

Designing a Roller Coaster Activity Guide

In this activity, youth will use their engineering skills to work together to design and create a “loop-de-loop” roller coaster that will take a marble for a ride!

Activity Type:	Engineering
Grade Level:	All
Grouping:	Groups of 3-4 youth
Activity Time:	1 hour
Preparation:	30 – 90 minutes
Career Connections:	Engineer

Key Terms:

Force	Speed	Velocity	Physics
Friction	Potential Energy	Kinetic Energy	Gravity

Learning Objectives as Purposeful Questions:

- ✓ What do gravity and friction have to do with building a roller coaster?

- ✓ In your roller coaster design, where did the marble have the most potential energy? Kinetic Energy?
- ✓ What skills do you think Engineers need if they are going to design roller coasters?

Materials Per Group:

- Long foam tubes (1/2" diameter) about 6 feet long cut in half, one half per group
- 4 Marbles – different materials, such as glass, wooden, metal
- Plastic cup – to catch the marbles as they come down the track!
- Masking Tape – Challenge: The tape can act as “money,” giving each group a certain amount.
- Paper, pencils, pen and paper for design
- Optional - Stands with clamps to hold tubes and add height

Advanced Preparation

- ✓ Make sure to collect and assemble all the supplies before this activity
- ✓ Try the activity out first on your own – take note of challenges or questions you have

Activity:

Work with your team of engineers to design, build, test and re-test a roller coaster that will transport a marble at least one time through a loop-de-loop using the materials provided.

Youth are in groups and have all the materials

Go over the activity:

1. Create a roller coaster that a marble will travel through.
2. Add a loop-de-loop in your track for your marble to travel through.

Get groups brainstorming their roller coaster design

Once design is drawn, they can begin creating their track

Testing and re-testing is part of the engineering process. Even if they get the marble through the first time, Engineers need to take time to develop their design to make it even better.

Plan for each team to display their roller coaster design and reflect and process the activity together as a large group.

Activity Criteria:

Must be free standing

Must be reliable-5 times in a row

Engineering (building) requirements

Tape can be on tables, chairs, floor, etc., but no tape on the walls

Keep feet and furniture on the floor

Only one marble has to work

No adults in your construction crew

Your group may hire a consultant after 15 minutes

Stay in “budget” - Once your tape is gone, out of money!

Have fun!

Resources - Links to give you more insight!

[Teach Engineering: Hands on Build a Roller Coaster](#)

[Understanding the Engineering Design Process](#)

[Making Connections to Careers in Engineering - Click2Science](#)

