

**GRADE LEVEL**  
Middle School

**SCIENCE CONTENT STATEMENT ADDRESSED**  
Physical Science

Matter and Motion

- There are two categories of energy: kinetic and potential.
- An object's motion can be described by its speed and the direction in which it is moving

**OVERVIEW**

Using materials available in the Makerspace student groups will design a roller coaster for a marble. The roller coaster must include one loop. The end of the Roller coaster should have the marble hitting a target. They then calculate and chart the speed of the marble along different points of the track.



# MARBELOUS COASTER

**MATERIALS**

Some material prompts could include

- water pipe insulation or foam tubing cut in half
- paper towel rolls
- K'nex
- Cardboard
- Plastic bottles cut in half
- Duct tape
- Markers
- Marbles
- Target for Marble to land in/on or at

Set aside an area for testing the roller coaster. The target must be set up prior to beginning the project so students can measure and plan accordingly.

**PROCEDURE**

- Students are divided into design teams Typically this is 2-4 students.  
You may want to assign jobs depending on your class for example recorder, designer, test engineer etc. However it most desirable if they work cooperatively in all stages.
- Using the material available in the maker space, students will design a roller coaster for their marble.
- You can create some requirements such as must have one loop, or must descend so far, or have one section that includes a certain angle.
- Students must sketch out design first before attempting to build. The sketch should include the types of materials they plan to use from the Maker Space.
- Build and test.
- Students measure the distance and time for the marble traveling along identified sections of the roller coaster.
- Time permitting allow for reflection and redesign. (good idea to put time limit on this)
- Using a spreadsheet software record data.
- Create graphs from the spreadsheet software to show these times and distances.

**POST-PROJECT CLASSROOM DISCUSSION/ACTIVITIES**

When does the marble speed up?

When does it slow down?

When does it change direction?

When is the marble not moving at all?

How does kinetic and potential energy affect what is happening?