



Curiosity Guide #303

Momentum

Accompanies Curious Crew, Season 3, Episode 3 (#303)

Design a Bobsled

STEM Challenge

Description

Using what you know about momentum, design and build a fast bobsled!

Materials for each team

- Metal rain gutter
- Plastic straws
- Paper clips
- Craft sticks
- Wood skewers
- Tooth picks
- Pipe cleaners
- Aluminum foil
- Wax paper
- Recyclable materials such as berry containers and toilet-paper tubes
- Wire
- Plastic spoons
- Brads
- Tape
- Hot glue
- Scissors
- 4 large metal washers to serve as passengers
- Scale that measures grams

Procedure 1: Designing and building the bobsleds

1. Each team will draft and build 2 bobsled prototypes.
2. Each sled must be a maximum of 70 grams.
3. Each sled must carry 4 metal washers, to serve as passengers.
4. Teams must use only the available materials.

Procedure 2: Testing the bobsleds

1. Weigh in each bobsled, not to exceed 70 grams.
2. Set one end of the metal gutter on a table and secure in place with tape. This will serve as the track.
3. Place a sled at the top of the track, and let go. Do not push the sled.
4. Test each sled with a stopwatch to determine its effectiveness.
5. Which sleds were most effective? Why?
6. How can you increase the sled's momentum and make it go faster?

My Results

Explanation

Bobsleds are designed to maximize their momentum by reducing friction. When a sled travels down a track, the sled gets slowed down by both the air molecules and the friction from the contact between

the track and the sled's runners. Colliding with the sides of the track also slows the momentum of the traveling sled. Trying to keep the sled aerodynamic, adjusting the sled to run straight, and reducing the friction on the bottom of the sled improves how long the sled can accelerate. That acceleration happens as the potential energy of the sled changes over to kinetic, or moving, energy. Eventually the forces slowing down the sled become greater than the increasing acceleration. At that moment, the sled is traveling as fast as it can, reaching its terminal velocity.

Investigate further: Use the internet to find photos of various bobsled designs, as well as video clips of bobsleds in motion.

Bobsled racing is a great example of a sport that tries to maximize momentum by reducing friction. The sleds are built to be very aerodynamic so that wind drag is cut down. As the driver maneuvers those tight curves, he tries hard not to collide with the sides because that could really slow the momentum and cost her the race! Once a sled loses the momentum from the starting push, gaining it back is impossible. A strong push, a fast run, and careful steering can carry the racers to a victory! Momentum can be very rewarding!

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