



TEAM HAMSTER! &amp; RUFF RUFFMAN

## Explore Gravity and Friction With Marble Runs

Sep 13, 2019

Bring the excitement of an amusement park into your home by building a marble roller coaster. The motion of marbles as they roll down ramps is a great way to learn about the pushes and pulls that cause objects to move. In this activity, you'll create different tracks for a marble as you and your child experiment with the forces of friction and gravity!

## Materials

- ☐ Foam core board or a large piece of cardboard
- ☐ Chair
- ☐ Cardboard tubes (from paper towels or toilet paper)
- ☐ Masking tape
- ☐ Marble(s)
- ☐ Stopwatch
- ☐ Ruler marked with inches
- ☐ Paper and pen or pencil (optional, to track results)

## Directions

- 1** Sketch the path of the tubes on the foam core board or piece of cardboard.



- 2** Cut the cardboard tubes in half to make half pipes.

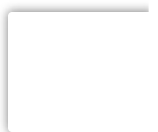




- 3** Tape the tubes to the path. Once completed, it should resemble cardboard chutes. Secure the board to a chair to ensure it doesn't move when you change other variables.



- 4** Roll a marble from the top of the chute and time how long it takes to travel through your maze.
- 5** Now, experiment to see how friction and gravity can change the speed of the marble! For example, make changes to your maze that will slow down or speed up the marble's travel time. Try lining the tubes with different materials, like yarn, sandpaper, and bubble wrap; or experiment with the angles of the half pipes.
- 6** Drop the marble again and record the time during each experimental run.





Try this experiment with a ping pong ball or a rubber ball in place of a marble. How does that change the speed?

## Talk About It:

This activity gives you lots of opportunities to learn more about gravity and friction!

- **Gravity:** As your child builds and tests marble runs, point out that gravity is the force pulling the marble down the slope. When the slope is steeper, will the ball move faster or slower? When it comes out to the bottom, will it go farther than it did before?
- **Friction:** Here's a simple way to explain friction to a child: "If you rolled the marble down a grassy hill, it would move more slowly than down a smooth sidewalk. Since grass is rougher than a smooth sidewalk, there is more resistance or friction. Friction is the force that slows objects down." While constructing your marble run, hypothesize about the different materials that will line the tubes. Which materials do you think will slow down the marble? Which surfaces might make it go faster?

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