2016 Roller Coaster Rules

What is Tau Beta Pi and What Does it Represent?

Tau Beta Pi is a National Engineering Honor Society. The members of Tau Beta Pi are chosen from among the top junior and senior engineering students on the basis of distinguished scholarship and exemplary character. They are also expected to participate in community service activities.

The Iowa Alpha Chapter at Iowa State University has been recognized nationally for the service projects that it has organized, and has taken the challenge of hosting a roller coaster competition for middle and high school students. Marc Hermon, an Urbandale High School teacher, started this competition in order to reach out to high school students who have an interest in mathematics, physics and engineering. The competition gives students an opportunity to apply theory to a project that is both fun and challenging.

Engineering

Creativity and problem solving are two high order thinking skills that are hard to teach. All that really can be done is to provide opportunities for students to apply and practice these skills. This competition is designed to fulfill that purpose. The problem solving skills that students learn will be invaluable in any field their career path takes them (engineering, science, other). Experimentation and asking questions are essential to maximum performance. Students should not worry about making mistakes. They will run into many problems in the future that they have not foreseen. Engineering is a process by which ideas are tested and re-tested in an effort to produce the best working product. A good engineer knows one way to get something to work and 99 ways it won't work. This competition is designed to promote interest in engineering and science. The competition is open to all students in middle school and high school.

Your mission:

Your mission, if you choose to accept it, is to build a roller coaster that transports a ball from a specified starting point to a specified end point (10-25 mm ball bearings work best) in 1 minute ± 5 seconds, and completes the Rube Goldberg Challenge. Prefabricated construction toys such as hot wheels or any other type of track, tinker toys, Lincoln Logs, Legos or K'Nex may not be used. Any type of energy may be used except chemical (includes fire!), human, NUCLEAR, and electric. Basically, the coaster must be mechanical (springs, mouse traps, rubber bands, magnets and gravitational potential energy) and once the ball is moving on its own, no one may touch the ball, the coaster, or influence its performance in any way. The same ball that begins the coaster does not have to be the same one that ends, which means the energy from one ball can be transferred to that of another ball. Once one ball starts another ball, the first ball should stop shortly thereafter. Also, there is **no water allowed**!

This year's Rube Goldberg challenge:

This year the challenge is to **Trap a Mouse**. Teams have broad latitude to determine how they want to accomplish this challenge. However, no actual animals, living or dead, are permitted. Ten bonus points will be added to the Technical Score if the "mouse" is moving when captured.

Award Qualifying Structural Requirements

1. Roller Coaster must be free standing.

2. No prefabricated toys used to create the functional roller coaster although they can be used for the theme/decoration.

3. The assembled coaster must be no larger than 4' long by 2.5' wide by 4' high (this is so the coaster will fit conveniently through a standard door opening)

Award Qualifying Competition Requirements

1. Project display board which at a minimum contains coaster name and team member names.

2. Implementation of Rube Goldberg challenge.

3. Completion of a run from the specified starting point to the specified ending point.

Judging & Awards

Judging will be based on the three categories: **Presentation**, **Overall Theme**, and **Technical Skill**. Before operating your roller coaster you must clearly state to the judges where your starting and ending points are located. Once this decision has been made it CANNOT be changed. If the ball traverses the entire coaster from start to finish AND does so in a time of 1 minute with a +/- 5 seconds, then your technical score will be DOUBLED. In addition, 10 bonus points will be added to the technical score if the "mouse" is moving when captured.

Presentation: (30 points) Judges will examine your professionalism, technical knowledge, and general speaking style (posture, eye contact, all member participation). Team members should point out starting and ending points and describe all of their technical "tricks" at this time.

Overall Theme: (30 points) Judges will examine the team's use of a theme and how it is integrated into their coaster, on the display board, any signs on the coaster, the naming of sections of the coaster, music, and costumes.

Technical Skill: (70 points) Judges will examine how many technical "tricks" were performed and assign a technical score out of 35 points. Your technical score is very important because if your ball travels from your start point to your end point successfully and does so in 1 minute (± 5 seconds) the technical score will be doubled to a maximum of 70 points. An additional 10 bonus points will be added to the technical score if the "mouse" is moving when captured.

YOU WILL RECEIVE UP TO THREE TRYS TO DEMONSTRATE A SUCCESSFUL RUN!

A successful run is one that transports the ball from start to finish in 1 minute (± 5 seconds) Teams may have up to 2 minutes to reset the coaster between unsuccessful runs, but the starting and ending points must remain the same. If a roller coaster can't be reset within the 2 minutes, it will be considered an unsuccessful run. Once a successful run has been demonstrated, the coaster will not be run again. (All contestants should examine the Judges Form to insure that the starting point, ending point and tricks have been identified correctly.)

Members of the Iowa State University Tau Beta Pi - Engineering Honor Society will do the judging. Teams of high school students and middle school students will be judged separately. Awards will be presented for 1st, 2nd and 3rd places for both the middle school and high school teams. At the judge's discretion, three additional awards may be given to middle school and high school teams for Overall Theme, Technical Skill and Presentation.

When & Where

The competition will be held Thursday, 14 April 2016 beginning at 9 am in the atrium of Howe Hall on the Iowa State University campus. Maps and directions for reaching Howe Hall and vehicle parking areas are available on the Roller Coaster website: http://iowaalpha.tbp.org/roller-coaster-competition/.

Teams & Coaches

On-line registration for the competition is available on the Roller Coaster website: http://iowaalpha.tbp.org/roller-coaster-competition/. Each team (4-8 students is recommended, but teams can have fewer or more members) may enter only one roller coaster. Each school may enter as many teams/roller coasters as they would like. Coaches that are parents or teachers may participate with the team by expressing ideas and suggestions and providing workspace and tools; however, the coach should not actively participate in construction of the roller coaster.