DRAGSTER

OVERVIEW

Applying leadership and 21st century skills, Participants design and produce a race-worthy CO_2-powered dragster according to stated specifications, using only specified materials. The current year's theme/problem will be posted on the TSA website under *Themes & Problems*.

ELIGIBILITY

Two (2) individuals per chapter may participate.

TIME LIMITS

A. The dragster and drawing are submitted at the time and place stated in the conference program.

B. All raceable cars will make one (1) qualifying time run, then judges check for spec compliance, leaving the top sixteen (16) legal cars as semifinalists for the semifinal double elimination bracket.

C. Sixteen (16) qualifying car builders participate in a five (5)-minute interview.

D. Drawings and cars must be picked up at the specified time and place stated in the conference program.

ATTIRE

TSA competition attire is required.

PROCEDURE

PRE-CONFERENCE

A. Participants review the TSA Honor Statement for Competitive Events found in the General Rules and listed in the individual competitive event rules.

B. Participants prepare their documentation and dragster model according to regulations.

PRELIMINARY ROUND

A. Participants check in the following at the time and place stated in the conference program:
   1. The dragster
   2. One (1) full-size metric drawing of the completed vehicle
   3. One (1) letter-sized printed document listing all parts and materials

B. Entries are reviewed by judges to determine specification adherence and safety on the track.

C. Safe dragsters race for qualifying time on the same lane of a raceway.

D. The top sixteen (16) qualifying cars, based on time trials, are evaluated against the required specifications for this event.

E. Dragsters that do not meet event regulations are disqualified and lower qualifying cars are moved up until sixteen (16) dragsters meeting specifications are determined.

F. Judges score the dragster body production quality, paint finish, assembly, the technical drawing scale and dimensioning as well as drawing completion and precision quality.

SEMIFINAL ROUND

A. The top sixteen (16) car builders report at the time and location stated in the conference program to sign up for an interview.

B. The top sixteen (16) car builders report to the track at the posted time for a five (5)-minute interview.

C. The top sixteen (16) cars race in a double-elimination format to earn points for the race portion of the event.

D. Drawing, design, materials list, and body finish points are combined with race points to determine the final standings.

E. Following the end of the race, participants pick up their entries from the display area at the time and place stated in the conference program.

F. Ten (10) finalists are announced during the conference award ceremony.

REGULATIONS AND REQUIREMENTS

Students will work to develop their leadership and 21st 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. Participants must check for a theme/problem on the TSA website under *Themes & Problems*.

B. Drawings:

1. The two (2)-view (top and side) drawing with metric dimensions is made on one piece of drawing paper no larger than 11" x 17" in size.
2. Drawings are developed using standard engineering practices and procedures.
3. The drawing may be produced using traditional drafting methods or CAD.
4. A one (1) letter sized page with the Materials List must be printed on or attached to the back of the technical drawing.
5. The title block includes only the participants identification number, which is assigned at registration time and is placed on the entry and drawing during check-in.

C. Dragsters that do not meet all specifications/ tolerances are disqualified and not permitted to progress to the semifinal round.

SEMIFINAL ROUND

A. Semifinalists report at the time and place in the conference program to sign up for an interview time.

B. Semifinalists arrive at the time and place in the conference program for the interview.

C. The Race:

1. The official distance between the start line and the finish line on the race track is twenty (20) meters.
2. No repair or maintenance is allowed after the entries have been submitted.
3. In the event that the vehicle is damaged by conference personnel, the event coordinator rules as to whether or not the vehicle may be repaired by the student entering the vehicle. This is the only reason a student is allowed to touch his/her vehicle after registration.
4. All CO_2 cartridges for the race are provided by national TSA.
5. Cars that lose wheels, bearings, screw-eyes will not continue to race.
6. Damaged wheels may not be replaced.

EVALUATION

PRELIMINARY ROUND

A. Sixteen (16) qualifying entries

SEMIFINAL ROUND

A. Dragster construction, interview, and race points

Refer to the official rating form for more information.

TSA HONOR STATEMENT

All work must be created and completed by individual competitors or teams. Plagiarism, the use of Generative Artificial Intelligence (GenAI) software, copyright violation, cheating, and falsification of information are prohibited. Participants may NOT use any generative artificial intelligence (GenAI) tools (e.g. ChatGPT, Google Gemini, GitHub Copilot, etc.). Any attempt to gain an unfair advantage will not be tolerated. Competitors at any level of TSA competition understand and agree to abide by the TSA Honor Statement.

If it is determined that a student violated the TSA Honor Statement, a rules violation of twenty percent (20%) will be incurred.

STEM INTEGRATION

This event has connections to the STEM areas of Science, Technology, Engineering, and Mathematics.

LEADERSHIP AND 21ST CENTURY SKILLS

This event provides opportunity for students to build and develop leadership and 21st 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, and Flexibility/Adaptability

CAREERS RELATED TO THIS EVENT

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

- Aeronautical engineer
- Automotive designer
- Automotive modeler
- Industrial designer
- Industrial engineer
- Mechanical engineer
- Race car engineer

Dragster body	MINIMUM	MAXIMUM
1. The Dragster body must be one (1) piece of any species of wood or can be from plastics, including urethane modeling foam. It may be produced using traditional hand tools, power tool, CNC Milling and 3D printing, following applicable safety rules. a. Two (2) or more like or unlike pieces of material glued together are not considered one (1)-piece b. Any type of lamination will result in disqualification. c. No add-ons, such as body strengtheners, fenders, plastic canopy, exhausts, or air foils may be attached to or enclosed within the vehicle. Hydro dipping technique is permitted. d. Fiberglass, vinyl wrap, and shrink wrap are considered body strengtheners and cannot be used on the car body for any reason. e. Decals may be used for decoration only; they may not be used to gain an aerodynamic advantage, i.e., decals cannot cover the exterior axle holes or be used to cover open areas of the body.		
2. Body length * denotes specific school year requirement	*(2026) – 280mm *(2027) – 230mm	290mm 240mm
3. Body height with wheels		75mm
4. Body mass (completed car without CO_2) * denotes specific school year requirement	*(2026) – 40g *(2027) – 55g	55g 65g
5. Body width at the point the axles pass through the body, front and back	35mm	42mm
6. Vehicle total width (including wheels).		90mm

Axles/axle holes/wheelbase	MINIMUM	MAXIMUM
1. Dragsters must have two (2) axles per car, no more.		
2. Bottom of axle hole or bearing above bottom of car body. (NOTE: This will only be measured at the lowest point of the side surfaces of the wood car body at the axle hole.)	5mm	10mm
3. Axle hole from front and rear of car	10mm	100mm
4. Wheelbase (axle distance apart at farthest points)	105mm	Not specified
5. Bearings, bushings and lubricants may be used.		
6. Glue may only be used to secure bearings to body.		

Spacer washers/clips	MINIMUM	MAXIMUM
1. Spacer washers		10
2. Axle clips		8
3. Silicone or any other type of glue/adhesive may not be used in place of wheel clips to hold wheels or axles in place.		

Power plant (CO_2 cartridge hole)		
	MINIMUM	MAXIMUM
1. The power plant hole must be at the farthest point at the rear of the car and must be drilled parallel to the racing surface to assure proper puncture of the CO_2 cartridge. a. A minimum of 5mm thickness around the entire power plant hole must be maintained on the dragster for safety. b. There should be no paint inside the CO2 cartridge hole.		
2. Hole depth	45mm	55mm
3. Safety zone thickness	5mm	
4. Chamber diameter	19mm	20mm
5. Lowest point of chamber diameter to race surface (with wheels)	26mm	40mm

Eye screws		
	MINIMUM	MAXIMUM
1. Dragsters must have no more than two (2) eye screws per car that meet tolerances. a. Eye screws must not make contact with the racing surface. b. The track string must pass through both eye screws, which are located on the center line of the bottom of the car. c. Eye screws may be glued in place with CA glue or epoxy. d. It is the responsibility of the car designer/engineer to see that the eye screw holes are tightly closed to prevent the track string from slipping out. e. Any adjustments must be done prior to event check-in.		
2. Inside diameter	3mm	5mm
3. Distance apart (at farthest points)	150mm	Not Specified

Wheels		
	MINIMUM	MAXIMUM
1. A dragster must have exactly four (4) wheels, each of which separately must meet regulations in items in 2 and 3 below. a. All four (4) wheels must touch the racing surface at the same time. b. All wheels must roll. c. Wheels must be made entirely from plastic. d. Dimensions must be consistent for the full circumference of the wheel.		
2. Wheel diameter	30mm	40mm
3. Wheel width* * Width is determined by the continuous point of contact between the wheel and track or flat surface.	2mm	18mm

Participant/Team ID# _____

DRAGSTER

2026 & 2027 OFFICIAL RATING FORM

MIDDLE 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.

☐ Car is present

☐ ENTRY NOT EVALUATED

PRELIMINARY DRAGSTER QUALIFYING RACE / POST RACE INSPECTION	YES	NO
Qualified Top 16 in Qualifying Race Speed		
Passed Top 16 Regulations Inspection		
Qualified Top 16 Legal (still safe to race) Cars for Interview and Final Race		
Please mark an "X" for each criteria. If all three are marked YES, place an "X" in the final box.		

SEMIFINAL DRAGSTER CONSTRUCTION (60 points)				Record scores in the column spaces below.
CRITERIA	Minimal performance	Adequate performance	Exemplary performance	
	1-4 points	5-8 points	9-10 points	
Dragster Body Production Quality (X1)	Dragster exhibits poor production quality, with a crude and rough surface and little or no attention to detail.	Dragster shows evidence of proper production techniques; it is adequate but may need improvement.	Dragster displays excellent production techniques, with obvious attention to detail and quality.	
Body Paint/Finish (X1)	Surface preparation is inadequate; the body is unprimed, with poorly applied final finish.	Dragster body is painted and finished adequately.	Dragster body finish is exemplary; body is smooth, shiny, and exhibits quality.	
Vehicle Assembly (X1)	Dragster exhibits poor or sloppy assembly of parts (loose wheels, eye screws are not level, and/or they are loose, etc.).	Dragster is well assembled, and adequately meets standards.	Dragster is properly assembled, with obvious evidence of attention to detail.	
Drawing Scale and Dimensioning (X1)	The drawing is present, but is not to scale; dimensions are missing, or dimensioning is poorly done.	The drawing is acceptable and to scale; it is a close representation of the vehicle, but some dimensions may be missing.	The drawing is exemplary, exact, and includes all pertinent dimensions.	
Drawing Completion and Quality (X1)	The drawing is sloppy, missing parts, and lacking quality.	The drawing is complete, and the quality is adequate.	The drawing is complete and precise, and of exceptional quality.	

SEMIFINAL DRAGSTER CONSTRUCTION (60 points) – continued				
Materials List (X1)	Materials List is present, but has very few items listed and lacks organization; has the appearance of being thrown together at the last second.	Materials list is present and lists the majority of parts.	Materials list is complete and detailed.	
			SEMIFINAL DRAGSTER CONSTRUCTION SUBTOTAL (60 points)	

SEMIFINAL INTERVIEW (20 points)				Record scores in the column spaces below.
CRITERIA	Minimal performance	Adequate performance	Exemplary performance	
	1-4 points	5-8 points	9-10 points	
Car Builder Interview (X2)	The participant shows very limited knowledge of (and has difficulty articulating) how the car was produced or decisions made during the production; the participant exhibits a basic understanding of design elements and functionality, and the rationale is inconsistent or absent.; leadership and/or 21st century skills are not evident.	The participant demonstrates some knowledge of the dragster production and has adequate knowledge of some processes or reasoning behind the vehicle design; leadership and/or 21st century skills are somewhat evident.	The participant demonstrates competence and knowledge related to the design and production of the dragster and articulates the "reasoning" behind the decisions made; leadership and/or 21st century skills are clearly evident.	
			SEMIFINAL INTERVIEW SUBTOTAL (20 points)	

SEMIFINAL RACE (55 points)							
1st	2nd	3rd	4th	5th & 6th	7th & 8th	9th-12th	13th – 16th
55 Points	50 Points	45 Points	40 Points	35 Points	30 Points	25 Points	15 Points
						SEMIFINAL RACE SUBTOTAL (55 points)	

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

Indicate the rule violated: _____

SUBTOTAL (135 points)

To arrive at the TOTAL score, add any subtotals and subtract rules violation points, as necessary. **TOTAL** (135 points)

Comments:

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

JUDGE

Printed name: _____ Signature: _____

DRAGSTER
EVENT COORDINATOR INSTRUCTIONS

PERSONNEL

A. Event coordinator

B. Judges:

   1. Preliminary round, two (2) or more
   2. Semifinal round, two (2) or more

C. Recorder for double elimination chart, one (1)

D. Assistants, two (2)

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. Stick-on labels for identifying entries (three [3] per entry; one [1] each for the car, drawing, and materials list

B. Time trial record sheet

C. Qualifier Interview Time Slot sheet

D. Double elimination bracket chart

E. CO_2 cartridges

F. Go/No-Go gauges for all judges

G. Metric scientific scales (triple beam balance or digital)

H. Mono-filament fishing line (50lb) for track (4 pre-tied, 2 on track, and 2 reserve)

I. Race track set, including a starting gate and a finish gate with digital timer and winning lane indicator

J. Padding for the finish gate

K. One (1) or more test cars

L. Tables for the display of cars and for evaluation

M. Table at the starting line for arranging and holding cars prior to the races

N. Table at the finish gate for the placement of cars after the races and to hold eliminated cars

O. Table for the official time keeper

P. When using a computer controlled track, provide the proper computer for the software being used, all necessary connections, and a printer (placed on the official time keeper's table)

Q. A method for displaying the time trial and race brackets

RESPONSIBILITIES

AT THE CONFERENCE

A. Attend the mandatory event 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 to be held for appropriate set-up, including room size, chairs, tables, outlets, etc. Notify the event manager of any potential problems.

E. Ensure the judges have access to the online judging system.

CHECK-IN

A. Participants report to the time and place stated in the conference program and check in:

   1. The dragster entry
   2. Full-size metric drawing of the completed vehicle
   3. A letter-sized, printed materials list fixed to the back of the technical drawing

B. Late entries are considered on a case-by-case basis and only when the lateness is caused by events beyond the participant's control.

C. In order to compete, participants must be on the entry list or must have approval of the CRC.

D. Requirements for attire do NOT apply during check-in, only on the first day of the conference.

E. Check to see that each entry drawing includes the participant's identification number in the upper right-hand corner of the paper.

F. Position each entry (dragster and drawing) for evaluation and viewing.

G. Secure the entries in the designated area.

PRELIMINARY ROUND

A. At least one (1) hour before the event is scheduled to begin, meet with judges/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.

B. Begin the time trials at the scheduled time.

   1. Every race-worthy car should be tested.
   2. Students do not have to be present.
   3. Public viewing is allowed.

C. Position a judge at the starting gate to ensure that all cars are positioned in the starting gate correctly.

D. Position another judge at the finish line.

E. If there is a misfire or if a time is not properly recorded, a rerun may be ordered at the discretion of the event coordinator.

F. Record preliminary times on a time trial record sheet.

G. Assist judges with the inspection of the cars to specifications/tolerances and then the evaluation of the design, drawing, and construction categories.

H. Judges verify that the top sixteen (16) qualifying cars meet Regulation C specifications.

I. Entries that do not meet specifications are removed.

J. Cars that are damaged or broken during the qualifying round are deemed non-raceable and also are removed.

K. Only raceable cars, as determined by the judges, are allowed to compete for the semifinalist category.

L. Lower qualifying cars are moved up until there are sixteen (16) legal semifinalists.

M. Submit the semifinalist results to the designated location.

N. Place each car in the double elimination race bracket (see next page for sample) according to the rank of its qualifying time.

O. Post Semifinalist List and at a designated time and place have semifinalists sign up for interview times.

SEMIFINAL ROUND

A. Begin the semifinals at the scheduled time.

B. Car builders report to the track at the posted time for a five (5)-minute interview.

C. Only the sixteen (16) qualifying cars are raced.

D. Students do not have to be present.

E. Public viewing is allowed.

F. Discuss rule violations (e.g., 20% deduction, disqualification) and have all relevant parties initial the rating form.

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

H. Checking for ID, allow competitors to claim their entries at a specified time at the track location.

RACE BRACKET FOR 16-CAR DOUBLE ELIMINATION

Double Elimination Tournament Chart Seeded 16 player Field