

# RUBBER BAND POWERED CAR

## OVERVIEW

Applying leadership and 21st-century skills, participants demonstrate their ability to design and construct a vehicle powered only by a rubber band and a bladed propeller, to travel a specified distance as fast as possible.

## ELIGIBILITY

Open to middle school and high school chapters. Three (3) individuals per chapter may participate.

## ATTIRE

TSA competition attire is required.

## PREPARATION

### PRE-CONFERENCE

- A. Participants access the annual theme in the Colorado TSA State Competitive Events Guide.
- B. Participants prepare their documentation and rubber band vehicle according to the regulations.

### PRELIMINARY ROUND

- A. Participants will design and build a vehicle powered by a rubber band and a propeller.
- B. Participants will turn in their vehicle and documentation portfolio to the display area at the beginning of the conference.

### SEMIFINAL ROUND

- A. Participants will launch their own vehicles.
- B. The vehicles will race against the stopwatch.
- C. Each vehicle will race three (3) times and an average speed will be calculated.

## REGULATIONS AND REQUIREMENTS

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

- A. The Documentation Portfolio
  - a. The documentation portfolio must be saved as a single, multi-page PDF document with the pages presented in the following order:
    - i. Title page with the event title, the conference state, the year, and the participant ID number; one (1) page
    - ii. Table of contents; pages as needed
    - iii. Design drawings detailing each part of the mousetrap vehicle; pages as needed
      1. CAD or hand-drawn projections that include the following: two (2)-dimensional views of the top, front, and side.
    - iv. Photographs of the final build; pages as needed
    - v. References and Resources in proper Modern Language Association (MLA) style; pages as needed
- B. The Vehicle
  - a. No kits are allowed; the participant must create their own vehicle.
  - b. All entries must be designed and constructed before the conference.
  - c. Specifications
    - i. Vehicles should resemble a real-life commercial production vehicle and not just use a simple stick and propeller configuration.
    - ii. The vehicle body must be three (3)-dimensional not just have a profile of a vehicle shape.
    - iii. The car will be powered by a single 7"x 1/8" rubber band (also known as a file band) attached to a bladed propeller
      1. Propeller examples: [puller](#), [puller](#), [pusher](#)
    - iv. The car must be powered solely by the rubber band and bladed propeller; the rubber band should NOT be used in a manner other than to provide power to the propeller.
    - v. The car may not exceed 24" in length.
    - vi. The car may not exceed 8" in width.
    - vii. The car may not exceed 10" in height. The height of the car includes the propeller blades.
- C. Vehicles that do not meet the specifications are disqualified from the race.

- D. Submission
  - a. Participants will check in their entry (vehicle/portfolio) at their scheduled interview/testing time stated in the conference schedule.
  - b. Submission information will be provided in the Colorado TSA State Competitive Events Guide.
- E. Judges test the vehicles and score the entries at the time listed in the conference schedule.
- F. Entries received after the time listed in the conference schedule will not be judged.
- G. Winners are announced

### **SEMIFINAL ROUND**

- A. The Race
  - a. Track
    - i. The track used should be 20' long and clearly marked with a starting line and finish line.
    - ii. The track used should be a smooth, hard surface such as hardwood, vinyl, or laminate flooring.
  - b. No repair or maintenance is allowed after the entries have been checked in.
  - c. Any entry damaged during the race is evaluated by the event coordinator to determine whether or not the vehicle is allowed to race again.
  - d. The cars will race against the stopwatch. Each car will race three times, and an average speed will be calculated.
- B. The top three (3) finalists are announced.

### **EVALUATION**

#### **PRELIMINARY ROUND**

- A. The documentation portfolio
- B. The vehicle

#### **SEMIFINAL ROUND**

- A. The race

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 an 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
- Flexibility/Adaptability

### **CAREERS RELATED TO THIS EVENT**

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

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

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## 2022 OFFICIAL RATING FORM

### MIDDLE AND 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.

- # Documentation portfolio was submitted
- # Vehicle was submitted
- # ENTRY NOT EVALUATED

DOCUMENTATION PORTFOLIO (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>Design Drawings</b> (X2)	Drawing is not accurate or is missing. It does not include views of the top, front, and side. It is not to scale. Measurements are not included. Does not match photos.	Drawing accurately reflects the design of the vehicle, but is not to scale. Includes only 1-2 of the following views: top, front, and/or side. Measurements are included. Matches photo image.	Drawing accurately reflects the design of the vehicle. Includes two (2)-dimensional views of the top, front, and side. It is to scale. Measurements are included. Photo is exactly like drawing.	
<b>Photographic Verification</b> (X1)	Photographs of the final build are not included/photographs are extremely blurry and unclear.	Photograph of the final build is included. Rulers/other measurement tools are used in the photo to verify the specifications of the final build.	Photographs of the final build are included. Multiple point of views are evident. Rulers/other measurement tools are used in the photos to verify the specifications of the final build.	
<b>Trials Log</b> (X1)	Trials log is not included or is missing signature verification.	Trials log is included with proper signatures, but is missing key information for multiple trials.	Trials log is included with proper signatures and has all necessary trial information filled in.	
<b>References and Resources</b> (X1)	A list of tools, software (if any) and resources/references used may not be included or is incomplete and/or MLA format is not used.	A list of tools, software (if any) and resources/references used is included. MLA format is used.	A detailed list of tools, software (if any) and resources/references used is included. MLA format is used.	
<b>DOCUMENTATION PORTFOLIO SUBTOTAL (50 points)</b>				<b>0</b>

VEHICLE (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>Design Specifications</b> (X1)	Vehicle does not meet the design specs for width and length and is out of spec for the duration of the race.	Vehicle does not meet one of the specs for width or length. It remains in spec during the race.	The vehicle meets design specs for width and length. It remains in spec during the race.	

<b>Power (X1)</b>	The vehicle is not powered only by a single, 7"x1/8" rubber band attached to a bladed propeller.	N/A	The vehicle is powered only by a single, 7"x1/8" rubber band attached to a bladed propeller.	
<b>Appearance (X1)</b>	Vehicle has two or more needs for improvement: glue usage, tight fitting pieces, and cuts are clean.	Vehicle is neatly done, but there is one need for improvement: glue usage, tight fitting pieces, and cuts are clean. Vehicle is painted or decorated.	The vehicle is neatly constructed, using a proper amount of glue, tight fitting pieces, and cuts are clean.	
<b>Integration of Theme (X1)</b>	The current theme is not demonstrated in the vehicle.	The current theme is adequately demonstrated in the vehicle. Theme/decoration may occasionally interfere with operation of vehicle.	The current theme is exceptionally well demonstrated in the vehicle. Theme/decoration does not interfere with the operation of the vehicle.	
<b>Speed (X1)</b>	The vehicle takes more than 5.00 seconds to travel twenty (20) feet.	The vehicle takes 3.00-5.00 seconds to travel twenty (20) feet.	The vehicle takes less than 3.00 seconds to travel twenty (20) feet.	
<b>VEHICLE SUBTOTAL (50 points)</b>				0

TIME TRIALS (Distance traveled in inches / Time in seconds)		Record scores in the column spaces below.
<b>Speed Trial 1</b>	_____ inches / _____ seconds =	
<b>Speed Trial 2</b>	_____ inches / _____ seconds =	
<b>Speed Trial 3</b>	_____ inches / _____ seconds =	
<b>CALCULATE AVERAGE SPEED AND MULTIPLY X10</b>		0

<p>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.</p> <p>Indicate the rule violated: _____</p>	
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<p><b>To arrive at the TOTAL score, add any subtotals and subtract rules violation points, as necessary.</b></p> <p><b>TOTAL</b></p>	0
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