

BUILDING ROLLER COASTERS PROJECT

TASK:

AFTER RESEARCHING INFORMATIONAL TEXTS ON THE FORCES INVOLVED IN THE MOTION OF ROLLER COASTERS, STRUCTURAL DESIGN, AND WEAKNESSES WE WILL DEVELOP A HYPOTHESIS AND CONDUCT AN EXPERIMENT TO EXAMINE THESE ASPECTS. FINALLY, WE WILL WRITE A LAB REPORT EXPLAINING OUR PROCEDURES AND RESULTS AND WHETHER OR NOT OUR HYPOTHESIS WAS CONFIRMED.

Task Engagement

Generate a list of things that you already know about roller coasters and the forces involved.

Real World Example:

Name:

Where It Is Located?

How Long Is It (metric)?

How Fast Is It (metric)?

Is it steel or wood?

Maximum weight capacity?

Define the following terms:

Velocity

Positive acceleration

Negative acceleration

Centripetal acceleration

Friction

Inertia

Digital Coaster Design

Mass: 500kg

How many hills? 3

Height of each hill:

54.7m 36.1m 21.0m

Potential energy at the top of each hill:

$g = 9.8$

241,080 155,330 90,650

Kinetic energy at the bottom of each hill:

182,250 156,250

How many loops? 2

Height of each loop:

37.8m 26m

Potential energy at the top of each loop:

166,600 113,190

Kinetic energy at the bottom of each loop:

132,250 121,000

Top speed: 27 m/s

The Lab Report

Constraints:

- Coaster cannot be more than 100cm tall and can be no longer than 12 meters. It must be able to fit on the desk/table.
- You may only use the materials provided to you.
- The marble cannot hit a barrier to stop it, roll backwards more than 10cm to stop, or fall off of the track.
- Your coaster must be free standing.
- You must have at least one hill, one loop, and one curve.

Coaster Name:

Hypothesis:

I predict that

Problem: How do we design a roller coaster that will allow two marbles of different masses to complete the track?

Entity to be studied:

How roller coasters work:

Kinetic and potential energy

Friction

Speed

Acceleration

Independent variable: mass of the marble

Dependent variable: effectiveness of the coaster

Control: using a marble of a particular mass to run a straight track starting up 100cm.

Materials

Two pieces of 2 meter foam track

Two styrofoam cups

Timer

Two marbles: large and small

Roll of masking tape

Cardboard tubes

Meter stick

Scissors

Procedure

Leave at least one whole page for your steps

Data

Leave at least one half page for your data tables

Analysis and Conclusions