Scrambler

Division B

Georgia Tech Event Workshop Series
2024-25

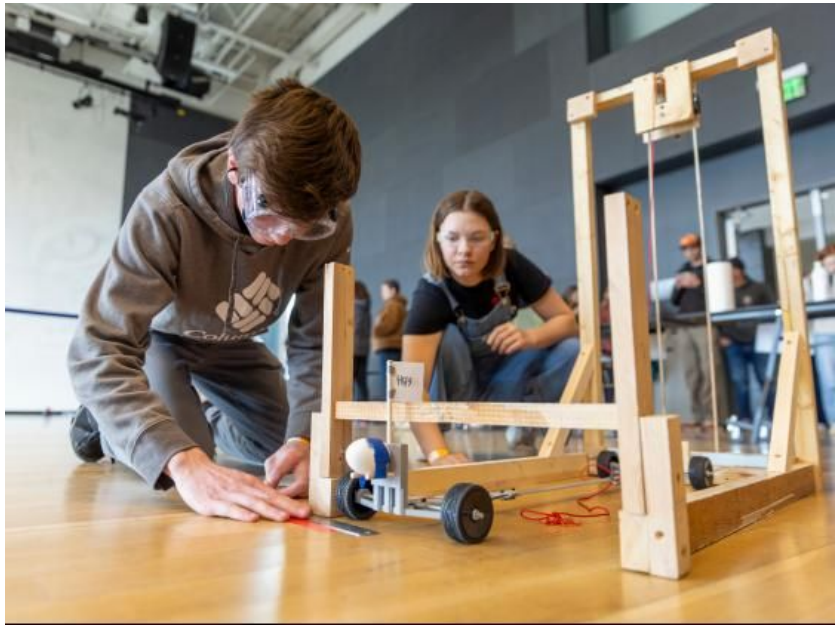
Science Olympiad
at
Georgia Tech®

01 RULES SHEET

02 DIFFICULT TOPICS

03 TIPS FROM A VETERAN

04 OTHER FREE RESOURCES



The Rules Sheet

- Basically have these memorized. Meet these criteria at all costs even if the device doesn't do what you want it to. Getting tiered is extremely detrimental.
- Make sure the device is able to be released using a pencil and fits the dimensions.

3. **CONSTRUCTION PARAMETERS:**
   a. The Scrambler must consist of an egg transport (Vehicle) and an energy propulsion system (launcher and falling mass). These may be separate or combined into a single unit.
   b. The Scrambler (Vehicle and energy propulsion system) including the egg, falling mass, and cushion to protect the floor, in the ready-to-run configuration, must completely fit within an imaginary rectangular box with 100.0 cm x 50.0 cm base and a 100.0 cm height. No part of the Scrambler can be taped or attached to the floor.
   c. All energy used to propel the Vehicle must come from a falling mass not to exceed 2.00 kg. The gravitational potential energy of the falling mass may be converted to other forms of energy. The mass must be part of the energy propulsion system and need not travel with the Vehicle. Any additional sources of kinetic energy must be in their lowest energy state in the ready-to-run configuration. Any part of the Scrambler whose gravitational potential energy decreases and provides energy to propel the Vehicle after the Scrambler is actuated is considered to be part of the falling mass. The falling mass must not directly contact the venue floor by using a pad or similar protective cushion. To facilitate mass measurements, the Scrambler must be impounded with the mass detached.
   d. The stopping mechanism must be contained completely within the Vehicle and work automatically. The Vehicle must not be remotely controlled or tethered. Pre-loaded energy storage devices may be used to operate other Scrambler functions (e.g., braking system) as long as they do not provide kinetic energy to propel the Vehicle.
   e. The egg must rest on two (2) 1/4" to 3/8" wooden round dowels which extend out between 3.0 and 4.0 cm from a solid, rigid, unpadded and flat backstop for the egg. The bottom of the wooden dowels must be between 5.0 and 10.0 cm above the track and within 1.0 cm from the bottom of the backstop. The egg backstop must be built of any rigid material, and it must have a flat surface of 5.0 ± 0.5 cm wide by 5.0 ± 0.5 cm high by 1.27 cm (0.50") or thicker. Nominal blemishes which do not affect the point of contact of the egg with the backstop are allowed. The backstop must be attached to the vehicle in a rigid method that prevents the backstop from moving during impact. A diagram of the backstop will be available on www.soinc.org. One or more violations of this paragraph counts as a single Construction Violation.
   f. Competitors must design the Scrambler to start by using any part of an unsharpened #2 pencil with an unused eraser, provided by the Event Supervisor (ES), to actuate a release mechanism. The pencil may be the release mechanism itself and may extend beyond the dimensions in 3.b. Actuating the release mechanism must not impart additional energy to the Vehicle.
   g. All parts of the Vehicle must move as a whole; no anchors, tethers, tie downs, or other separate pieces are allowed. The only parts allowed to contact the floor during the run are those already in contact with the floor in the ready-to-run configuration. All wheels must be in contact with the floor at launch. Pieces falling off during the run constitutes a Construction Violation.
   h. No electrical or electronic devices may be used (with the exception of any type of calculator).

Scoring

- Accuracy > Speed
- Prioritize consistent launcher for your car and consistent/accurate stopping mechanism
- Find different ways to reduce slippage when the car stops for accuracy.

7. **SCORING:**
   a. Each team's Final Score is the better of the 2 Run Scores + Final Score Penalties. Low score wins.
   b. Run Score = Distance Score + Time Score + Run Penalties
   c. Distance Score = 2 pts/cm x Vehicle Distance.
      i. The Vehicle Distance is a point-to-point measurement from the End Point to the pointed end of the egg (or the point of impact for broken eggs) measured to the nearest 0.1 cm.
      ii. The Distance Score for a Failed Run is 2500 points.
   d. Time Score = Run Time
      i. The Run Time begins when the Vehicle moves and ends when the Vehicle stops.
      ii. The Run Time is recorded in seconds to the precision of the timing device used.
      iii. The Run Time will be recorded as 0.00 seconds for Failed Runs
      iv. Three timekeepers should be utilized with the middle time used as the official Run Time.
   e. Run Penalties:
      i. Competition Violation: 150 points added to the Run Score per violation
      ii. Construction Violation: 300 points added to the Run Score per violation
      iii. Failed Runs can also be assessed Competition and/or Construction violations
   f. Final Score Penalties: Scrambler not Impounded: 5000 points added to the team's Final Score.
   g. Two or more teams tied with 2 Failed Run scores, without Competition or Construction Violations, will remain scored as ties. Other ties are possible.
   h. Tiebreakers in order: 1. Better Vehicle Distance of the scored run; 2. Lower Time Score of the scored run; 3. Better Vehicle Distance of the non-scored run; 4. Better Time Score of the non-scored run.

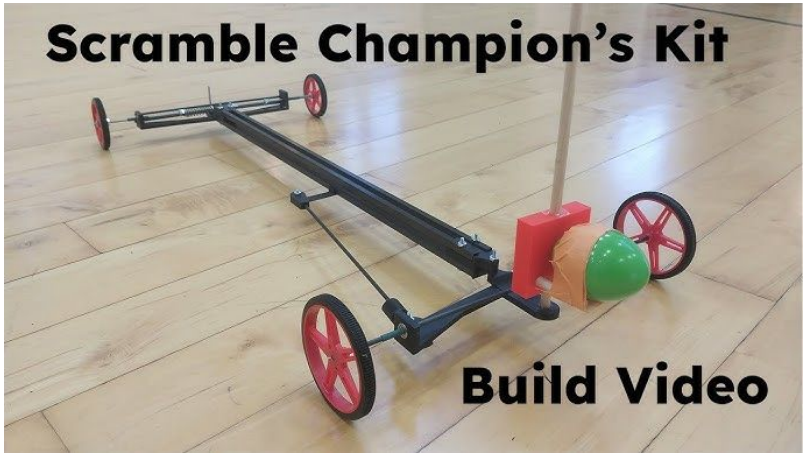

DIFFICULT
TOPICS

Topic 1: Goals

- Prioritize consistency and basic capability
- Minimize changed variables between trials as much as possible to isolate independent variables

Design on the right

- Pros
  - Kit, can focus on consistency
  - Realistic for a first competition
- Cons
  - Not that customizable



Topic 2: Consistency

- **Perfect the # of wheel turns for distances (depending on your stopping mechanism)**

- Change independent variable to reach as many distances as you can
  - I usually start with increments of 0.5m and half the increments each time I go through them all
  - Get to each distance within a certain threshold 3 times in a row before moving on.
- Make logs even though they're not mandatory and record everything.
  - The more data you have, the more you can extrapolate

Only after you have the bare-minimum. Have a device that can go the full distance first before working on achieving all the distances in between.

Topic 3: Late-Stage

Benefits:
- Custom for our launcher dimensions
- Varying weight based on 3D-printing infill
- Focus on reducing time rather than high accuracy

Cons:
- More skills required and harder to do

(variation of initial kit)

Presentation of 3D Model and Explanation of how launcher + device works

Tips from a Veteran

- Prioritize consistency above everything else
- Collect as much information about your device as possible before competitions
    - Logs
    - Measurements
    - Make sure it meets rules requirements
- **Do NOT get tiered.**
- Make sure you know what is realistic for your timeline
- Get inspired by other designs and whatever you think you can make consistent

Additional Resources

Unphayzed Kit

Website to buy and watch tutorials on how to build the Champion's Kit by Unphayzed.

OnShape

Free 3D Modeling software, easy to learn, no download needed.

THANKS!