Game Overview

The 2015 e3 robotics METALS Competition is called: Ping-Pong-Pie! The competition is held on a 4x8 foot field with 4 inch tall walls. Teams will each build one robot out of ANY materials they wish as long as it fits in a 15x15x15 box. There are a total of 66 balls on the competition field: 24 large and 50 small located between each dispensers in the corners of the field. Each small ball is worth 1 point, while each large ball is worth 3 (totaling at 91 points without any multipliers). Additionally, there are 3 podiums topped with pie tins along the center of the field where points may be scored. The center podium is taller than the outlying podiums and is also taller. The two outside podiums are labeled 1 and 2. At the start of each match; each team is given a math equation (below algebra 1) to solve. The equation will simplify to either 1 or 2, corresponding to the outlying scoring podiums, balls scored in the correct podium are worth double the face point value of the respective scored ball. However, any balls scored in the incorrect outlying podium are worth 0 points. Balls scored in the center podium are worth their face value, regardless of the answer of the equation.

Scoring & Gameplay

Before the match, <u>3 TEAM MEMBERS</u> will move to the competition table and place their robot on the field, they are then given a sealed math problem, pencil, clipboard, and piece of blank paper. Once the match starts, teams may not touch the robot until the match is over. The math problem may only be opened once the match begins. Once the match begins, teams will have 3 minutes and 14 seconds (3:14) to score as many points as they can.

Points are scored by releasing the balls from the containers on the playing field, collecting them, and placing them in the pie tins atop the scoring podiums.

Balls scored in the podium that is labeled with the answer of the math equation are worth double (2x) their face point value while balls scored in the other outlying podium are worth nothing (0). Balls scored in the middle podium are always worth the face point value of the ball.

Small Ball = 1 point per ball
Large Ball = 3 points per ball
Center Podium = 1x points
Correct answer podium = 2x points
Incorrect answer podium = 0 points

Example score:

Math equation: 2x+0=2 = (answer is 1)
Large ball scored in podium 1: (3*2) = 6 points
Large ball scored in podium 2: (3*0) = 0 points
Large ball scored in center podium: (3*1) = 3 points

Robot Design Rules

Upon entering the competition, teams will have their robot inspected. Inspectors will look for the following:

- Unshielded wires
- Purposely sharp or potentially dangerous parts. (i.e. flamethrowers, knives, etc.)
- Projectile launchers (A mechanism to launch collected balls into scoring podiums is acceptable)
- Hydraulics or pneumatics containing to pressure of 30 psi or greater
- Robots may not draw power from an AC outlet. Power must come from a battery either onboard or tethered to the robot
- The robot must not exceed dimensions of 15x15x15 inches
- Excessive putts, glue, grease, or other wet/sticky materials.

If a robot fails inspection, then the team will be required to modify their robot to a point where it passes or they will be unable to compete. These rules were designed to protect team members, volunteers, observers, and the game objects/field.

Helpful Tips

Here are some helpful tips that may help your team hit the ground running:

- Tetrix, Vex, and Lego Mindstorms are some of the more popular universal robotic building systems for young engineers. These are <u>not</u> required, but may be found beneficial.
- If your team wishes to build a robot from scratch, you may look at Lego Mindstorms EV3, Arduino Uno, Raspberry Pi, and Vex Cortex or Vex IQ microcontrol systems.
- One on the field, the robot can expand to any size (without additional parts). The only requirement is that it can compact enough to fit into the 15x15x15 inch box with ALL attached parts during inspection.
- Robots are not limited to only using wireless controls (however it is allowed). Robots may use tethered controls as well.
- Onboard power for the robot is not required, but is recommended. Robots can draw power from the team's driver station.