

# NoCo TIME TRIALS

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# NoCo Time Trials Middle School Car Competition

## Solar Powered Division

Platte River Power Authority's NoCo Time Trials is an annual event adapted from NREL's Colorado Middle School Car Competition. The trials are a way for students to apply STEM (science, technology, engineering and mathematics) principles in a hands-on learning experience. Students are evaluated on the designs they come up with and get the opportunity to race against other students!

### Primary goals of the NoCo Time Trials

- Encourage enthusiasm for STEM programs in a competitive, yet supportive environment.
- Improve students' understanding of scientific concepts and renewable energy technologies.
- Understand Platte River's mission of providing reliable, sustainable, and affordable energy to its communities.

### Event description

- Teachers of participating students will attend an information meeting where they are supplied car kits and general information.
- Students will use collaboration and creativity to assemble cars and make modifications they believe will improve the cars functioning.
- Students are encouraged to challenge themselves and toy with different variables to expand their problem solving and project management skills.
- Teams will compete against each other. Students with the best design and fastest cars will be recognized with awards.

### Competition structure

Platte River will host the annual trials, where each registered car will race twice. Battery powered cars will race in the morning. Students will be assigned a heat in which their car and team members will face off against opponents. After their first trial, students will have 20 minutes to make any necessary adjustments, and then will

complete their second time trial. The fastest score from the two trials will be recorded. Any car that does not finish in 55 seconds will be considered a Did Not Finish (DNF).

Teams are required to use the supplied Ray Catcher solar panel in compliance with their kits as the only method of supplying power to their cars. Other adaptations are allowed, and outside supplies may only be used to increase efficiency, not replace the solar power source.

This is a student competition. All competing cars must be designed and built by the students. Teachers and other non-team members may be consulted but are encouraged to give the students the opportunity to problem solve on their own.

Competing cars will have two categories in which they will compete: fastest car and best design. Fastest car is the car that crosses the finish line in the fewest amount of seconds. The best design award will be predetermined by a judge panel. Judges will receive a criterion in which they will assess each car for its use of STEM principles and diligence to engineering qualities.

### The following materials must be used:

- One Pitsco Ray Catcher Solar Panel (provided)
- Mabuchi 280 motor (provided)
  - Only the Mabuchi motor may be used. Motors may not be re-wound or disassembled.

## Vehicle guidelines

- The car must adhere to all parameters and be structurally sound and safe for contestants and spectators (no sharp edges, projectiles, etc.).
- The vehicle must not exceed the following dimensions 32 cm (12.6 inches) by 61 cm (24.02 inches)
- The vehicle must only use solar powered energy. No batteries, capacitors, flywheels, or other storage devices will be allowed.
- Cars will receive a wire attachment (eyelet or paperclip), that will be used to guide steering. The attachment will hook on to a fishing line that will guide the car along the racetrack. This is the only allowed method of steering. Radio control is not permitted. Lane changing or interference with another car will result in a DNF.

## Track specifications

- Race lanes are 60 cm wide, and 20 meters long.
- Students will have the opportunity to use repair stations provided by Platte River for quick repairs and adjustments. Students in upcoming heats will be given priority at repair stations. Students are asked to be mindful about the amount of time they spend at repair stations, and to share available supplies.
- During races, cars must be placed behind the starting line. All car wheels must be touching the ground. Up to two team members will be permitted in the starting area.
- Students will be given a green flag, when their car is ready to race they will raise the flag. An official signal will be given to initiate the race. Students may not push or touch their car once the race has started. Cars have up to 55 seconds to finish.
- Up to two team members will be permitted at the finish line to catch incoming cars. Team members may not touch the car until it crosses the finish line, unless it is past the allotted 55 seconds, or it is declared by the lead judge.
- Platte River will provide race timekeepers who will use stopwatches to time each vehicle. Timekeeper decisions are final.
- Only competing students and race officials are to be in the race area. All others including teachers and parents must watch the race from designated spectator areas. Teams will be disqualified if there is spectator interference.

- Judges may inspect cars at any time.

## Awards

Students with the fastest car and best design will be awarded. Best design is determined based on the student's demonstration of knowledge, use of STEM principles, ingenuity, testing/adjustments, and teamwork. Runner ups will be recognized in both categories.

Additionally, students are encouraged to show school and team spirit. A team spirit award will be given to the school that displays excellent sportsmanship as voted on by event staff, volunteers, and judges.

*All rules, regulations, and descriptions are adapted from NREL's official procedures for the Colorado Middle School Car Competition.*