

# TRANSPORTATION MODELING



## OVERVIEW

Using only designated materials and following required specifications, participants apply leadership and 21<sup>st</sup> century skills in the research, design, and production of a scale model of a vehicle that fits the annual design problem, which will be posted on the [TSA website](#) under *Themes & Problems*. The entry must take appearance and realism into consideration.

## ELIGIBILITY

One (1) individual per chapter may participate.

## TIME LIMITS

Semifinalists participate in an on-site interview that lasts up to five (5) minutes.

## ATTIRE

TSA competition attire is required for this event.

## PROCEDURE

### PRE-CONFERENCE

- A. Participants produce a scale model of a vehicle and supporting display to contain it, focusing on the year's current theme, while observing the outlined regulations.
- B. Participants prepare the documentation portfolio and display according to the regulations for this event.

### PRELIMINARY ROUND

- A. Participants check in the following at the time and place stated in the conference program:
  1. the scale model
  2. the display
  3. the documentation portfolio
- B. Entries are evaluated by the judges with neither students nor advisors present based on the following criteria:
  1. Judges score the Model and Display criteria to determine the top twenty-four (24) preliminary contestants, which will not be posted.

2. Judges score the Documentation Portfolio criteria of those top twenty-four contestants to determine the top twelve (12) semifinalist teams.

- C. A list of twelve (12) semifinalists (in random order) is posted.

### SEMIFINAL ROUND

- A. Participants report at the time and place stated in the conference program to sign up for an interview time.
- B. Judges ask questions pertaining to the research, production of the model, and the design process.
- C. The top ten (10) finalists are announced during the awards ceremony.

## REGULATIONS AND REQUIREMENTS

Students will work to develop their leadership and 21<sup>st</sup> century skills in the process of preparing for and participating in this TSA competitive event. The development and application of those skills must be evident in their submission, demonstration, and/or communication pertaining to the entry.

### PRELIMINARY ROUND

- A. Entries must include a scale model, a display, and documentation portfolio.
- B. The model, display and documentation must meet the following specifications:

#### Model

1. The scale model must accurately reflect the annual design problem.
2. The model must be designed and produced as original work by the student during the current school year.
3. The model may be made from wood, urethane modeling foam, or it may be 3D-printed.
4. Using commercially produced (store-bought) model vehicle body parts (including hoods, fenders, wings, propellers, frames, etc.) is prohibited.

5. It is permissible to use pre-manufactured parts such as body strengtheners, tires and wheels, plastic canopy, exhausts, mirrors, head and tail lights, windshields, and antennae.
  - a. These parts may be attached to or enclosed within the vehicle and may be constructed from materials other than wood, excluding glass or liquids. These parts must be fastened securely.
  - b. It is also permissible to use CNC production and 3D printers in the production of the parts of this model.
6. The finished vehicle must fit inside the display space of 16" x 16" x 16".
7. The themed vehicle model must have an actual length that measures at least six inches (6").
8. The designer must choose a scale for the vehicle so that it meets regulations and must be specified in the portfolio.
9. Wheels: Dimensions should be consistent with the scale of the body.

### **Display**

1. The model must be presented for evaluation on a display not to exceed 16" tall x 16" deep x 16" long (including the model).
2. The portfolio is not considered part of the display but is placed with it at its side.
3. No electrical access will be provided by TSA for displays.
4. Use of dry cell batteries is permissible, but they must be contained within the stated display space.

### **Documentation Portfolio**

1. Documentation materials (comprising a "portfolio") are required and must be secured in a [clear front report cover](#).
2. In addition to the 11" x 17" pages noted below, the report cover must include the following single-sided, 8½" x 11" pages, in this order:
  - a. Title page with the event title, the conference city and state, and the year; a picture of the vehicle may be included as well; one (1) page

- b. Table of contents; pages as needed
- c. Description of designer's vehicle, making note of the scale used, inspiration for the choice and design of the vehicle, research about the history and evolution of the original vehicle, and design elements that set the vehicle apart from others (e.g. fuel used, unique features); one (1) page
- d. Photo examples of current or past vehicles that are similar to the current year's theme or that inspired the entry; one (1) page
- e. Concept drawings/detailed sketches or 3D CAD modeling; two (2) pages (11" x 17" size)
- f. Photos of the clay, foam, wax, or 3D-printed mock-up; one (1) page
- g. Final technical illustrations (orthographic); maximum two (2) pages (11" x 17" size)
- h. Photos of the production of the model; one page
- i. Documentation for this event must not include the name of the student name, chapter, or state.
- j. All ideas, text, or images from sources other than the designer must be cited.
- k. Cited works should be in MLA format.
- l. Pages that are 11" x 17" in size should be folded to fit in the notebook.

## **EVALUATION**

### **PRELIMINARY ROUND**

- A. The notebook
- B. The model
- C. The display

### **SEMIFINAL ROUND**

- A. The interview

Refer to the official rating form for more information.

## STEM INTEGRATION

This event aligns with the STEM (Science, Technology, Engineering, and Mathematics) educational standards.

## LEADERSHIP AND 21<sup>ST</sup> CENTURY SKILLS DEVELOPMENT

This event provides opportunity for students to build and develop leadership and 21<sup>st</sup> century skills including but not limited to:

- Communication
- Collaboration/Social Skills
- Initiative
- Problem Solving/Risk Taking
- Critical Thinking
- Perseverance/Grit
- Creativity
- Relationship Building/Teamwork
- Dependability/Integrity
- Flexibility/Adaptability

## CAREERS RELATED TO THIS EVENT

This competition has connections to one (1) or more of the careers below:

- Automotive designer
- Automotive engineer
- Digital modeling technician
- Industrial designer
- Industrial engineer

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## 2023 & 2024 OFFICIAL RATING FORM HIGH SCHOOL

Judges: Using minimal (1-4 points), adequate (5-8 points), or exemplary (9-10 points) performance levels as a guideline in the rating form, record the scores earned for the event criteria in the column spaces to the 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.) A score of zero (0) is acceptable if the minimal performance for any criterion is not met.

### Go/No Go Specifications

- Before judging the entry, ensure that the items below are present; indicate presence with a check mark in the box.
- If an item is missing, leave the box next to the item blank and place a check mark in the box labeled ENTRY NOT EVALUATED.
- If a check mark is placed in the ENTRY NOT EVALUATED box, the entry is not to be judged.

- ☐ Vehicle scale model fits within the display and is at least 6" long
- ☐ The model is made of appropriate materials
- ☐ The documentation portfolio is present
- ☐ The display size is no more than 16" x 16" x 16"
- ☐ ENTRY NOT EVALUATED

MODEL AND DISPLAY (50 points)				Record scores in the column spaces below.
CRITERIA	Minimal performance	Adequate performance	Exemplary performance	
	1-4 points	5-8 points	9-10 points	
<b>Production Quality</b> (X1)	The model exhibits poor production quality; the surface is rough; there is little or no attention to detail.	There is some evidence of proper production techniques; the model appearance is adequate.	The model demonstrates excellent production techniques with obvious effort and attention to detail.	
<b>Paint and Finish</b> (X1)	Surface imperfections are evident; the model is sticky, and/or the painting quality is low.	The quality of the painted surface is acceptable, with some imperfections visible.	The painted surface is exceptional, with little or no visible imperfections.	
<b>Appropriate to Designated Problem</b> (X1)	The model does not relate to the stated annual design theme.	The model generally relates to the stated annual design theme.	The model effectively represents and portrays the stated annual design theme.	
<b>Details</b> (X1)	There is a very weak and limited attempt to include identifying characteristics and/or additional parts to help create a realistic appearance.	The model includes some identifying characteristics and/or additional parts that give it a sense of realism.	The model displays exemplary effort to include identifying characteristics and/or additional parts that give it a realistic appearance.	
<b>Display</b> (X1)	The quality of the display is poor, and/or it exceeds the size requirements.	The display is adequately created and meets the size specifications.	The display is exemplary, includes eye-catching details, and meets the size specifications.	
<b>MODEL AND DISPLAY SUBTOTAL (50 points)</b>				

DOCUMENTATION PORTFOLIO (70 points)				Record scores in the column spaces below.
CRITERIA	Minimal performance	Adequate performance	Exemplary performance	
	1-4 points	5-8 points	9-10 points	
<b>Portfolio Components</b> (X1)	The portfolio is missing several components, and/or it is unorganized; it is messy and lacks quality.	Most components are included in the portfolio; it is adequately organized.	All portfolio components are included and completely organized; effort and quality of work are evident.	
<b>Vehicle Description</b> (X1)	The description is inadequate; research references are lacking; the scale is incomplete.	The description is adequate, research is evident with some documentation, and the scale is stated and accurate.	An excellent description is included, with necessary research referenced to support the model solution; the scale is stated and accurate.	
<b>Concept Drawings, Detailed Sketches, or 3D CAD Modeling</b> (X1)	The drawings are not to scale, and/or the the quality is poor, and/or there are missing parts and dimensions; the drawings are not on 11" x 17" paper.	The drawings are acceptable, true to scale, and representative of the vehicle, with some details/ dimensions included; the drawings are produced on 11" x 17" paper.	The drawings are accurate and complete; they include all necessary details/dimensions and are drawn on 11" x 17" paper.	
<b>Photo Examples of Current/Past Similar Vehicles</b> (X1)	There is only one (1) photo example of current or past similar vehicles.	There are two or three (2-3) photo examples of current or past similar vehicles.	There are a number of photo examples of current or past similar vehicles, showing that in-depth research was done.	
<b>Photos of Clay, Foam, Wax, or 3D-Printed Model</b> (X1)	There is only one (1) photograph of the clay/foam or wax model included.	Two or three (2-3) photographs of the clay/foam or wax model are included, but more are needed to adequately document the model.	There are a number of photographs included that effectively document the preliminary clay/foam/wax model.	
<b>Final Technical Illustrations</b> (orthographic plans) (X1)	Orthographic plans are poorly executed, and/or the plans are not on 11" x 17" paper.	Adequate orthographic plans are included; the plans are on 11" x 17" paper.	Complete orthographic plans are included; they are of excellent quality on 11" x 17" paper.	
<b>Photos of Production of the Model</b> (X1)	Only one (1) photograph of the model production is included.	Two or three (2-3) photographs of the model production are included, but they are not enough to provide full documentation.	The photographs included fully and effectively document and describe the model production process.	
<b>DOCUMENTATION PORTFOLIO SUBTOTAL (70 points)</b>				
<p>Rules violations (a deduction of 20% of the total possible points in the above sections) must be initialed by the judge, coordinator, and manager of the event. Record the deduction in the space to the right.</p> <p>Indicate the rule violated: _____</p>				
<b>PRELIMINARY SUBTOTAL (120 points)</b>				

SEMIFINAL INTERVIEW (30 points)				Record scores in the column spaces below.
CRITERIA	Minimal performance	Adequate performance	Exemplary performance	
	1-4 points	5-8 points	9-10 points	
<b>Articulation</b> (X1)	Communication of the design process is unclear, unorganized, and or illogical; leadership and/or 21 <sup>st</sup> century skills are not evident.	Communication of the design process is somewhat logical and clear; leadership and/or 21 <sup>st</sup> century skills are somewhat evident.	Communication of the design process is clear, concise, and logical; leadership and/or 21 <sup>st</sup> century skills are clearly evident.	
<b>Knowledge</b> (X1)	Participant seems to have little understanding of the development and concepts in the project; vague interview answers are provided.	Participants have a generalized understanding of the development and concepts discussed and answer questions adequately.	Evidence is clear that the participant has a thorough understanding of the development and concepts discussed; questions are answered thoroughly.	
<b>Organization</b> (X1)	Participant is unprepared and unorganized for the interview, with an illogical explanation of the project.	Participant is prepared for the interview and is somewhat organized in his/her explanation to judges; the answers are, for the most part, logical and/or clear.	Participants responses are concise and logical, with a clear explanation of the development of the project.	
<b>SEMIFINAL INTERVIEW SUBTOTAL (30 points)</b>				
<p>Rules violations (a deduction of 20% of the total possible points in the semifinalist sections above) must be initialed by the evaluator, coordinator, and manager of the event. Record the deduction in the space to the right.</p> <p>Indicate the rule violated: _____</p>				
<b>SEMIFINAL SUBTOTAL (30 points)</b>				
<p>To arrive at the <b>TOTAL</b> score, add any subtotals and subtract rules violation points, as necessary.</p> <p><b>TOTAL (150 points)</b></p>				

Comments:

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

JUDGE

Printed name: \_\_\_\_\_ Signature: \_\_\_\_\_

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## EVENT COORDINATOR INSTRUCTIONS

### PERSONNEL

- A. Event coordinator
- B. Assistants, two (2)
- C. Judges:
  - 1. Preliminary round, two (2) or more
  - 2. Semifinal round, two (2) or more

### MATERIALS

- A. Coordinator's packet containing:
  - 1. Event guidelines, one (1) copy for the coordinator and for each judge
  - 2. TSA Event Coordinator Report
  - 3. List of judges/assistants
  - 4. Results envelope

### RESPONSIBILITIES

#### AT THE CONFERENCE

- A. Attend the mandatory coordinator's meeting at the designated time and location.
- B. Report to the CRC room and check the contents of the coordinator's packet.
- C. Review the event guidelines and check to see that enough personnel have been scheduled.
- D. Inspect the area(s) in which the event is being held for appropriate set-up, including room size, chairs, tables, outlets, etc. Notify the event manager of any potential problems.
- E. At least one (1) hour before the event is to begin, meet with judges and assistants to review time limits, procedures, regulations, evaluation, and all other details related to the event. If questions arise that cannot be answered, speak to the event manager before the event begins.

### EVENT CHECK-IN

- A. Check in the entries at the time and place stated in the conference program.
- B. Participants check in:
  - 1. the scale model
  - 2. the documentation portfolio
  - 3. the display
- C. Late entries are considered on a case-by-case basis and only when the delay is caused by events beyond participant control.
- D. In order to compete, participants must be on the entry list or must have CRC approval.
- E. Requirements for attire do NOT apply during check-in, only on the first day of conference.
- F. Each entry must include the identification number in the upper right-hand corner of the entry.
- G. Instruct the participants to position the displays for viewing.
- H. Secure the entries in the designated area.

### PRELIMINARY ROUND

- A. When it is necessary to move models, only judges and official personnel should handle the models. Extreme care should be taken to avoid damage to the entries.
- B. Judges independently assess the entries based on the following:
  - 1. Judges review and score the Model and Display criteria to determine the top twenty-four (24) preliminary contestants, which will not be posted.
  - 2. Judges score the Documentation Portfolio criteria of those top twenty-four contestants to determine the top twelve (12) semifinalist teams.

- C. Decisions about rules violations must be discussed and verified with the judges, event coordinator, and CRC manager to determine either:
  - 1. To deduct 20% of the total possible points or
  - 2. To disqualify the entryThe event coordinator, judges, and CRC manager must initial either of these actions on the rating form.
- D. Judges determine the twelve (12) semifinalists.
- E. Submit the finalist results and all related forms in the results envelope to the CRC room.
- F. Create a sign-up sheet for the semifinal interviews.

### SEMIFINAL ROUND

- A. Semifinalists report at the time and place stated in the conference program to sign up for an interview time.
- B. Manage completion of the on-site interviews.
- C. Discuss rule violations (e.g. 20% deduction, disqualification) and have all relevant parties initial the rating form.
- D. Judges determine the ten (10) finalists and discuss and break any ties.
- E. Submit the finalist results and all related forms in the results envelope to the CRC room.
- F. At the designated time, return models, displays, and portfolios to student owners after verifying official conference identification.