to real world problems.
- 3.7.12A Apply advanced tools, materials and techniques to answer complex questions.
- 3.7.12B Evaluate appropriate instruments and apparatus to accurately measure materials and processes.
- 3.7.12C Evaluate computer operations and concepts as to their effectiveness to solve specific problems.
- 3.8.12B Apply the use of ingenuity and technological resources to solve specific societal needs and improve the quality of life.
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Reading, Writing, Speaking and Listening Academic Standards

- 1.4.11B Write complex informational pieces (e.g., research papers, analyses, evaluations, essays).
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- 1.6.11F Use media for learning purposes.
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- 1.8.11C Organize, summarize and present the main ideas from research.

Mathematics Academic Standards

- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
- 2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

Career Challenge (MS)

Career Comparisons (HS)

Participants thoroughly research various technology-related careers that are associated with one of the following technology areas: Biotechnology, Communications, Energy and Power, Engineering, Manufacturing, Medical Technology, Technology Education Teaching, Transportation, or Construction. After documenting the research, each student submits a cover letter and resume for the selected career and completes a formal job application. Finalists participate in an on-site mock interview.

Reading, Writing, Speaking and Listening Academic Standards

- 1.6.11C Speak using skills appropriate to formal speech situations.
- 1.6.11F Use media for learning purposes.
- 1.8.11A Select and refine a topic for research.
- 1.8.11B Locate information using appropriate sources and strategies.
- 1.8.11C Organize, summarize and present the main ideas from research.

Chapter Team [WRITTEN AND ORAL] (HS and MS)

Participants (one team of six members per chapter) take a written parliamentary procedures test in order to proceed to the finals. Finalist teams perform an opening ceremony, dispose of three items of business, and perform a closing ceremony within a specified time period.

Reading, Writing, Speaking and Listening Academic Standards

- 1.6.11C Speak using skills appropriate to formal speech situations.

Computer-Aided Design 2D, Architecture (HS)

Participants create representations, such as foundation and/or floor plans, and/or elevation drawings, and/or details of architectural ornamentation or cabinetry.

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- 3.6.12D Analyze physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, marketing, research and design to real world problems.
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- 3.2.12D Analyze and use the technological design process to solve problems.

Reading, Writing, Speaking and Listening Academic Standards

- 1.6.11F Use media for learning purposes.

Mathematics Academic Standards

- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
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Computer-Aided Design 3D, Engineering (HS)

Participants create 3D computer model(s) of an engineering or machine object, such as a machine part, tool, device, or manufactured product. Students may be expected to extract a 2D representation from their 3D model.

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Reading, Writing, Speaking and Listening Academic Standards

- 1.6.11F Use media for learning purposes.

Mathematics Academic Standards

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Computer-Aided Design Animation, Architecture (HS)

Participants are given a hard copy sketch from which to develop an animated technical drawing using computer-aided design tools.

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- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.6.12B Analyze knowledge of information technologies of processes encoding, transmitting, receiving, storing, retrieving and decoding.
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Construction Systems (HS)

Participants complete a written test that covers general construction systems knowledge. Finalist teams demonstrate their knowledge by solving a construction systems problem that is announced on site.

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Cyberspace Pursuit (MS and HS)

Participants are required to design, create and launch a web site that features the school's technology education program, the TSA chapter, and research about a cutting edge technological topic. Pre-conference finalists participate in an on-site interview.

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- 3.7.12E Assess the effectiveness of computer communications systems.
- 3.8.12A Synthesize and evaluate the interactions and constraints of science and technology on society.
- 3.2.12D Analyze and use the technological design process to solve problems.

Reading, Writing, Speaking and Listening Academic Standards

- 1.6.11F Use media for learning purposes.

Desktop Publishing (HS)

Participants develop a notebook that includes a tri-fold pamphlet, a three-column newsletter, and a poster. All participants (not just finalists) then work to solve an on-site problem that demonstrates their abilities to use the computer to design, edit, and print materials for publication.

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- 3.7.12D Evaluate the effectiveness of computer software to solve specific problems.
- 3.7.12E Assess the effectiveness of computer communications systems.
- 3.2.12D Analyze and use the technological design process to solve problems.

Dragster Design (HS)

Dragster Design Challenge (MS)

Participants design, produces working drawings for, and builds a CO₂-powered dragster.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
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Reading, Writing, Speaking and Listening Academic Standards

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Mathematics Academic Standards

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Electronic Game Challenge (MS)

Electronic Game Design (HS)

Participants develop an E-rated game that focuses on the subject of their choice.

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- 3.7.12D Evaluate the effectiveness of computer software to solve specific problems.
- 3.7.12E Assess the effectiveness of computer communications systems.
- 3.2.12D Analyze and use the technological design process to solve problems.

Reading, Writing, Speaking and Listening Academic Standards

- 1.6.11C Speak using skills appropriate to formal speech situations.

Electronic Research and Experimentation (HS)

Participants research, plan, design, and construct an electronic device. Entries are evaluated on quality of research, ingenuity and complexity of the device, and effectiveness of the exhibit display.

Science and Technology Academic Standards

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- 3.7.12A Apply advanced tools, materials and techniques to answer complex questions.
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- 3.7.12E Assess the effectiveness of computer communications systems.
- 3.2.12D Analyze and use the technological design process to solve problems.

Reading, Writing, Speaking and Listening Academic Standards

- 1.6.11C Speak using skills appropriate to formal speech situations.
- 1.4.11B Write complex informational pieces (e.g., research papers, analyses, evaluations, essays).
- 1.8.11A Select and refine a topic for research.
- 1.8.11B Locate information using appropriate sources and strategies.
- 1.8.11C Organize, summarize and present the main ideas from research.

Mathematics Academic Standards

- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
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Engineering Design (HS)

Participants work as part of a team to solve a design problem. Through use of a model/prototype, display and design notebook, the team explains in detail how it has solved the problem and the solution's impact on society and the environment. Finalists demonstrate the problem and solution in a timed presentation.

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- 3.1.12E Evaluate change in nature, physical systems and man made systems.
- 3.2.12A Evaluate the nature of scientific and technological knowledge.
- 3.2.12B Evaluate experimental information for appropriateness and adherence to relevant science processes.
- 3.2.12D Analyze and use the technological design process to solve problems.
- 3.3.12A Explain the relationship between structure and function at all levels of organization.
- 3.3.12B Analyze the chemical and structural basis of living organisms.
- 3.6.12A Analyze biotechnologies that relate to propagating, growing, maintaining, adapting, treating and converting.
- 3.8.12A Synthesize and evaluate the interactions and constraints of science and technology on society.
- 3.8.12B Apply the use of ingenuity and technological resources to solve specific societal needs and improve the quality of life.
- 3.8.12C Evaluate the consequences and impacts of scientific and technological solutions.

Reading, Writing, Speaking and Listening Academic Standards

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- 1.6.11C Speak using skills appropriate to formal speech situations.
- 1.6.11F Use media for learning purposes.
- 1.8.11A Select and refine a topic for research.
- 1.8.11B Locate information using appropriate sources and strategies.
- 1.8.11C Organize, summarize and present the main ideas from research.

Mathematics Academic Standards

- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
- 2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

Extemporaneous Presentation (HS)

Participants give a three to five minute speech, fifteen minutes after having drawn a card on which a technology or TSA topic for a speech is written.

Reading, Writing, Speaking and Listening Academic Standards

1.6.11C Speak using skills appropriate to formal speech situations.

Film (HS)

Participants develop a film that focuses on a subject of their choice from one or more of the following areas: the arts, social studies, science, or technology. Possible subjects include but are not limited to social study documentaries, nature films, advertisements, comedies, or dramas. Sound may accompany the film/video.

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- 3.7.12A Apply advanced tools, materials and techniques to answer complex questions.
- 3.7.12C Evaluate computer operations and concepts as to their effectiveness to solve specific problems.
- 3.7.12D Evaluate the effectiveness of computer software to solve specific problems.
- 3.7.12E Assess the effectiveness of computer communications systems.
- 3.2.12D Analyze and use the technological design process to solve problems.

Flight Endurance (HS)

Participants analyze flight principles with a rubber band-powered model aircraft.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.2.12D Analyze and use the technological design process to solve problems.

Reading, Writing, Speaking and Listening Academic Standards

- 1.6.11F Use media for learning purposes.
- 1.8.11A Select and refine a topic for research.
- 1.8.11B Locate information using appropriate sources and strategies.
- 1.8.11C Organize, summarize and present the main ideas from research.

Mathematics Academic Standards

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- 2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

Imaging Technology (HS)

Participants capture images and process photographic prints for display that depict the current year's published theme. Finalists participate in an on-site event in which they record digital images and utilize multimedia software to prepare a storyboard/outline and media presentation of newsworthy TSA conference activities and events.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.6.12B Analyze knowledge of information technologies of processes encoding, transmitting, receiving, storing, retrieving and decoding.
- 3.7.12A Apply advanced tools, materials and techniques to answer complex questions.
- 3.7.12C Evaluate computer operations and concepts as to their effectiveness to solve specific problems.
- 3.7.12D Evaluate the effectiveness of computer software to solve specific problems.
- 3.7.12E Assess the effectiveness of computer communications systems.
- 3.2.12D Analyze and use the technological design process to solve problems.

Manufacturing Prototype (HS)

Participants design and manufacture a prototype of a product and provide a description of how the product could be manufactured in a state-of-the-art American industry.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.2.12D Analyze and use the technological design process to solve problems.

Reading, Writing, Speaking and Listening Academic Standards

- 1.4.11A Write complex informational pieces (e.g., research papers, analyses, evaluations, essays).

Mathematics Academic Standards

- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
- 2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

Medical Technology (HS)

Medical Technology Challenge (MS)

Participants conduct research on a contemporary medical technology problem of their choosing, document their research, and create a display. The steps used in the solution of the problem may be student-performed research or a re-creation or simulation of research performed by the scientific community. A model or prototype of the solution must be included in the display.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.2.12D Analyze and use the technological design process to solve problems.

Reading, Writing, Speaking and Listening Academic Standards

- 1.4.11B Write complex informational pieces (e.g., research papers, analyses, evaluations, essays).
- 1.6.11C Speak using skills appropriate to formal speech situations.
- 1.6.11F Use media for learning purposes.
- 1.8.11A Select and refine a topic for research.
- 1.8.11B Locate information using appropriate sources and strategies.
- 1.8.11C Organize, summarize and present the main ideas from research.

Prepared Presentation (HS)

Prepared Speech (MS)

Participants deliver an oral presentation that includes audio and/or visual enhancement based on the theme for the current year's conference.

Science and Technology Academic Standards

- 3.2.12D Analyze and use the technological design process to solve problems.

Reading, Writing, Speaking and Listening Academic Standards

- 1.6.11C Speak using skills appropriate to formal speech situations.
- 1.8.11A Select and refine a topic for research.
- 1.8.11B Locate information using appropriate sources and strategies.
- 1.8.11C Organize, summarize and present the main ideas from research.

Graphic Design Challenge (MS) **Promotional Graphics** (HS)

Participants develop and present a graphic design that can be used as a TSA recruitment tool and that includes the theme for the next year's conference.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
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- 3.7.12D Evaluate the effectiveness of computer software to solve specific problems.
- 3.7.12E Assess the effectiveness of computer communications systems.
- 3.2.12D Analyze and use the technological design process to solve problems.

Reading, Writing, Speaking and Listening Academic Standards

- 1.6.11F Use media for learning purposes.
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- 1.8.11B Locate information using appropriate sources and strategies.
- 1.8.11C Organize, summarize and present the main ideas from research.

Radio Controlled Transportation (HS)

Participants designs, fabricate, test, and demonstrate the use of a radio-controlled vehicle that collects and distributes a load during a five minute demonstration. Evaluation is based on performance, vehicle craftsmanship, and documentation of design efforts.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.2.12D Analyze and use the technological design process to solve problems.

Mathematics Academic Standards

- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
- 2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

Scientific and Technical Visualization [sciviz] (HS)

Participants develop a visualization focusing on a subject or topic from one or more of the following areas: technology, engineering, science, mathematics, or social studies.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.6.12B Analyze knowledge of information technologies of processes encoding, transmitting, receiving, storing, retrieving and decoding.
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- 1.8.11B Locate information using appropriate sources and strategies.
- 1.8.11C Organize, summarize and present the main ideas from research.

Structural Challenge (MS) **Structural Engineering** (HS)

Participants work as part of a team, on site with supplied materials, to build a model of a structure that is destructively tested to determine design efficiency.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.2.12D Analyze and use the technological design process to solve problems.

Mathematics Academic Standards

- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
- 2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

System Control Technology (HS and MS)

Participants work as part of a team on site to develop a computer-controlled model-solution to a problem, typically one from an industrial setting. Teams analyze the problem, build a computer-controlled mechanical model, program the model, explain the program and mechanical features of the model-solution, and leave instructions for evaluators to operate the device.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.6.12B Analyze knowledge of information technologies of processes encoding, transmitting, receiving, storing, retrieving and decoding.
- 3.7.12A Apply advanced tools, materials and techniques to answer complex questions.
- 3.7.12C Evaluate computer operations and concepts as to their effectiveness to solve specific problems.
- 3.7.12D Evaluate the effectiveness of computer software to solve specific problems.
- 3.7.12E Assess the effectiveness of computer communications systems.
- 3.2.12D Analyze and use the technological design process to solve problems.

Technical Research and Report Writing (HS)

Technical Writing Challenge (MS)

Participants conduct research in an announced technological area and, using the knowledge and resources gained from this research, write a comprehensive report on one subtopic selected from two or three related subtopics designated on site.

Science and Technology Academic Standards

3.2.12D Analyze and use the technological design process to solve problems.

Reading, Writing, Speaking and Listening Academic Standards

1.4.11B Write complex informational pieces (e.g., research papers, analyses, evaluations, essays).

1.8.11A Select and refine a topic for research.

1.8.11B Locate information using appropriate sources and strategies.

1.8.11C Organize, summarize and present the main ideas from research.

Technical Design Challenge (MS)

Technical Sketching and Application (HS)

Participants complete a written test in order to qualify as finalists. Finalists must demonstrate their ability to solve an on-site engineering graphic problem using standard drafting techniques.

Science and Technology Academic Standards

3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.

3.2.12D Analyze and use the technological design process to solve problems.

Mathematics Academic Standards

2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.

2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

Technology Bowl [WRITTEN AND ORAL] (HS and MS)

Participants complete a written, objective test in order to qualify for oral question/response, head-to-head team competition.

Reading, Writing, Speaking and Listening Academic Standards

- 1.6.11C Speak using skills appropriate to formal speech situations.
- 1.8.11C Organize, summarize and present the main ideas from research.

Technology Challenge (HS)

Participants design, fabricate, and demonstrate the application and control of mechanical, fluid, and electrical power by sorting materials with a device that applies power and energy principles. Evaluation is based upon a timed demonstration of mechanical, fluid, and electrical energy principles, and craftsmanship.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.1.12B Apply concepts of models as a method to predict and understand science and technology.
- 3.7.12A Apply advanced tools, materials and techniques to answer complex questions.
- 3.2.12D Analyze and use the technological design process to solve problems.

Reading, Writing, Speaking and Listening Academic Standards

- 1.8.11A Select and refine a topic for research.
- 1.8.11B Locate information using appropriate sources and strategies.
- 1.8.11C Organize, summarize and present the main ideas from research.

Mathematics Academic Standards

- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
- 2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

Problem Solving (MS)

Technology Problem Solving (HS)

Participants use problem solving skills and limited materials to develop a solution to a problem given on site.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.1.12B Apply concepts of models as a method to predict and understand science and technology.
- 3.2.12D Analyze and use the technological design process to solve problems.

Transportation Modeling (HS)

Participants using only certain materials and following required specifications, design and produce a CO₂-powered scale model of a vehicle that fits the annual design problem and that takes appearance and performance into consideration.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.6.12D Analyze physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, marketing, research and design to real world problems.
- 3.7.12A Apply advanced tools, materials and techniques to answer complex questions.
- 3.7.12B Evaluate appropriate instruments and apparatus to accurately measure materials and processes.
- 3.2.12D Analyze and use the technological design process to solve problems.

Reading, Writing, Speaking and Listening Academic Standards

- 1.4.11B Write complex informational pieces (e.g., research papers, analyses, evaluations, essays).
- 1.8.11A Select and refine a topic for research.
- 1.8.11B Locate information using appropriate sources and strategies.
- 1.8.11C Organize, summarize and present the main ideas from research.

Mathematics Academic Standards

- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
- 2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

Challenging Technology Issues (MS)

Participants prepare and deliver an extemporaneous oral presentation, with team members explaining opposing views of a current technology issue that has been selected on site from a choice of three options.

Science and Technology Academic Standards

3.2.12D Analyze and use the technological design process to solve problems.

Reading, Writing, Speaking and Listening Academic Standards

- 1.6.11C Speak using skills appropriate to formal speech situations.
- 1.8.11A Select and refine a topic for research.
- 1.8.11B Locate information using appropriate sources and strategies.
- 1.8.11C Organize, summarize and present the main ideas from research.

Communication Challenge (MS)

Participants write, design and produce 1) a newsletter that promotes the chapter's activities, 2) an effective sponsor support request on chapter letterhead, and 3) a business card. Finalists work creatively under constraints to design a solution to an on-site problem.

Science and Technology Academic Standards

- 3.6.12B Analyze knowledge of information technologies of processes encoding, transmitting, receiving, storing, retrieving and decoding.
- 3.7.12A Apply advanced tools, materials and techniques to answer complex questions.
- 3.7.12C Evaluate computer operations and concepts as to their effectiveness to solve specific problems.
- 3.7.12D Evaluate the effectiveness of computer software to solve specific problems.
- 3.7.12E Assess the effectiveness of computer communications systems.
- 3.2.12D Analyze and use the technological design process to solve problems.

Construction Challenge (MS)

Participants submit a display that documents the use of their leadership and technical skills to fulfill a community need related to construction. Finalists discuss their projects in a presentation and an interview.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.

Mathematics Academic Standards

- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
- 2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

Digital Photography Challenge (MS)

Participants produce and submit an album and an 8" x 10" collage of digital photographs consisting of six color or black and white digital photographs that present a single chapter activity/theme. Finalists produce three digital photographs taken at the conference site that have been edited appropriately for the on-site task.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.

Electrical Applications (MS)

Participants demonstrate knowledge of basic electrical theory through a written test. Finalists assemble a specific circuit from a schematic diagram (using a kit provided) and make required electrical measurements. Finalists then explain their solution during an interview.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.

Mathematics Academic Standards

- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
- 2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

Environmental Challenge (MS)

Participants identify and research a specific environmental problem or issue that has been influenced by advancements in technology. Students present their findings in the form of a multimedia presentation.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.

Mathematics Academic Standards

- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
- 2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

Flight Challenge (MS)

Participants study the principles of flight and design in order to fabricate (using materials provided) and test-fly gliders. Gliders must be designed to be launched from a catapult that is provided on site. Flight duration of the gliders and documentation of the design process are the primary elements of the evaluation.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
- 2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

Inventions and Innovations (MS)

Participants investigate and determine the need for the invention of a device, system or process. The invention may be groundbreaking, or it may be an improvement to an existing device, system or process. The invention may be an idea, in lieu of a working model. Team members present their idea for an invention using a stand-alone multimedia presentation, documentation notebook, and a model or prototype. Finalists make an oral presentation about the invention to a panel of judges who will act as a group of venture capitalists interested in funding an invention.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.1.12B Apply concepts of models as a method to predict and understand science and technology.
- 3.1.12C Assess and apply patterns in science and technology.
- 3.1.12E Evaluate change in nature, physical systems and man made systems.
- 3.2.12A Evaluate the nature of scientific and technological knowledge.
- 3.2.12B Evaluate experimental information for appropriateness and adherence to relevant science processes.
- 3.2.12D Analyze and use the technological design process to solve problems.
- 3.3.12A Explain the relationship between structure and function at all levels of organization.
- 3.3.12B Analyze the chemical and structural basis of living organisms.
- 3.6.12A Analyze biotechnologies that relate to propagating, growing, maintaining, adapting, treating and converting.
- 3.8.12A Synthesize and evaluate the interactions and constraints of science and technology on society.
- 3.8.12B Apply the use of ingenuity and technological resources to solve specific societal needs and improve the quality of life.
- 3.8.12C Evaluate the consequences and impacts of scientific and technological solutions.
- 3.2.12D Analyze and use the technological design process to solve problems.

Reading, Writing, Speaking and Listening Academic Standards

- 1.4.11B Write complex informational pieces (e.g., research papers, analyses, evaluations, essays).
- 1.6.11F Speak using skills appropriate to formal speech situations.
- 1.6.11C Use media for learning purposes.
- 1.8.11A Select and refine a topic for research.
- 1.8.11B Locate information using appropriate sources and strategies.
- 1.8.11C Organize, summarize and present the main ideas from research.

Inventions and Innovations (MS) [continued]

Mathematics Academic Standards

- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
- 2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

Leadership Challenge (MS)

Participants work in teams to develop a plan of action that addresses a specific challenging situation provided on site. Under time constraints, finalists develop a plan for a second situation and then make a team presentation.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.2.12D Analyze and use the technological design process to solve problems.

Reading, Writing, Speaking and Listening Academic Standards

- 1.6.11C Speak using skills appropriate to formal speech situations.
- 1.8.11A Select and refine a topic for research.
- 1.8.11B Locate information using appropriate sources and strategies.
- 1.8.11C Organize, summarize and present the main ideas from research.

Manufacturing Challenge (MS)

Participants design and manufacture a product using discarded material that has been donated from business or industry. The chapter submits documentation of chapter activities and two product samples made during the manufacturing experience.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.1.12A Apply concepts of models as a method to predict and understand science and technology.
- 3.1.12C Assess and apply patterns in science and technology.
- 3.1.12E Evaluate change in nature, physical systems and man made systems.
- 3.2.12A Evaluate the nature of scientific and technological knowledge.
- 3.2.12B Evaluate experimental information for appropriateness and adherence to relevant science processes.
- 3.2.12D Analyze and use the technological design process to solve problems.
- 3.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
- 3.3.11C Demonstrate the ability to produce measures with specified levels of precision.
- 3.3.12A Explain the relationship between structure and function at all levels of organization.
- 3.3.12B Analyze the chemical and structural basis of living organisms
- 3.6.12A Analyze biotechnologies that relate to propagating, growing, maintaining, adapting, treating and converting.
- 3.8.12A Synthesize and evaluate the interactions and constraints of science and technology on society.

Technology Transfer (MS)

Participants design, manufacture and package a marketable mass-produced product through a collaborative effort. Two completed products will be included in the display for this event.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.1.12B Apply concepts of models as a method to predict and understand science and technology.
- 3.1.12C Assess and apply patterns in science and technology.
- 3.1.12E Evaluate change in nature, physical systems and man made systems.
- 3.2.12A Evaluate the nature of scientific and technological knowledge.
- 3.2.12B Evaluate experimental information for appropriateness and adherence to relevant science processes.
- 3.2.12D Analyze and use the technological design process to solve problems.
- 3.3.12A Explain the relationship between structure and function at all levels of organization.
- 3.3.12B Analyze the chemical and structural basis of living organisms.
- 3.6.12A Analyze biotechnologies that relate to propagating, growing, maintaining, adapting, treating and converting.
- 3.8.12A Synthesize and evaluate the interactions and constraints of science and technology on society.

Mathematics Academic Standards

- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
- 2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

Transportation Challenge (MS)

Participants design, engineer, and fabricate a battery-powered vehicle that covers a course in the shortest amount of time.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.2.12D Analyze and use the technological design process to solve problems.

Reading, Writing, Speaking and Listening Academic Standards

- 1.6.11F Use media for learning purposes.
- 1.8.11A Select and refine a topic for research.
- 1.8.11B Locate information using appropriate sources and strategies.
- 1.8.11C Organize, summarize and present the main ideas from research.

Mathematics Academic Standards

- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
- 2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

TSA Cup: Marine Design Challenge (MS)

Participants research and present sailboat design principles and build a model sailboat that is raced in a test tank. Participants choose a country and incorporate information about that country — as well as information about a sailboat design/manufacturing company from the country — into an event display.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.6.12B Analyze knowledge of information technologies of processes encoding, transmitting, receiving, storing, retrieving and decoding.
- 3.7.12A Apply advanced tools, materials and techniques to answer complex questions.
- 3.7.12C Evaluate computer operations and concepts as to their effectiveness to solve specific problems.
- 3.7.12D Evaluate the effectiveness of computer software to solve specific problems.
- 3.7.12E Assess the effectiveness of computer communications systems.
- 3.2.12D Analyze and use the technological design process to solve problems.

Mathematics Academic Standards

- 2.3.11A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.
- 2.3.11C Demonstrate the ability to produce measures with specified levels of precision.

TSA Multimedia (MS)

Participants create and design a stand-alone multimedia presentation to promote TSA.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.6.12B Analyze knowledge of information technologies of processes encoding, transmitting, receiving, storing, retrieving and decoding.
- 3.7.12A Apply advanced tools, materials and techniques to answer complex questions.
- 3.7.12C Evaluate computer operations and concepts as to their effectiveness to solve specific problems.
- 3.7.12D Evaluate the effectiveness of computer software to solve specific problems.
- 3.7.12E Assess the effectiveness of computer communications systems.
- 3.2.12D Analyze and use the technological design process to solve problems.

Video Challenge (MS)

Participants develop and submit a detailed storyboard, production plan, and finished video that depicts the chapter's involvement in TSA, technology education, or community service.

Science and Technology Academic Standards

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
- 3.6.12B Analyze knowledge of information technologies of processes encoding, transmitting, receiving, storing, retrieving and decoding.
- 3.7.12A Apply advanced tools, materials and techniques to answer complex questions.
- 3.7.12C Evaluate computer operations and concepts as to their effectiveness to solve specific problems.
- 3.7.12D Evaluate the effectiveness of computer software to solve specific problems.
- 3.7.12E Assess the effectiveness of computer communications systems.
- 3.2.12D Analyze and use the technological design process to solve problems.

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