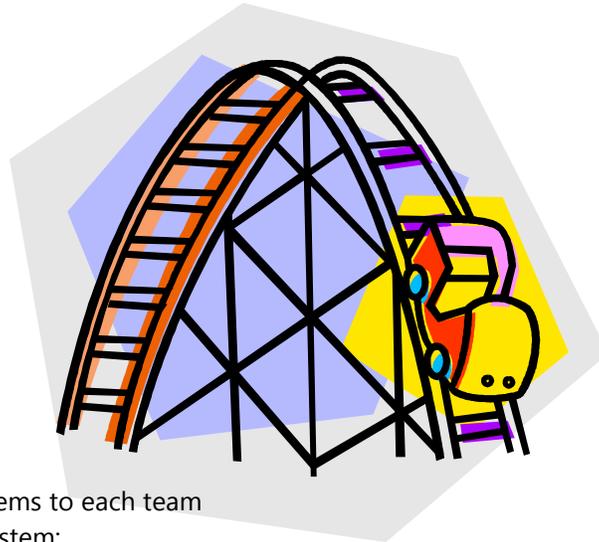




## Roller Coaster – Energy

Supplies: Marbles, Insulation Tubing, Tape, Cups, Popsicle Sticks, Paper, (Elevated starting point)



### Instructions:

1. Explain Points systems to each team
  - a. Scoring System:
    - i. Flat=1 point
    - ii. Hill=2 points
    - iii. Loop=5 points
    - iv. Gap jump/Drop=7 points
2. Pass out design kit to each team
  - a. Design Kit:
    - i. 10 markers
    - ii. 15 rubber bands
    - iii. Tape
    - iv. 5 plastic cups
    - v. 4 foam cups
    - vi. 12 popsicle sticks
    - vii. 20 pieces of paper
    - viii. 1x6ft, 1x4ft, 2x3ft, 1x2ft insulation tubing
3. Keep track of time, provide hints to help the teams.
4. Alert teams of how much time is left (ex: 10 minutes left, 5 minutes left)
5. Test with 10 min left to go, scoring is subjective, so work with other judges to stay consistent.

### Questions to ask:

1. What type of energy is demonstrated when the marble is elevated?
2. What type of energy is demonstrated when the marble is moving?
3. If it didn't work, why?
4. Can you identify on your roller coaster where there is maximum and minimum velocity?
5. What were some challenges?



## Rollercoasters – Intro Guidelines

**(Use this information to help introduce the activity, if necessary. To be kept under 5 minutes)**

- Introduce yourself, introduce name of activity
- Brief explanation of activity
  - Build a rollercoaster with marbles, insulation tubing, popsicle sticks, cups, paper, and tape
  - Winner in each rotation gets a special prize at the end of the day!
    - **NOTE: KEEP A LEADERBOARD DURING EACH ROTATION, AND KEEP TRACK OF WHICH STUDENT(S) (INDIVIDUAL OR GROUP) IN EACH ROTATION HAD THE HIGHEST SCORE.**
- Discuss motivation for rollercoasters (why do we need it, why do we care)
  - Ask questions!
  - What are examples everyday examples similar to rollercoasters?
    - Cars driving up/down hills
    - Do you think you use more gas going up or down a hill? Why?
  - Why are rollercoasters fun?
    - Acceleration, speed, falling from a high distance
- Brief discussion of underlying technology (draw on board to help illustrate if you so choose)
  - Potential energy vs. kinetic energy
  - Acceleration
  - Momentum
    - Do you think using larger (or smaller) marble would make a difference?
- Point out questions for students to be thinking about during activity (below and on Activity Instructions) and Launch the Activity!

Questions to ask during the activity:

1. What type of energy is demonstrated when the marble is elevated?
2. What type of energy is demonstrated when the marble is moving?
3. If it didn't work, why?
4. Can you identify on your roller coaster where there is maximum and minimum velocity?
5. What were some challenges?