Electric Vehicle
Div C

Pete Rado & Brian Hoffman
National Event Supervisors
Tech Committee Members

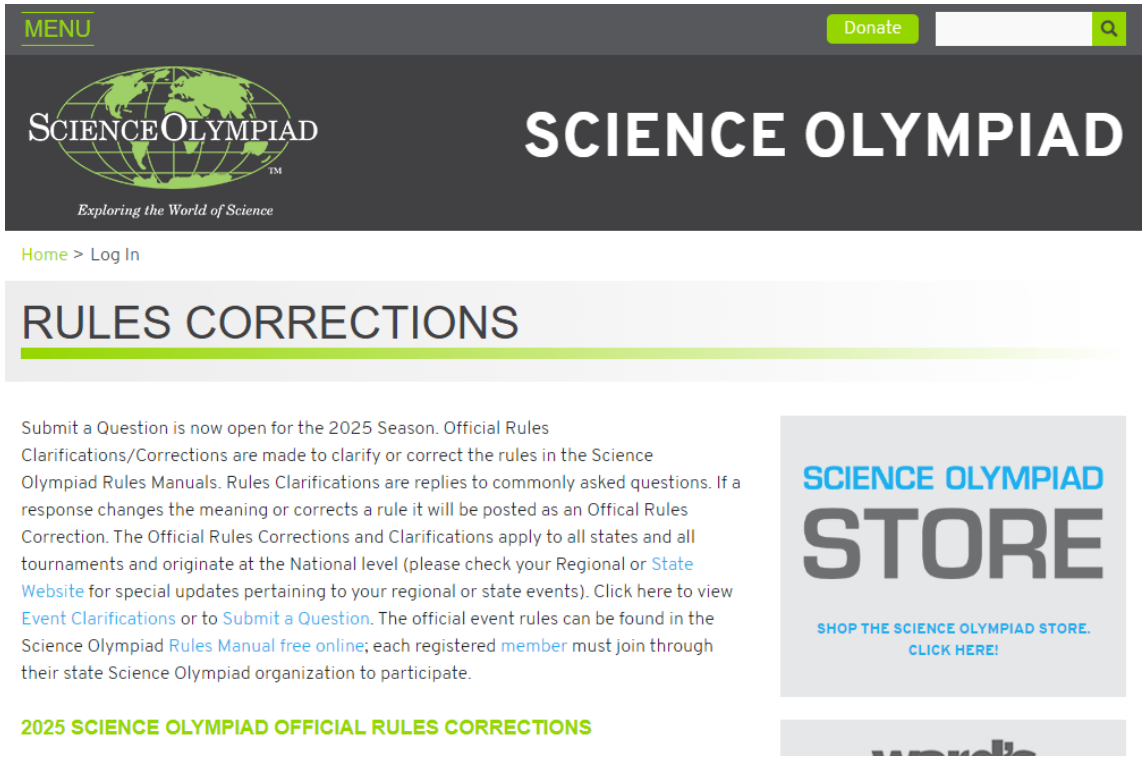
Agenda

- **Basic Event Description**
- **Rules**
  - **Construction Parameters**
  - **Track**
  - **Competition**
  - **Practice Log**
- **Scoring**
  - **Run Score**
  - **Distance Score**
  - **Bonus**
  - **Penalties**
- **Summary / Closing**

Event Description

Teams must design, build, and test one Vehicle that uses electrical energy as its sole means of propulsion to travel a distance as quickly and stop close to a Target Point

Rule Corrections & Clarifications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RULES CORRECTIONS

Submit a Question is now open for the 2025 Season. Official Rules Clarifications/Corrections are made to clarify or correct the rules in the Science Olympiad Rules Manuals. Rules Clarifications are replies to commonly asked questions. If a response changes the meaning or corrects a rule it will be posted as an Offical Rules Correction. The Official Rules Corrections and Clarifications apply to all states and all tournaments and originate at the National level (please check your Regional or State Website for special updates pertaining to your regional or state events). Click here to view Event Clarifications or to Submit a Question. The official event rules can be found in the Science Olympiad Rules Manual free online; each registered member must join through their state Science Olympiad organization to participate.

2025 SCIENCE OLYMPIAD OFFICIAL RULES CORRECTIONS

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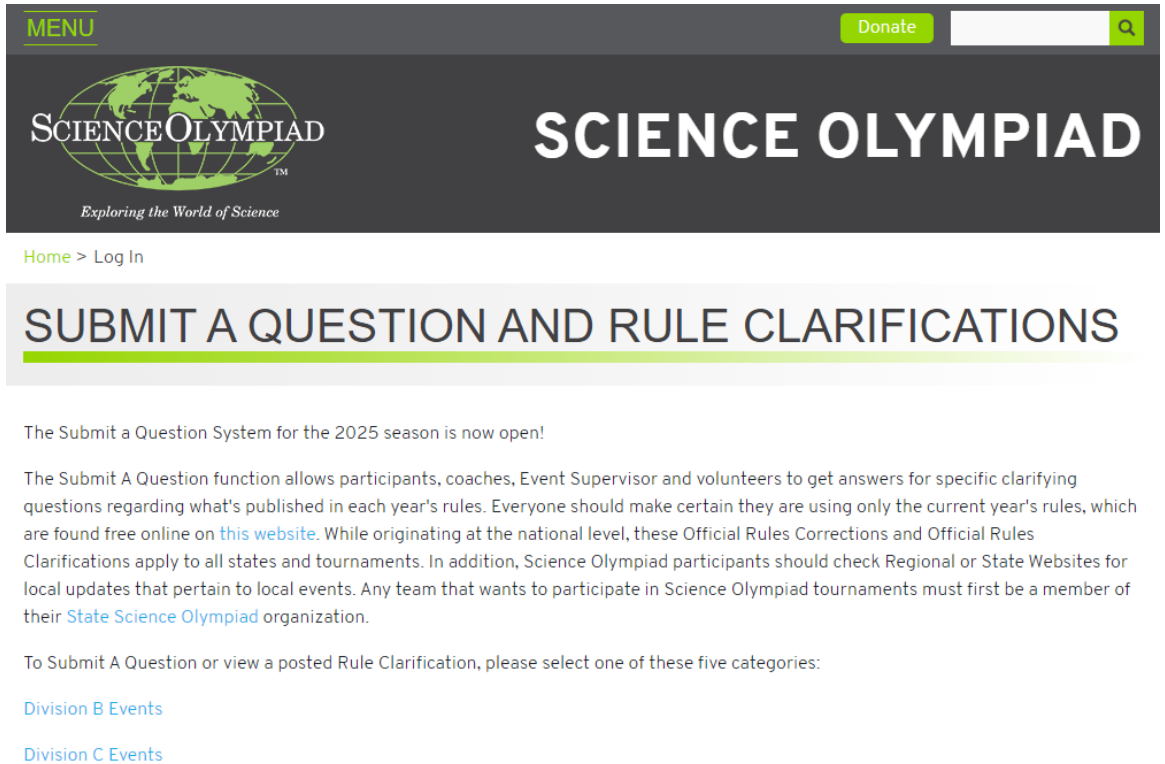
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SUBMIT A QUESTION AND RULE CLARIFICATIONS

The Submit a Question System for the 2025 season is now open!

The Submit A Question function allows participants, coaches, Event Supervisor and volunteers to get answers for specific clarifying questions regarding what's published in each year's rules. Everyone should make certain they are using only the current year's rules, which are found free online on this website. While originating at the national level, these Official Rules Corrections and Official Rules Clarifications apply to all states and tournaments. In addition, Science Olympiad participants should check Regional or State Websites for local updates that pertain to local events. Any team that wants to participate in Science Olympiad tournaments must first be a member of their State Science Olympiad organization.

To Submit A Question or view a posted Rule Clarification, please select one of these five categories:

Division B Events

Division C Events

General Questions

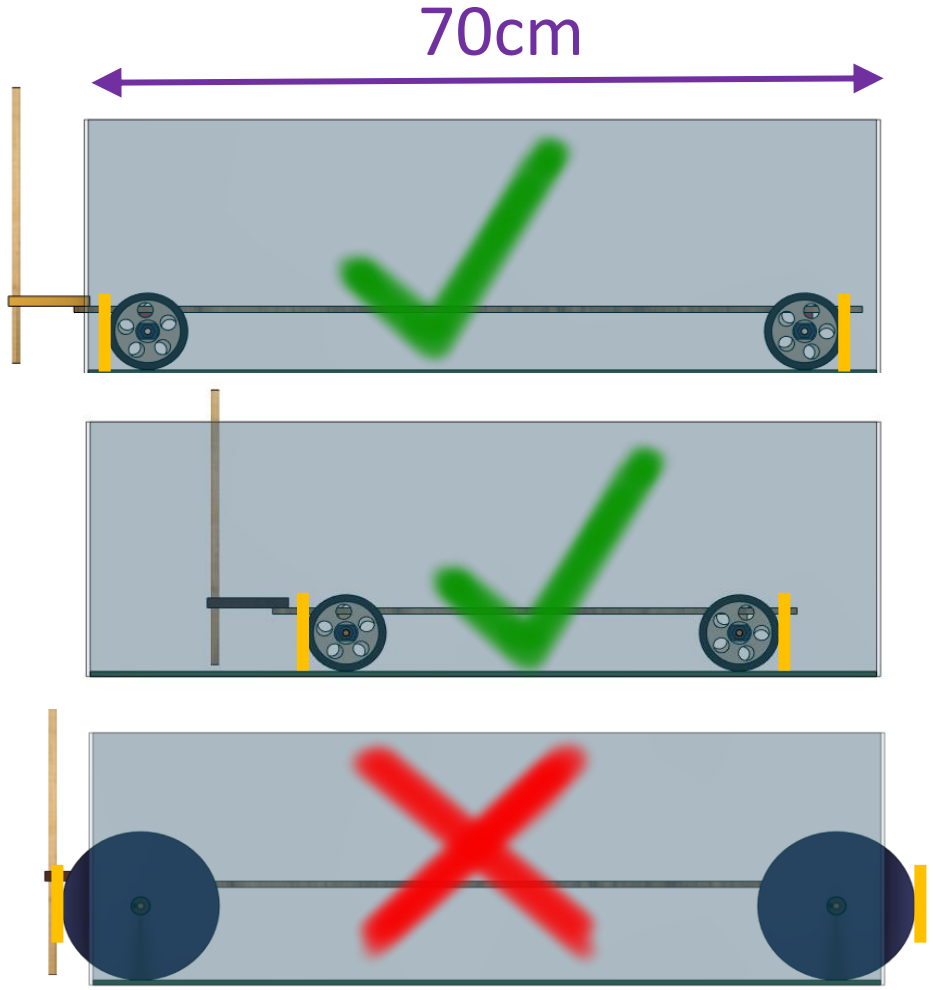
Coaching/Team Requirements

Construction - Energy

- All propulsion energy must be stored in a maximum of 8 AA batteries
  - Rechargeable batteries are allowed
  - Lithium or Lead Acid batteries are NOT allowed

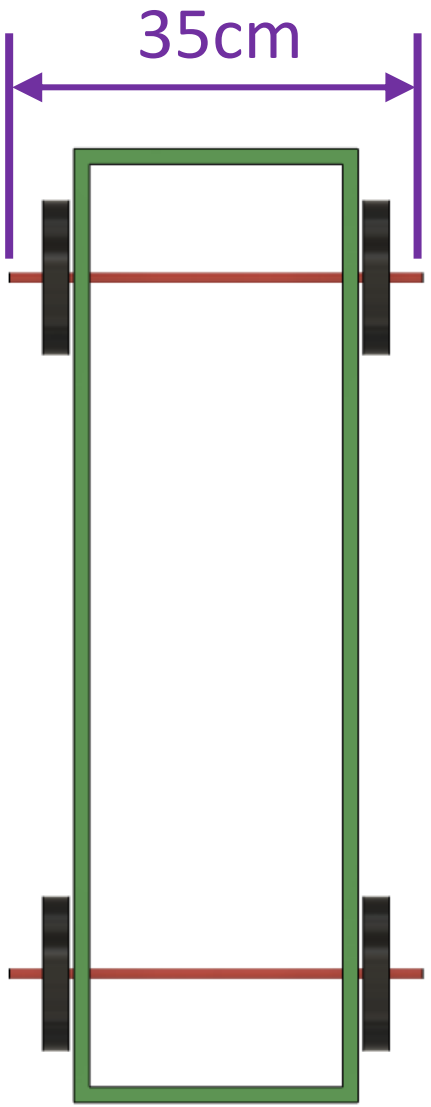
Construction – Size - Length

- Distance from front of the front wheel to the back of the back wheel must not be greater (>) than 70.0cm



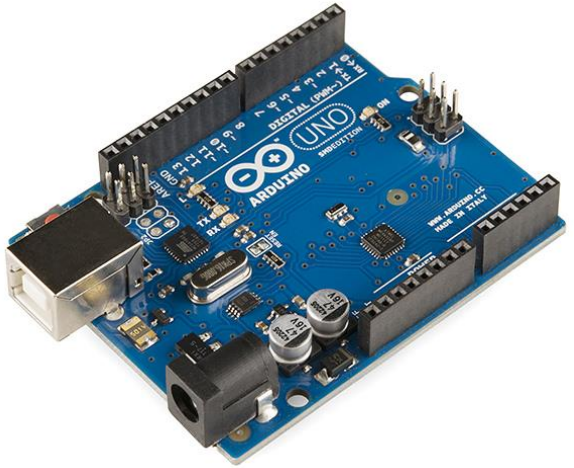
Construction – Size - Width

- The Vehicle width must not exceed 35.0 cm at any point
- Width includes all vehicle components



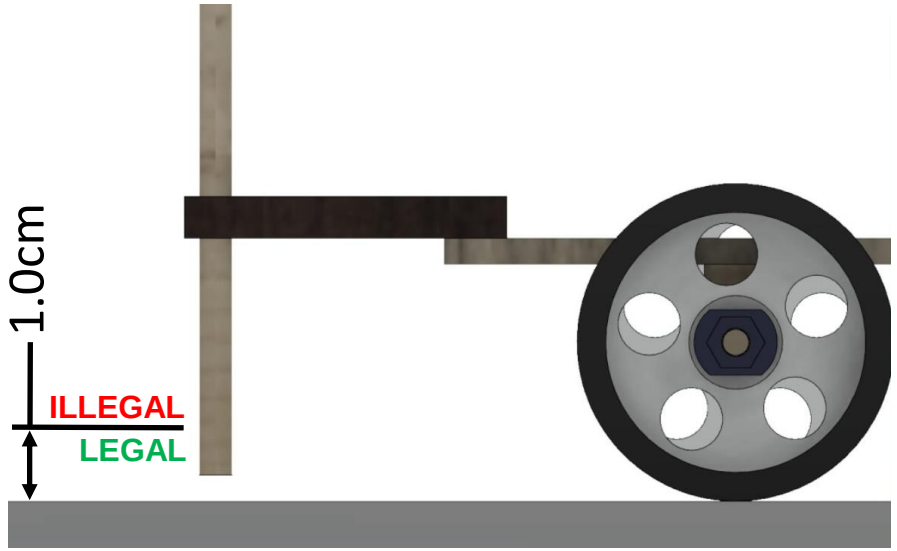
Construction – Electronic Components

- Electronic components are allowed
  - Solid-state devices
  - Integrated circuits
  - Microprocessors
- Communicating over WiFi or Bluetooth is <u>not</u> allowed during the competition

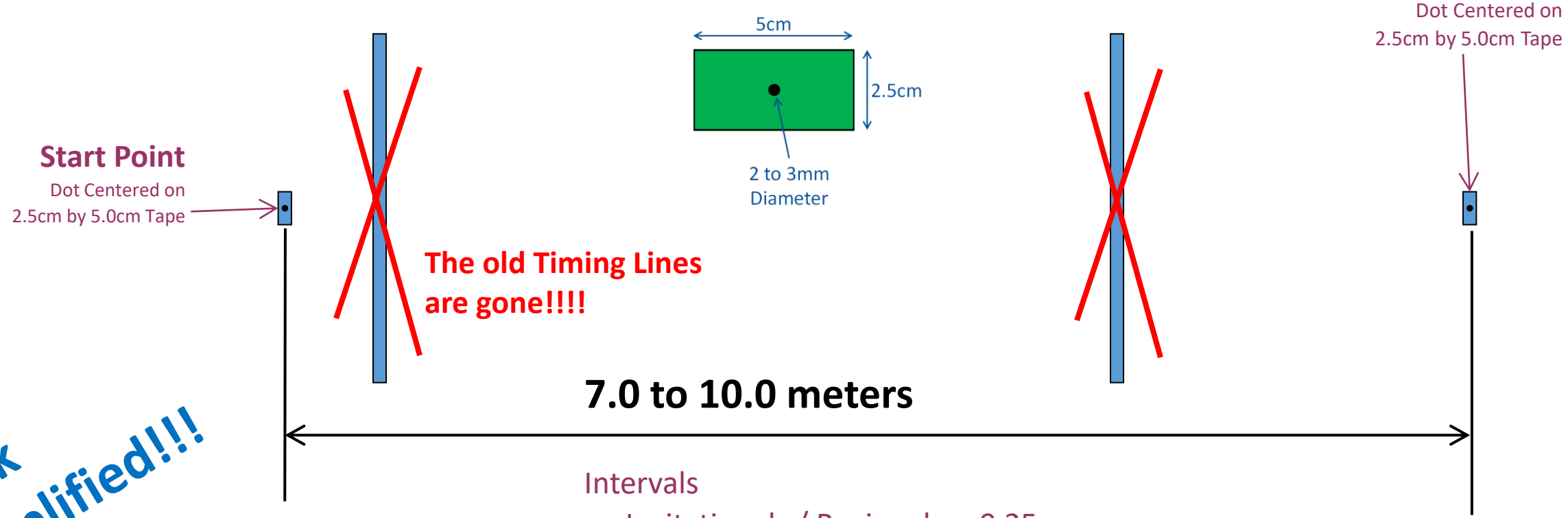


Construction – Measurement Point

- The Vehicle must have a narrow structure at its front which will be used as the Vehicle's Measurement Point (MP) for distance measurements.
  - The MP may be made of any material (e.g. wooden skewer, toothpick, pencil, dowel). Examples include, but are not limited to: tip of a skewer/toothpick, tip of a pen, tip of a nail/paper clip/wire, corner of a wedge, the edge of a dowel.
  - The MP must be less than or equal to 1.0 cm above the Track.
  - The MP does not need to be the foremost part of the Vehicle, but its bottom must be easily accessible while the Vehicle is on the Track.



Track Setup – Start & Target Points



Track Simplified!!!

Intervals

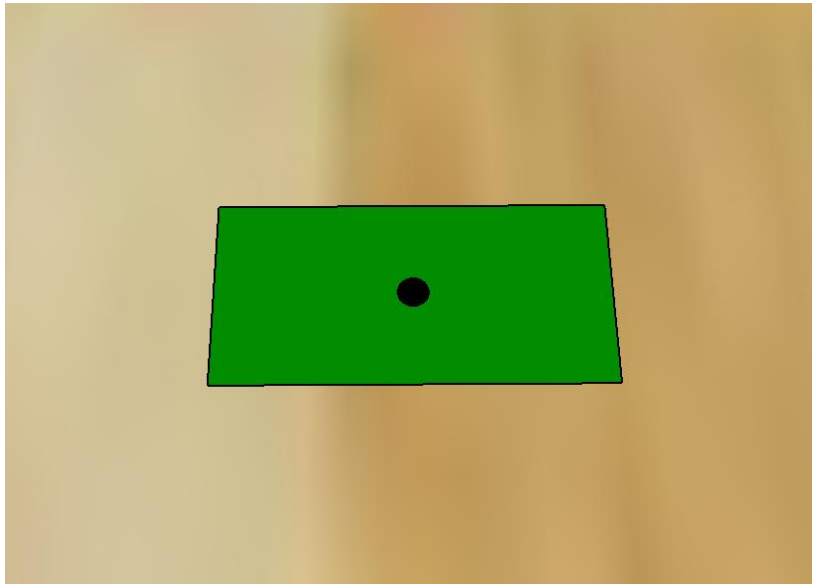
- Invitationals / Regionals 0.25m
- States 0.10m
- Nationals 0.01m

Competition – Event Time

- 8-Minutes for 2 Runs
- Participants are done after the 2nd run or the 8 minutes is reached
- Adjustments or repairs are made during this time
- Event supervisor measurements are not included in 8-minute time

Competition – Ready-to-Run

- In the ready-to-run configuration, the Vehicle's Measurement Point must be over the Start Point



Competition – Starting Vehicle

- Must start Vehicle using any part of an unsharpened #2 pencil in a motion approximately perpendicular to the floor to actuate a trigger

Competition – Failed Run

- Distance or Time cannot be measured
  - e.g. participants pick up the vehicle before measurement
- Vehicle starts before Event Supervisor is ready
- Team pushes the Vehicle down the Track
- The Run does not start within 8-minute time
- Vehicle travels in wrong direction

Practice Log - Optional

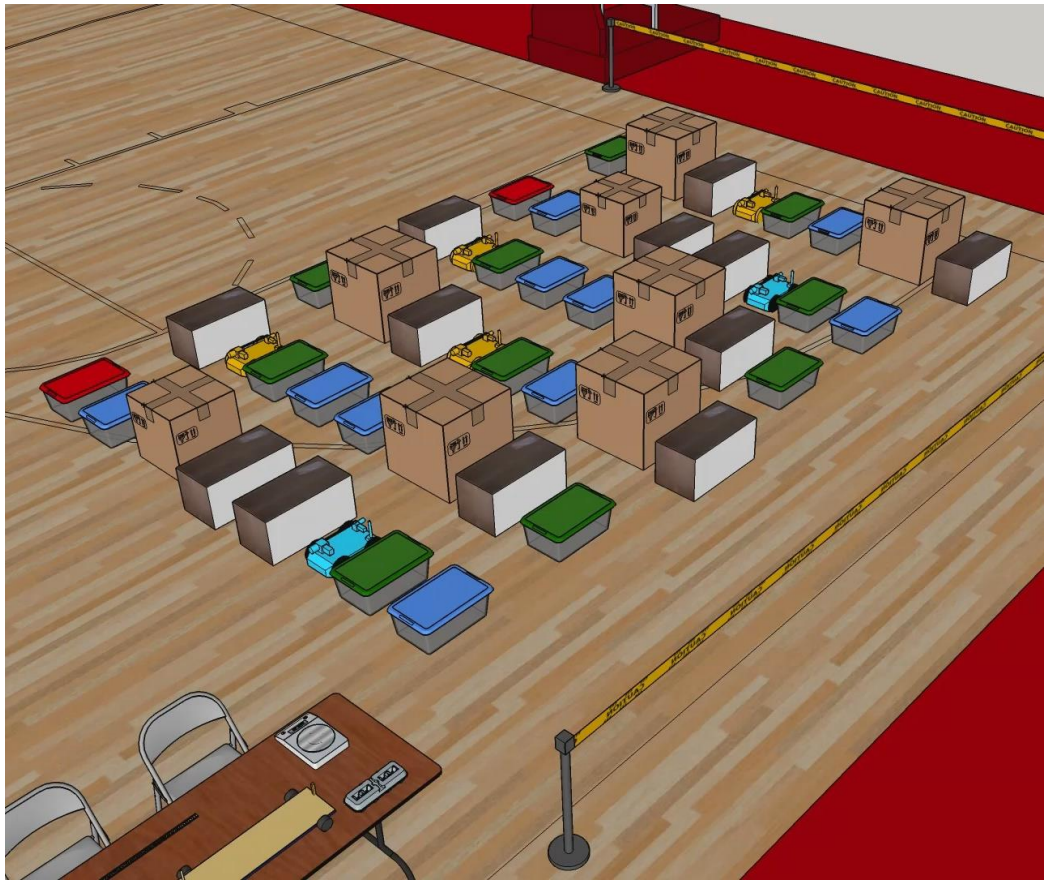
A Practice Log is recommended but not required.

The Practice Log may contain paper for the competitors to use and must be impounded in order for the competitors to use during the competition.

		Distance					
	Target	From	Run	Motor	Brake	Aiming	
Run #	distance	Target	Time	Speed	Winds/Setting	Offset/Angle	Correction

Impound Event

- Electric Vehicle is an Impound Event
- Teams must impound the following before the start of the 1st time slot
  - Vehicle
  - Alignment Devices (if used)
  - Practice Log (if used)
  - Additional / Spare Parts
- Laptops, tablets, or other computers used for programming cannot be impounded



Scoring

UPDATED

Final Score is the better of the 2 Run Scores plus any Final Score Penalties

Run Score = Distance Score + Time Score + Run Penalties

Scoring – Time Score

Time Score = Run Time

The Run Time begins when the **team actuates** the Vehicle and ends when the Vehicle comes to a complete stop

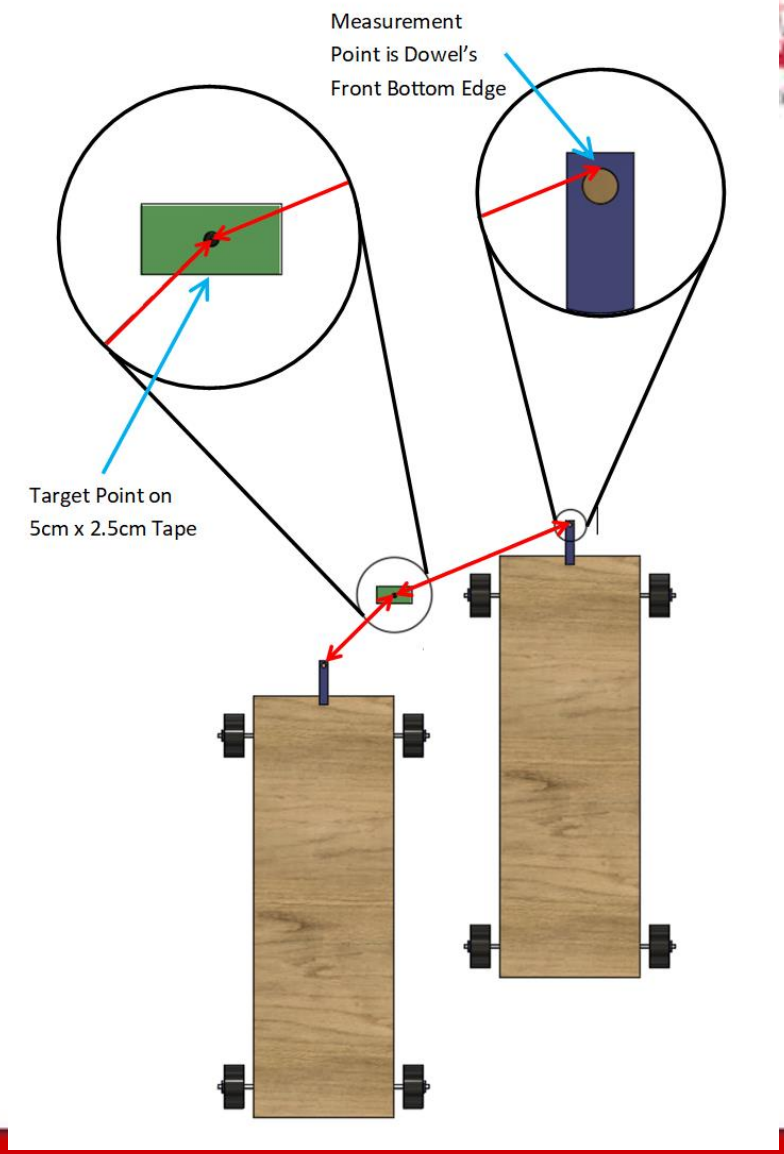
Failed Runs will be recorded as 0.00 seconds

The old Timing Lines are gone!!!!

Scoring – Distance Score

- Vehicle Distance
  - Point to Point Measurement from the Target Point to Vehicle's MP
  - Measured to nearest 0.1cm
- Distance Score = Vehicle Distance * 2 point/cm

- Distance Score for a Failed Run is 2500 points



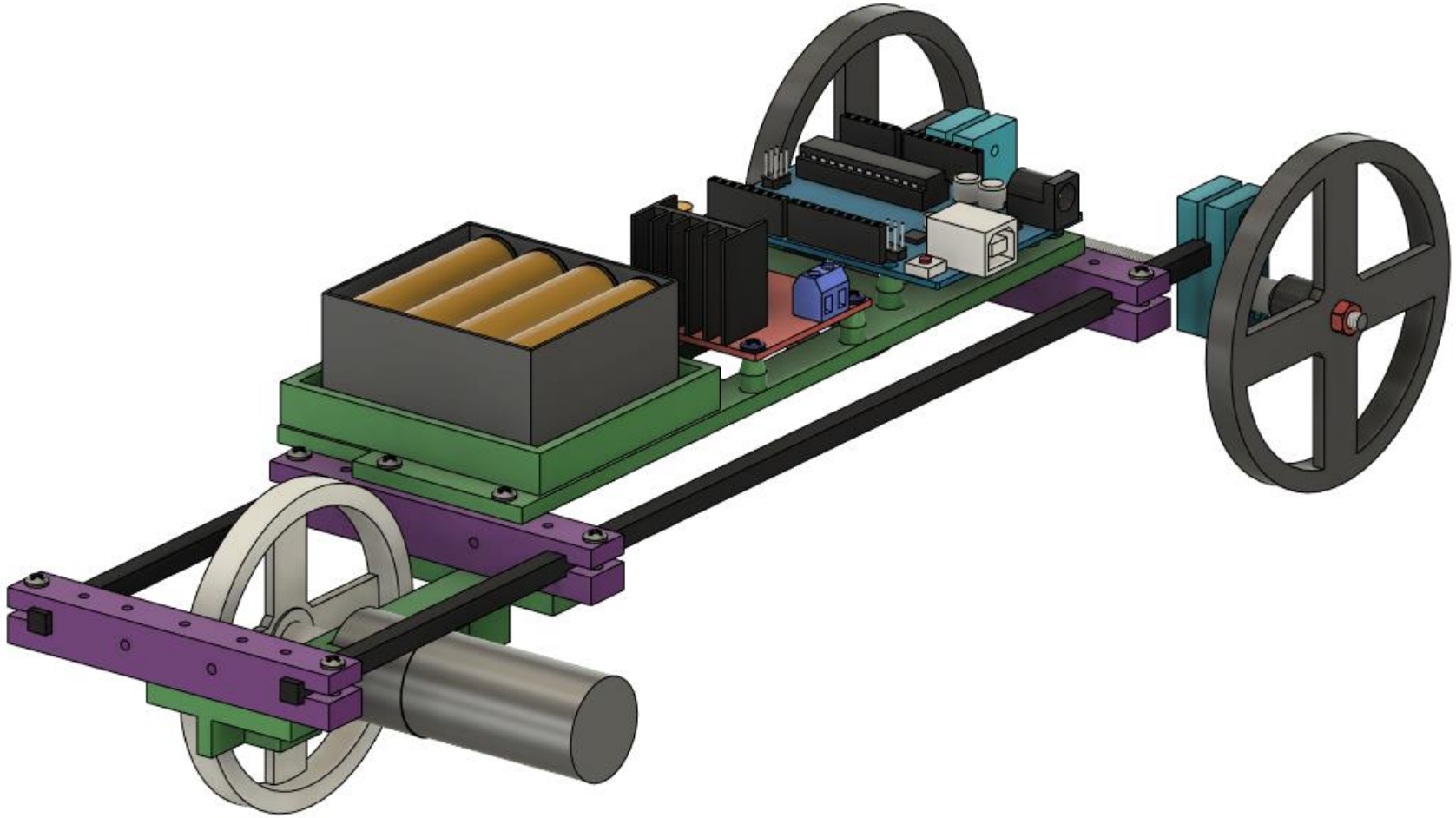
Scoring – Run Penalties

- Competition Violation: 150 points added to the Run Score **per violation**
- Construction Violation: 300 points added to the Run Score **per violation**
- Failed Runs can be assessed violations.

Scoring – Final Score Penalties

- Vehicle Not Impounded: 5000 points added to the team's Final Score.

Building Time



Construction Tips - Stopping

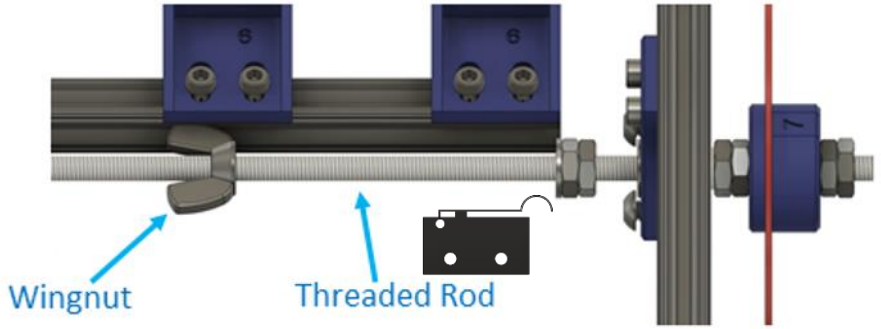
The prayer method – Please let it stop where it is supposed to.

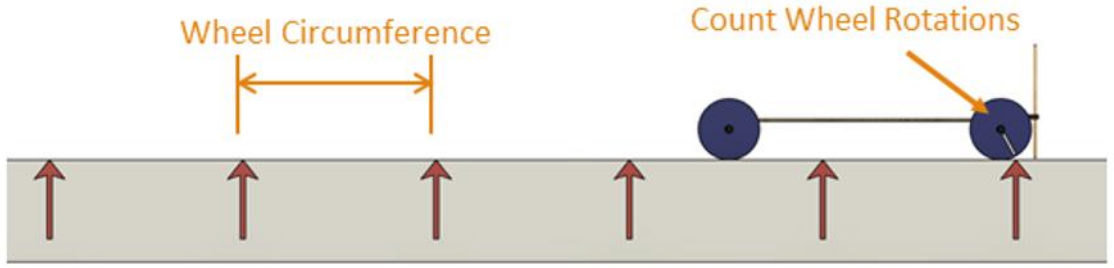
or

An axle and wing nut can still do the job. BUT…

The wing nut must start at a point, move away from the stopper nuts, then move back toward the stopper nuts to stop the vehicle.

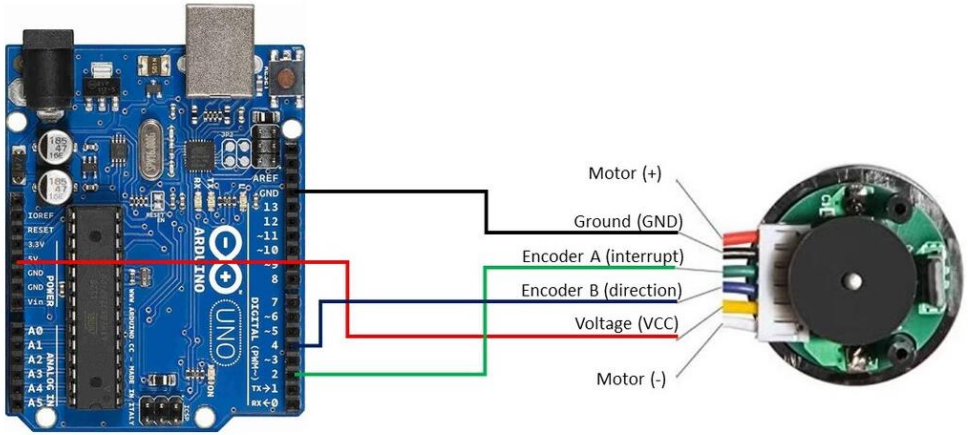
- The students will have to experiment to find the proper starting point.
  - Here is where the Practice Log helps make a winner.

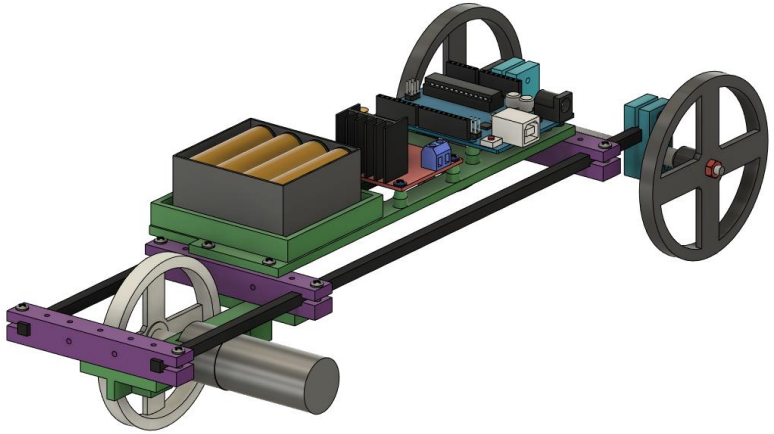


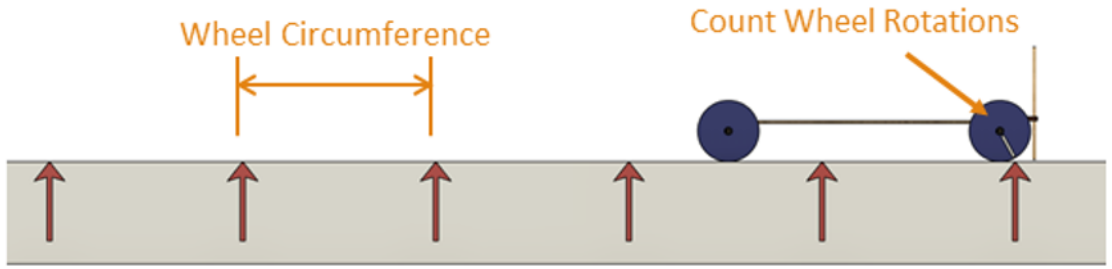


Construction Tips - Stopping

- If using a microprocessor, it is recommended to use an encoder to count the wheel rotations

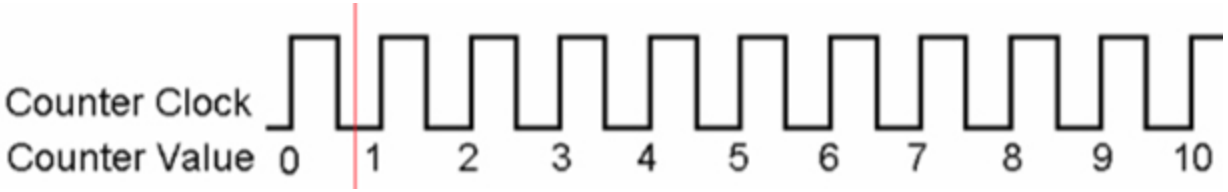


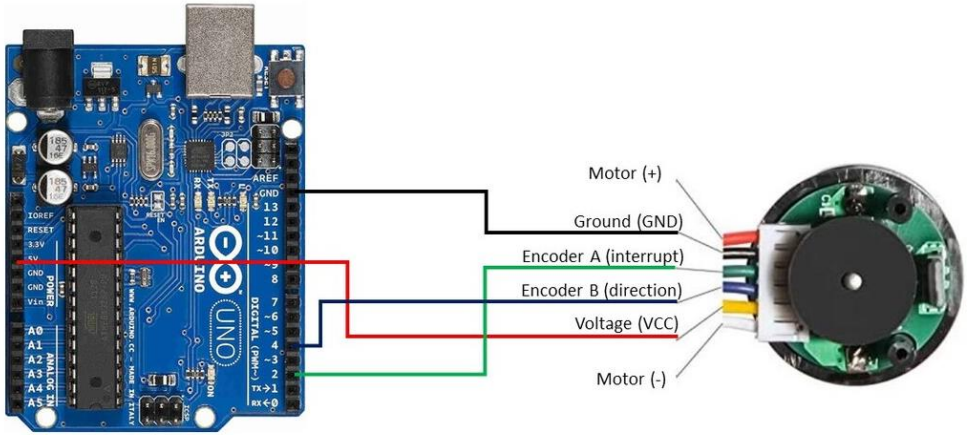


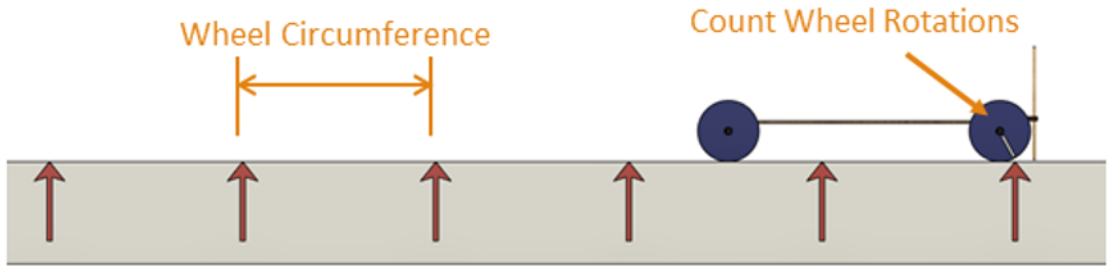


Construction Tips - Encoder

- If using a microprocessor, it is recommended to use an encoder to count the wheel rotations







Encoder Counts

Roll over image to zoom in

- ✓Product type: DC Gear motor with two-channel Hall effect encoder;Rated Voltage: 12V; No-Load Speed: 300RPM; No-Load Current: ≤ 0.15A; Rated Torque: 0.5kg.cm;
- ✓Main Body Dimensions: 66 x 19mm / 2.6in x 0.75in (L*D); Out Shaft Dimensions: 11 x 4mm / 0.433 x 0.1575in (L*D) with 10 x 0.5mm / 0.39 * 0.017inches flat cut off;
- ✓Single Output 240 Pulses Per Revolution: Gear Reduction Ratio: 1/20, Each Loop Output Pulses: 12PPR 20*12=240PPR;
- ✓Wiring Diagram: Red - Motor power terminal (+); Black - Motor power terminal(-); Green - Quad encoder Ground; Blue - Quad encoder +5V Vcc; Yellow - Quad encoder A signal; White - Quad encoder B signal.
- ✓Application: Suit for Projects Such as Robotics, RC Car Model, Custom Servo, Arduino and 3D Printers, DIY Engine Toy.

Report an issue with this product or seller

Encoder Math

$$\text{Encoder Counts} = \frac{\text{Distance to Travel}}{\text{Wheel Circumference}} \text{ X Pulses per Revolution}$$

Example:

Distance = 10 Meters
7.5cm Wheel : 23.6cm
Encoder 240 PPR

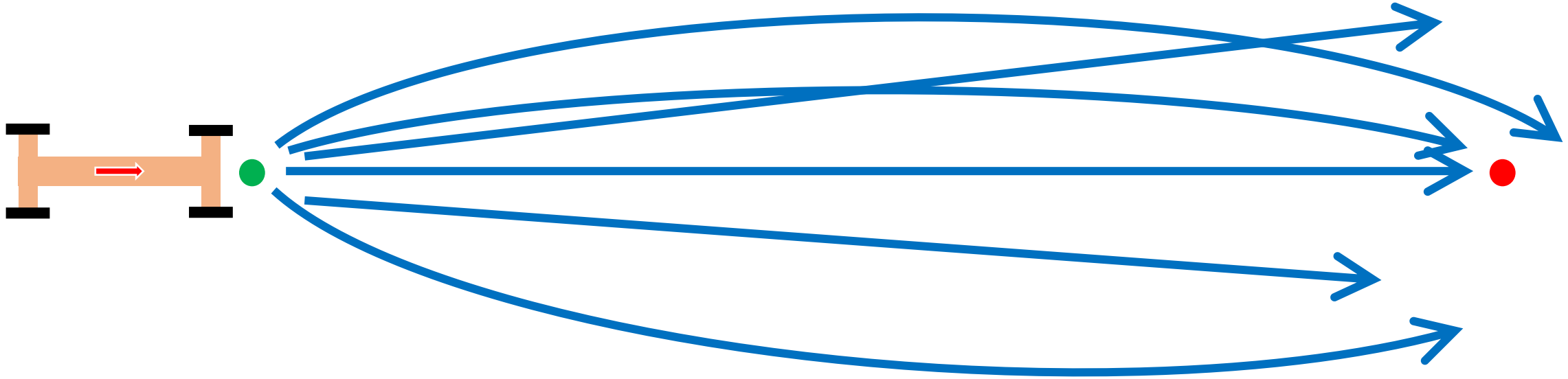
Counts = 10m / 23.6cm * 240
= 1000cm / 23.6cm * 240
= 10,169 counts

Construction Tips – Chassis Materials

- Carbon fiber tubes
  - Arrows commonly found in the sports department at stores.
    - Sort among them, the cheap ones do just as well as the expensive ones.
    - When they are cut to size, be careful of splinters, they travel.
- Extruded aluminum
  - Easy to use but can be more expensive
    - More under resources
- Wood, balsa or other
  - Not very expensive
  - Can be hard to make adjustments

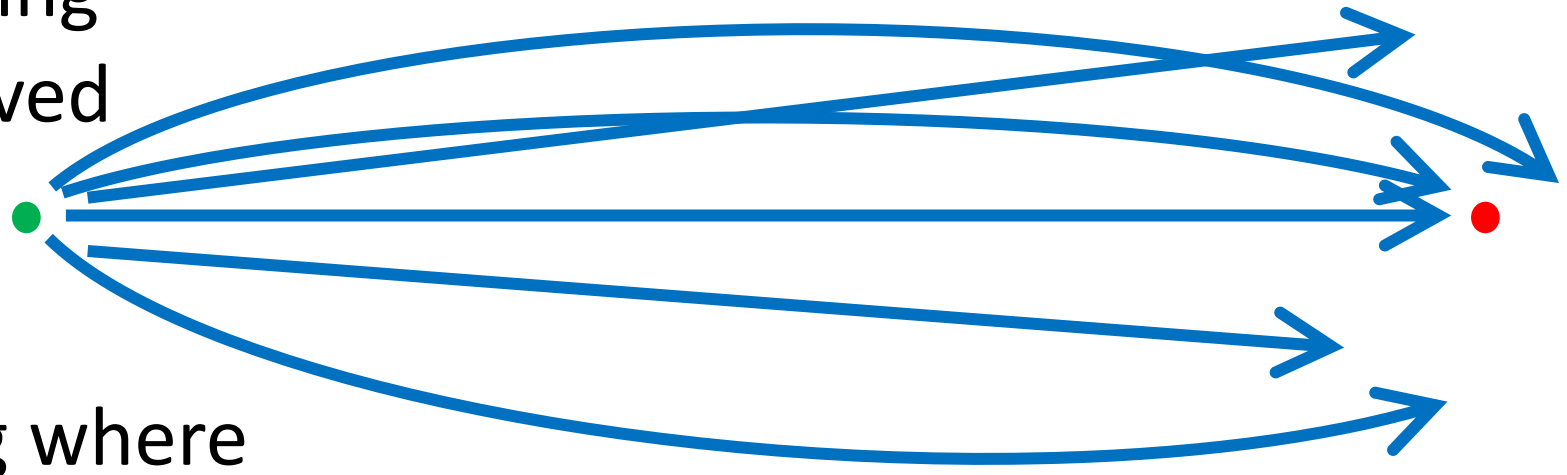
Explain Wiring

Steering vs Aiming – Do Not Confuse



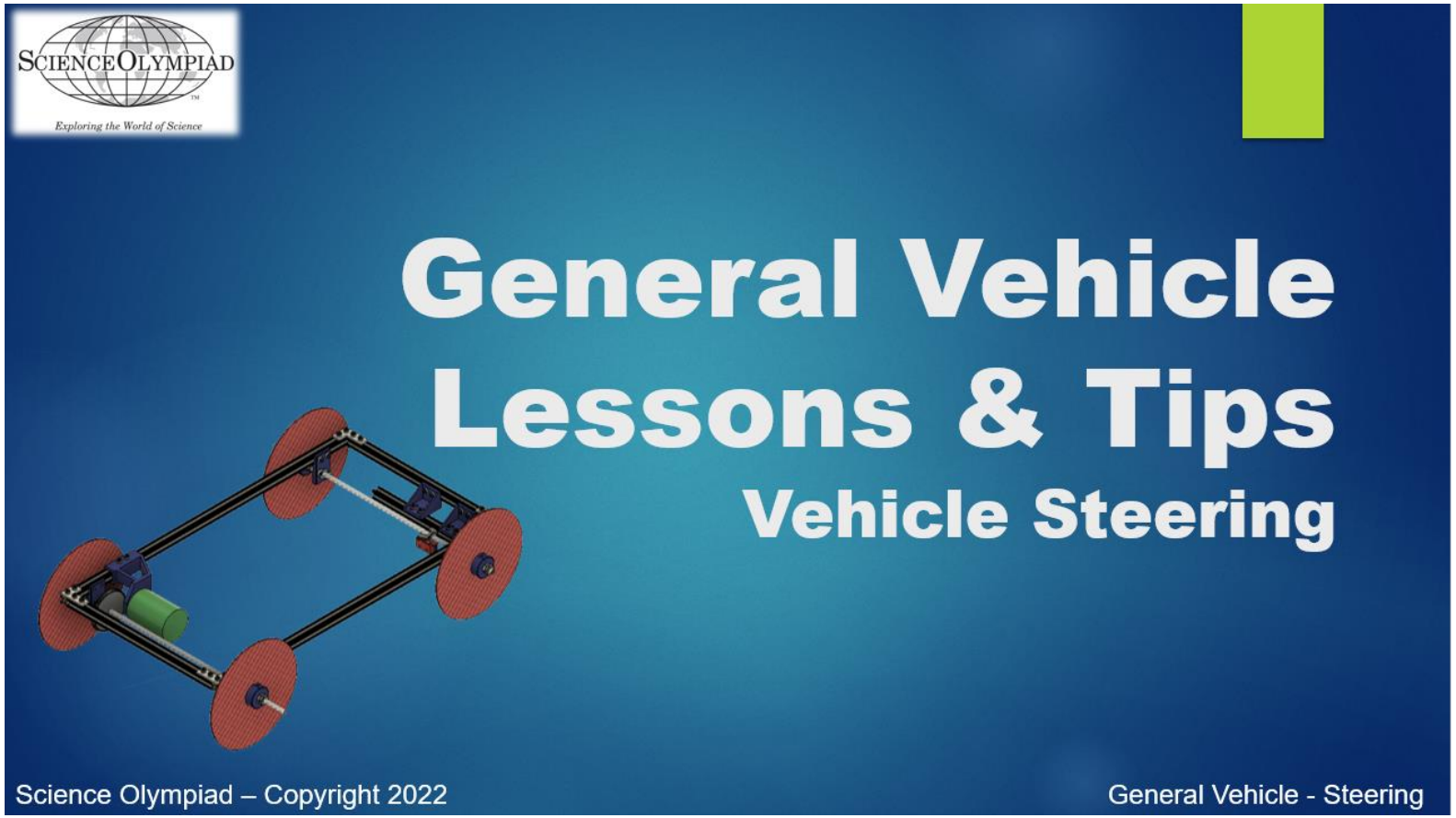
Steering vs Aiming

- **Steering**
  - Controls how the vehicle travels while moving
    - Straight or Curved



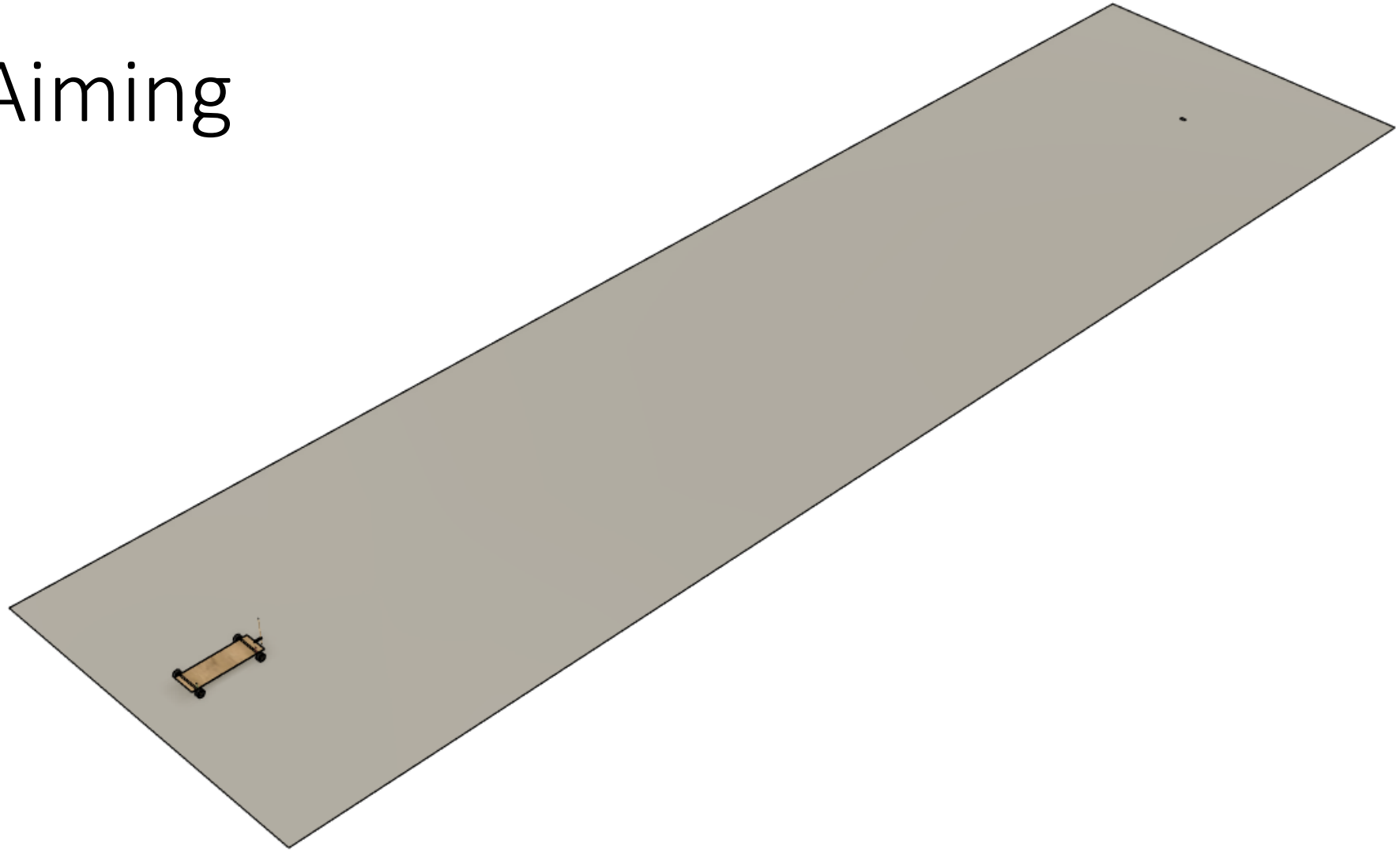
- **Aiming**
  - Part of controlling where the vehicle stops

Steering Video

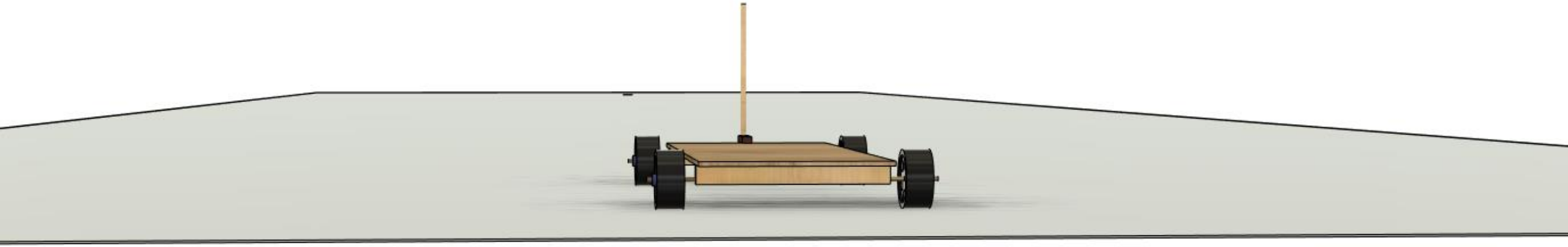


https://youtu.be/LFXPmVsg71Q?si=Y4byN6hSKCbDTNOb

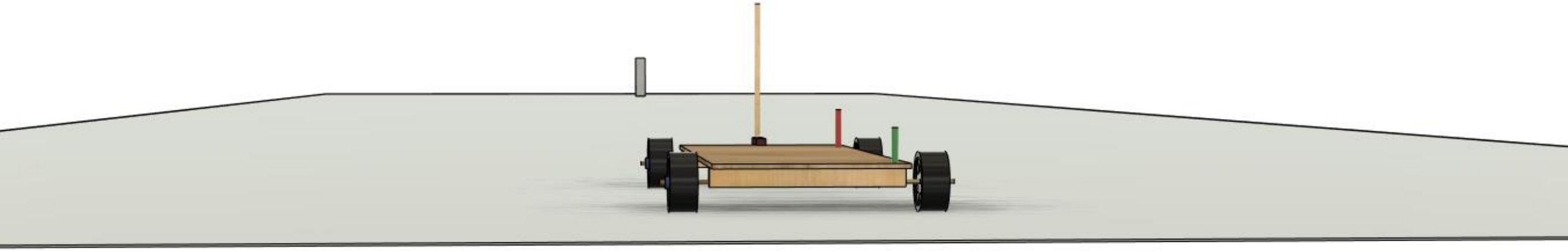
Aiming

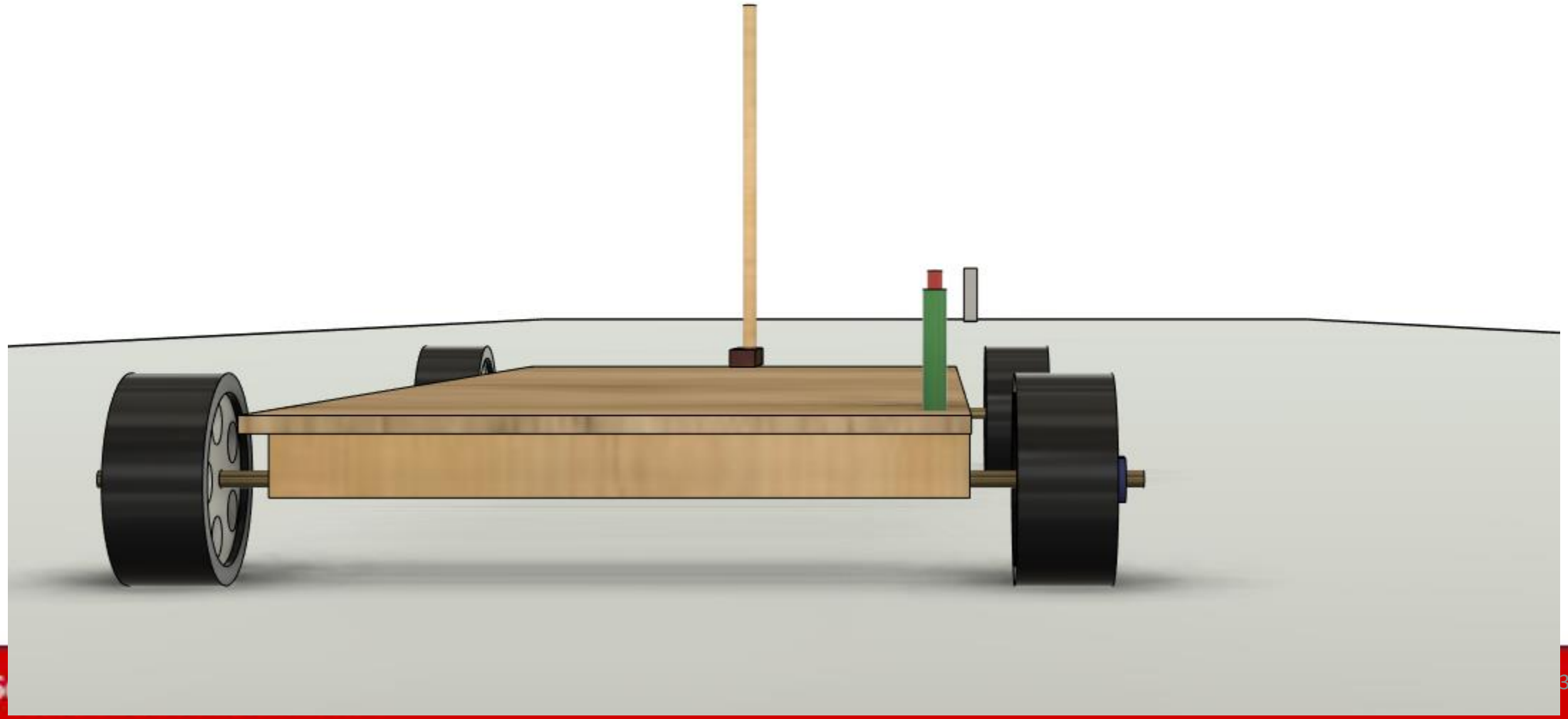


Aiming



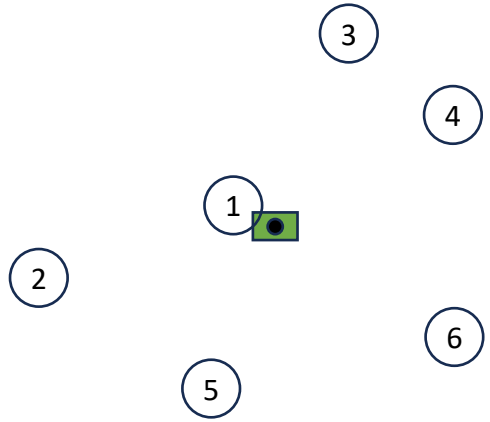
Aiming



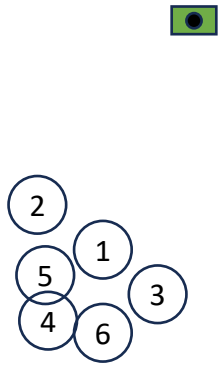


How are my Students Performing???

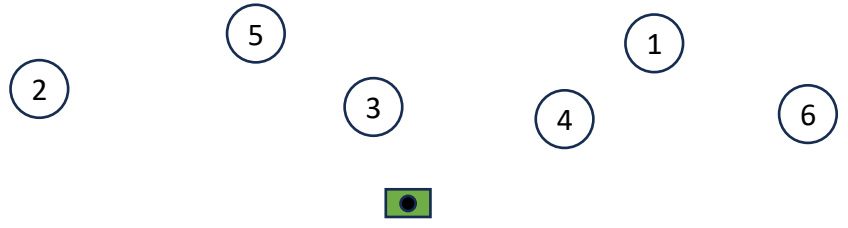
- Run the Vehicle several times <u>with no changes between runs</u>
- Mark the floor after each run



Team #1

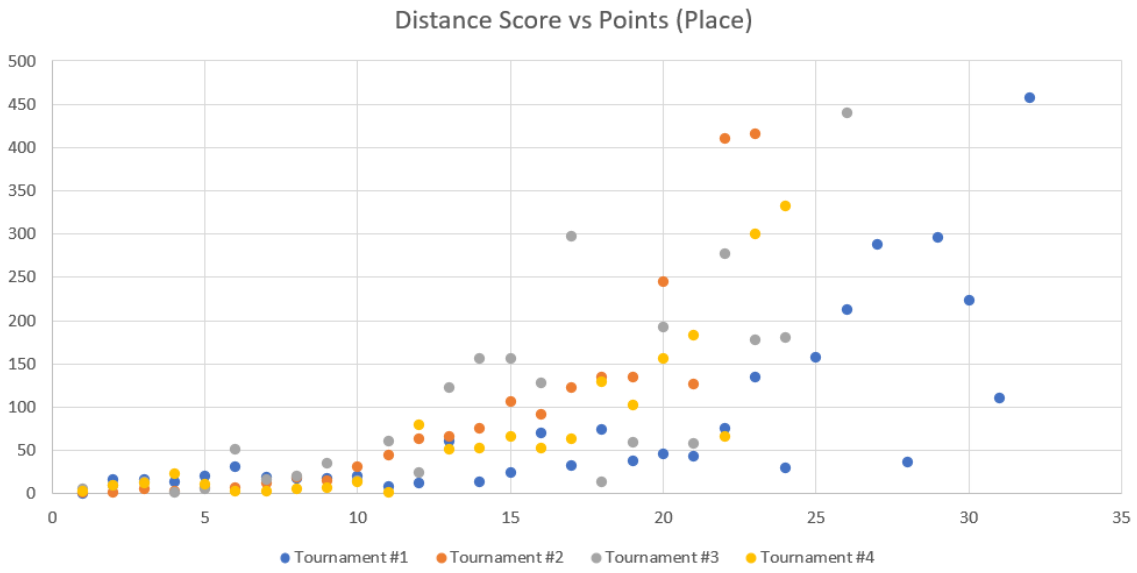


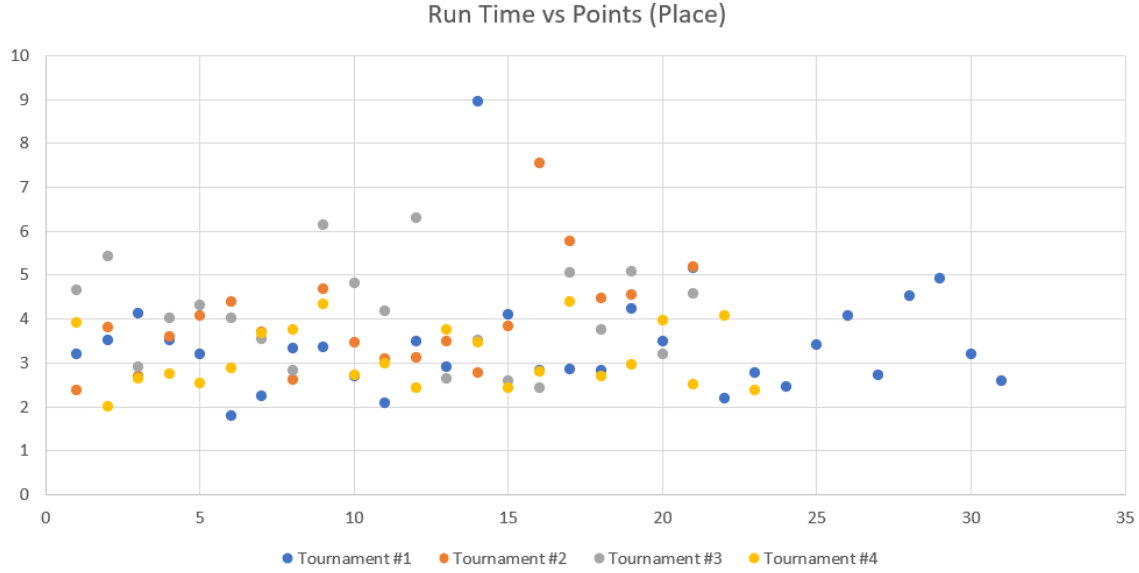
Team #2



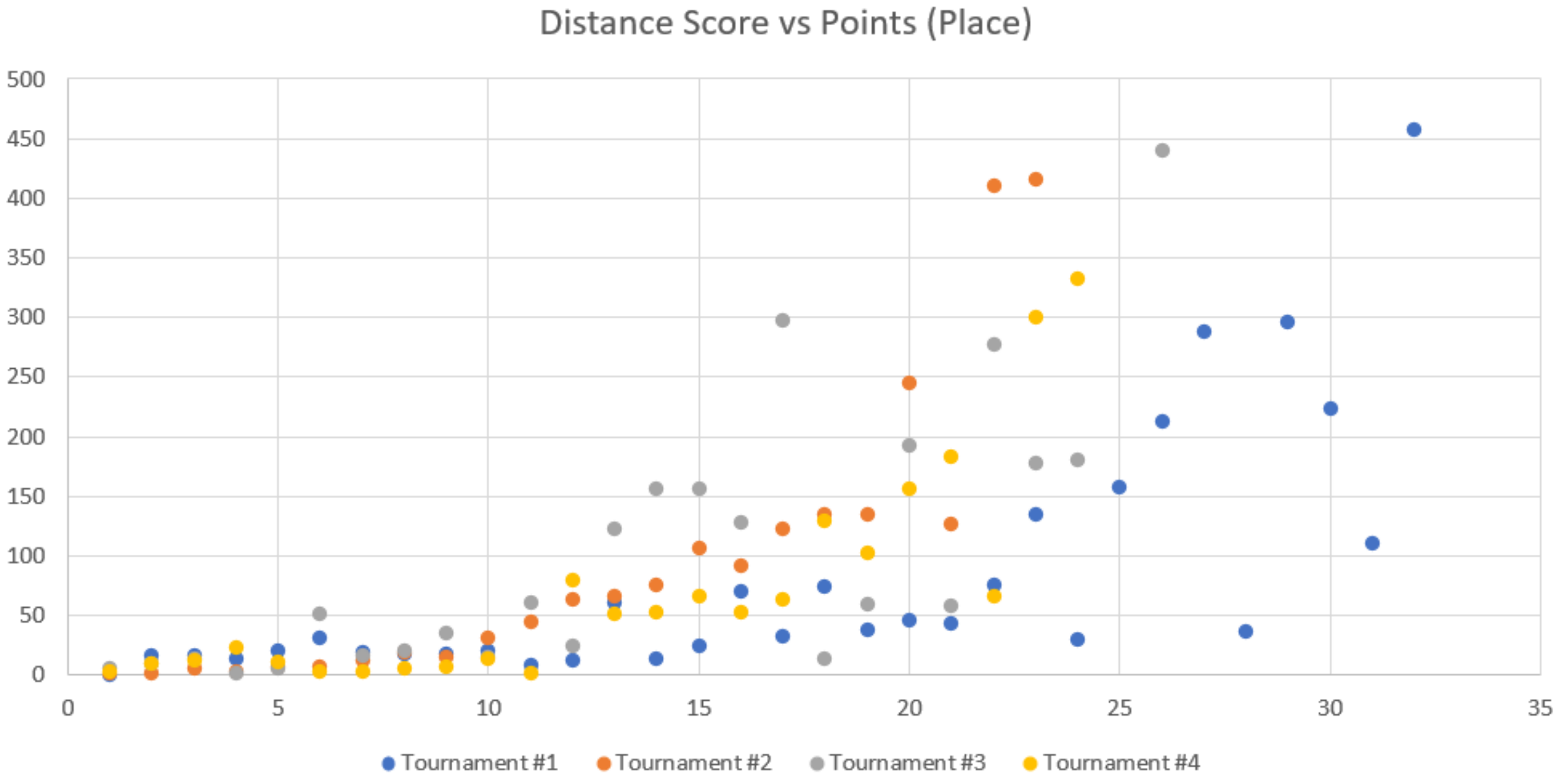
Team #3

Distance vs Time





Wheeled Vehicle Scores 2024 (Last Year)



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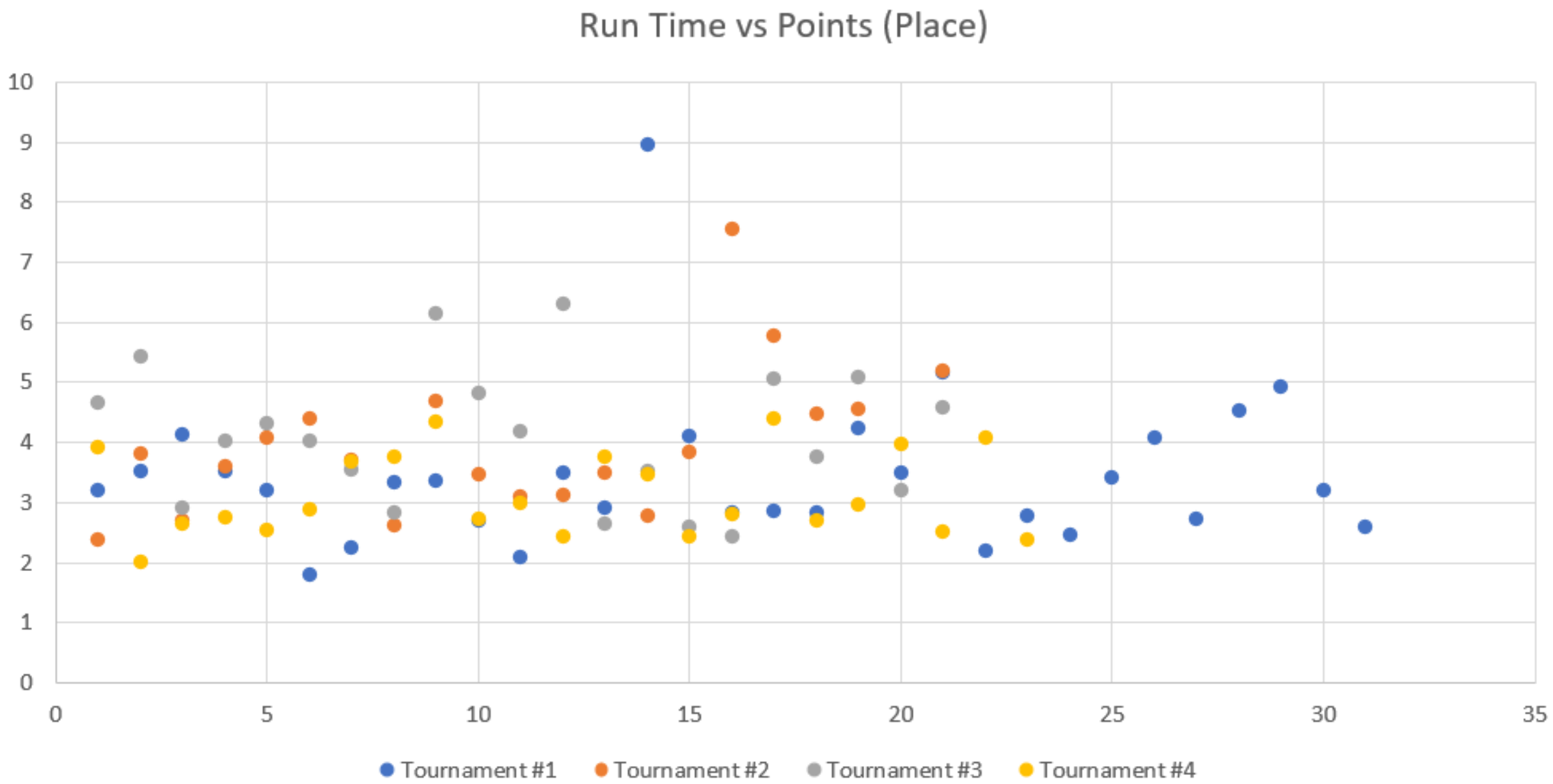
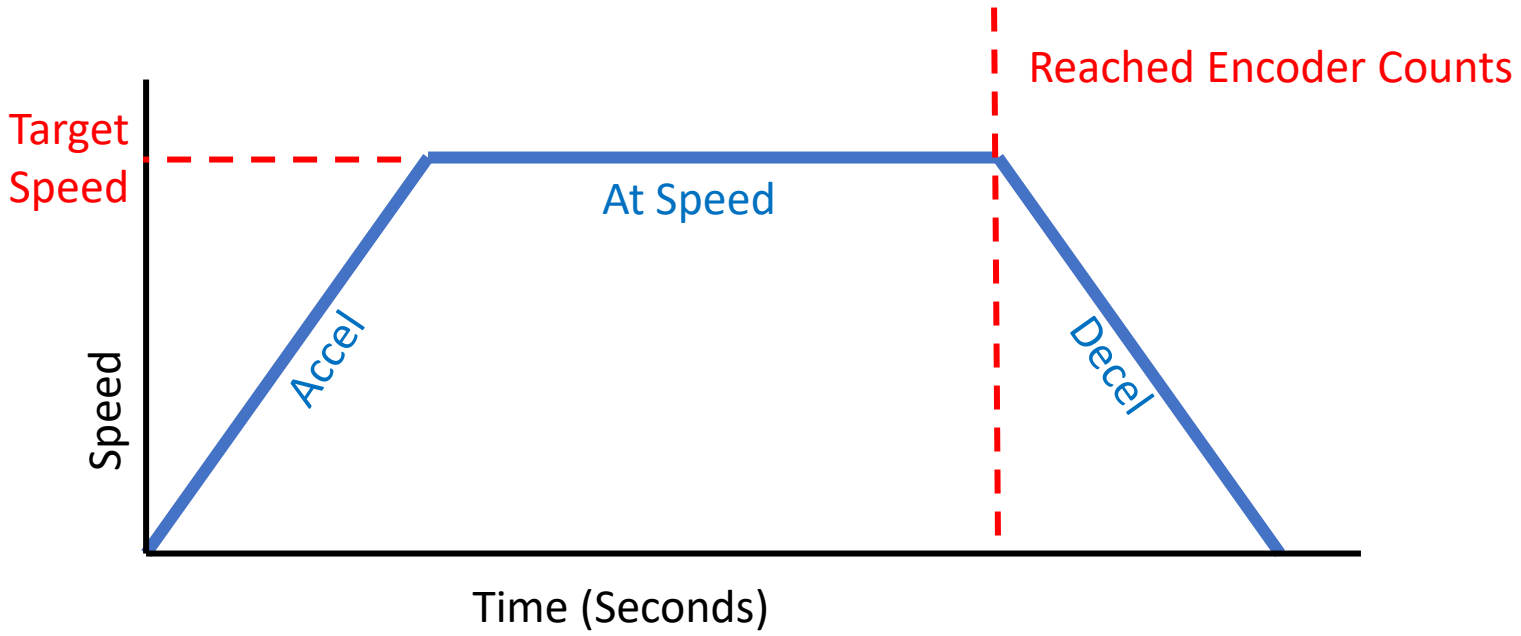
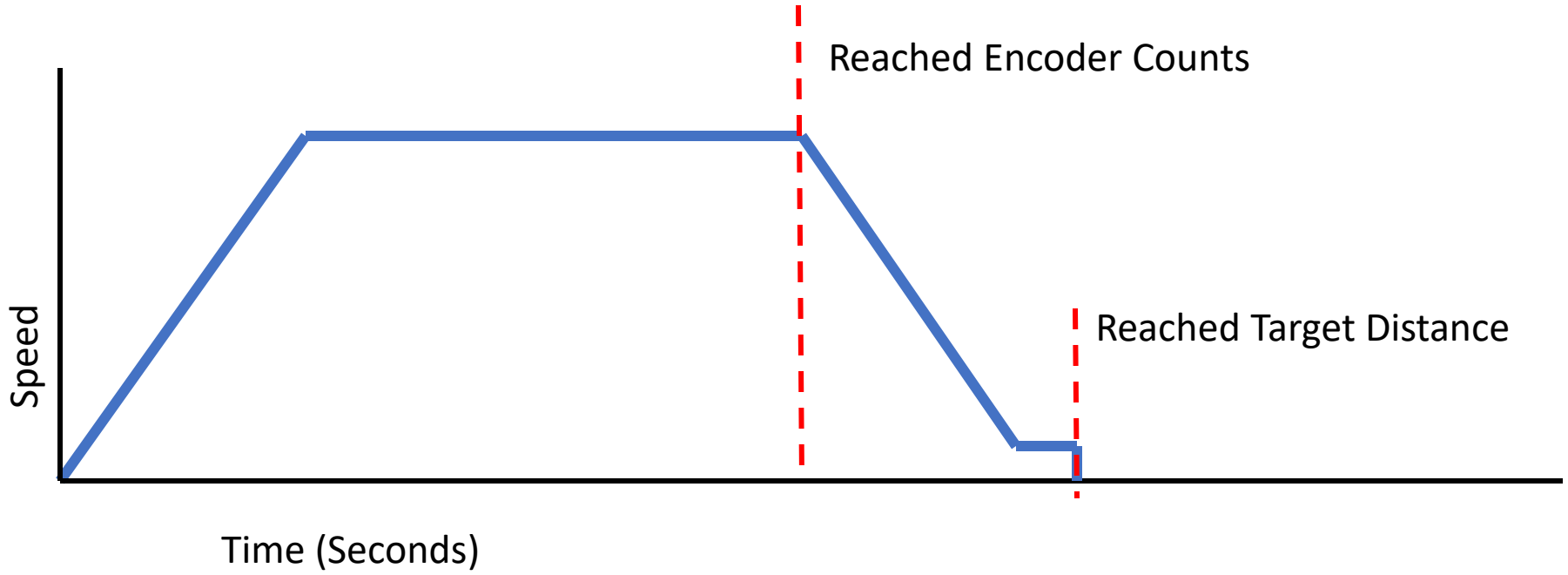


Wheeled Vehicle Scores 2024 (Last Year)

Program Objectives



Program Objectives - Advanced



Construction Tips

- www.TopFinishKits.com
  - Lists individual components and sites to purchase individual components
- www.scioly.com
  - Unofficial tips and suggestions from students and coaches

Note: Be careful of purchased kits. Pros and Cons to all kits

Thank You and Good Luck