Rube Goldberg Challenge 2009-2010

LEVEL: Elementary School

TYPE OF CONTEST: Team

COMPOSITION OF TEAMS: 5-6 students per team

OVERVIEW: Teams will construct a device designed to keep 2 marbles in motion the longest and drop each marble into its own cup. Teams will gather their own inexpensive materials with which to construct the device. A scaled drawing will accompany the device.

MATERIALS:

Rube Goldberg: All device materials will be provided by the team. Materials should consist of household items, found, scavenged, salvaged or recycled materials.

T.I.M. Set: Two marbles and two cups to be used during the competition will be provided by the host center.

Drawing materials: Ink pens, pencils, or markers, for scaled drawing provided by the team.

Paper: Paper for scaled drawing provided by the team.

Illegal Materials: The device may not contain any substance that will splatter or may be considered hazardous including, but not limited to: liquids, Jell-O, flammable substances, sharp objects, etc. The use of perishable items is prohibited. The use of any electronic parts is prohibited.

RULES:

1. The device must be constructed using ONLY materials described above.
2. The device may not be constructed using prefabricated items with functions specific to the required function/task (i.e. a team may not take a commercial “marble track” or Marble Run Game Set and incorporate it into their design).
3. The marbles and cups may only be altered to attach it to the device. (UCI will provide each team with the marbles and cups to be used in their device)
4. Devices must be competition ready at registration. This includes the marbles and cups which must be part of the device prior to registration. UCI will not provide any marbles or cups on the day of competition.
5. Both the marbles and the cups must be visible prior to the start of testing.
6. Each marble must be put in motion by a single operation (removing a stopper, opening a door, etc.). No human power may be used to add kinetic or potential energy for the operation of the device.
7. The device must incorporate two marbles and two cups. The starting point of each marble must be labeled Marble #1 and Marble #2. The cups they will drop into must be labeled Cup #1 and Cup #2. The device must be designed so that when triggered each marble will roll along the track and eventually land into its corresponding cup. (i.e. Marble #1 must drop into one Cup #1 and Marble #2 must drop into Cup #2.)

8. Teams may decide whether to build their device to incorporate one track or multiple tracks.

9. Both marbles must be put into motion at the same time, and they will each be timed from their starting point to the moment they drop into their corresponding cup. The marble must remain in continuous motions; if it stops for more than 1 second, no time will be awarded. (see Time In Motion Judging Rubric)

10. Each team will have one opportunity to test their device. Judges will time the two marbles independently. There will be no additional set up time between the testing of marble #1 and marble #2.

11. A COMPLETED registration form should accompany each device. Failure to arrive with a completed registration form will result in a loss of points.

12. A scaled drawing of the device should accompany the project and adhere to following requirements:
   a) The drawing should depict the actual device built;
   b) Photographs or computer generated drawings are not permitted;
   c) Drawing may not exceed a 1:1 ratio (i.e. drawing may not be bigger than the device itself).
   d) Any type of paper may be used;
   e) Front, side, and top views should be included;
   f) All parts of the device should be labeled (height, width, length, etc.);
   g) On the top right-hand corner, there should be a legend showing the scale used and the names of ALL team members.
   h) A materials section should include all materials used in the construction of the device.

13. The device must fit on a table with the following dimensions: 29.5”Hx30”Wx72”L.

JUDGING:

1. Judges may award the following maximum amount of points in the following categories:
   a) Registration: 5 points (max.)
   b) Height: 5 points (max.)
   c) Aesthetics: 10 points (max.)
   d) Individuality: 10 points (max.)
   e) Creativity: 10 points (max.)
   f) Scaled Drawing: 10 points (max.)
   e) Time in Motion (T.I.M.): 50 points (max.)

2. Registration Judging Rubric:
   • 4-5 points: Legible, completed registration form
   • 1-3 points: Illegible, incomplete registration form
   • 0 points: Teams arrive with no registration form

3. Height Judging Rubric:
   • 0 points: Height ≥ 16 inches
   • 1 points: 15 inches ≤ Height < 16 inches
   • 2 points: 14 inches ≤ Height < 15 inches
   • 3 points: 13 inches ≤ Height < 14 inches
4. Aesthetics Judging Rubric:
   • 0-10 points: Judges will assign a score based on the beauty and neatness of the device.

5. Individuality Scoring Rubric:
   • 0-10 points: Judges will assign a score based on the uniqueness, originality and individuality of design (the mode of comparison for the judges will be against devices from the same school)

6. Creativity Judging Rubric:
   • 0-10 points:
     o Imaginative use of materials
     o Variety and variability in the use of materials
     o Innovative use of materials (i.e. using something in a “new” way)

7. Scaled Drawing Judging Rubric:
   • 9-10 points:
     o Drawing is to scale
     o Very neatly hand drawn in ink, pencil or marker
     o Scale, units & all dimensions clearly visible
     o Detailed front, side, & top views
     o All part labeled consistently & accurately
     o Legend in correct location and all elements clearly present
     o Materials list complete
   • 6-8 points:
     o Drawing is close to scale
     o Well done in ink, pencil, or marker
     o Scale, units & dimensions incomplete
     o Some errors or omissions in three views
     o Some inconsistency in labeling & accuracy
     o Legend in wrong location and missing one element
     o Materials list missing an element
   • 4-5 points:
     o Drawing is not to scale
     o Poorly done in ink, pencil, or marker
     o Scale, units & dimensions poorly done
     o Many errors or omissions in the three views
     o Few, inconsistent & inaccurate labeling
     o Legend in wrong location and missing two elements
     o Materials list missing several elements
   • 0-3 points:
     o Drawing is obviously wrong size
     o Sloppily done and/or wrong materials
     o Scale, unit & dimensions not present
     o No detailed front, side, or top view
     o Few or no labels
     o Legend not used
     o Materials list missing inaccurate or missing completely
8. **Time in Motion (T.I.M.) Judging Rubric:**

   - **Marble #1: 25 pts max**
     The following applies to Marble #1. A team's Time in Motion for Marble #1 will be judged against all teams' Time In Motion for Marble #1.
     - If the marble fails to drop into the cup, then the team will receive a zero for T.I.M.
     - If the marble stops rolling longer than 1 second, time will stop.
     - The following equation will be used to score the T.I.M. score:
       \[
       \text{T.I.M. score} = \frac{\text{Team's T.I.M.}}{\text{Longest T.I.M.}} \times 25
       \]
   
   - **Marble #2: 25 pts max**
     The following applies to Marble #2. A team's Time in Motion for Marble #2 will be judged against all teams’ Time In Motion for Marble #2.
     - If the marble fails to drop into the cup, then the team will receive a zero for T.I.M.
     - If the marble stops rolling longer than 1 second, time will stop.
     - The following equation will be used to score the T.I.M. score:
       \[
       \text{T.I.M. score} = \frac{\text{Team's T.I.M.}}{\text{Longest T.I.M.}} \times 25
       \]

   - **Example of using the Rubric:**
     
     - Time that my marble is in motion (Team's T.I.M.): **8.2 seconds**
     - Device time that had the marble in motion the longest (Longest T.I.M.): **13.8 seconds**
       - Using equation: \( \text{T.I.M. score} = \frac{8.2 \text{ seconds}}{13.8 \text{ seconds}} \times 25 \)
       - Hence, T.I.M. score = \( \frac{8.2}{13.8} \times 25 \)
       - Therefore, my T.I.M. score is **14.85** (rounded off to the nearest hundredth)

9. The team with the highest cumulative score wins. In the event of a tie, the tied teams undergo the following tie breaking procedures:
   
   A) If tied, the longest T.I.M. will be declared the winner.
   B) If still tied, the top Individuality score will be declared the winner.
   C) If still tied, the top Creativity score will be declared the winner.
   D) If still tied, the top Aesthetics score will be declared the winner.
   E) If still tied, the top Registration score will be declared the winner.
   F) If still tied, duplicate awards will be given.

**AWARDS:** Awards are given for 1st, 2nd, & 3rd places.

**ATTACHMENTS:** Registration Form
A completed registration form should accompany the project upon arrival. If a registration form is needed when your team arrives, then the team will forfeit their registration points for the competition.

Rube Goldberg Challenge
Registration Form

Instructions: Type or clearly print the requested information below. Illegible writing may result in disqualification.

School Name: ___________________________ Advisor: ___________________________

Team Members (each team must be 5 - 6 students per team):

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<th>Last Name</th>
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