

A Wild Ride! Week 2: Grades K-2

Day 2: Investigating Force and Motion

Teacher/Parent Background

When you kick a ball, you are applying a force to the ball. When you pull your brother in a wagon behind you on the way to the park, you are applying a force to the wagon. A force is a push or a pull. Pushes and pulls (forces) can cause objects to move/change position (motion).

Overview

In this activity, young learners will explore forces (pushes and pulls) and their effects on objects' motions. They will then use their observations to make decisions about which objects would work best during a roller coaster engineering design challenge.

Related Standards

- **Plan and carry out investigations** which demonstrate how equal forces can balance objects and how unequal forces can push, pull, or twist objects, making them change their speed, direction, or shape.

Key Terms

- force - a push or a pull
- motion - a change in the position of an object

Materials List

- 3D objects which can roll from Day 1
- ramp (cardboard, wood or plastic)
- roller coaster track (pool noodles cut in half, pipe insulation cut in half, empty paper towel rolls, empty toilet paper rolls, paper plates, straws, K'NEX kits, etc.)
- paper/pencil (optional)
- videos and/or books about roller coasters (optional)
 - [Wild Waves Enchanted Village](#)
 - [Little Dipper](#)
 - [Road Runner Express](#)
 - Roller Coaster by Marla Frazee
 - Zoom! by Diane Adams

Activity Description

1. Revisit the 3D objects the student explored during Day 1, focusing on the objects that rolled.
 - Yesterday we explored objects that can roll or slide. We determined that these objects roll down a ramp. What properties (characteristics) do they have in common?
 - Round or nearly round shape
2. Remind the student that the goal of this week's science lessons are to explore ideas that will help him/her design a roller coaster.
 - Let's think about a roller coaster (if the student does not have experience seeing and/or riding a roller coaster, use a video or book to introduce). A roller coaster has many different parts. What part do the rolling objects represent on a roller coaster?
 - The passenger cars.
 - What part of a roller coaster might the ramp represent?
 - A hill.
3. Once the student has discussed what the rolling objects and ramps represent/act like in a roller coaster. Discuss the other features of roller coasters using the images from the videos/books if needed.
 - What are some other characteristics of roller coasters?
 - Long, flat stretches
 - Loops
 - Turns
4. Show the student the available materials and ask:
 - If we want to build a long, flat stretch for our roller coaster, which material could we use? Why would you use that material?
 - If we want our roller coaster to have a loop, what could we use? Why?
 - How could we use these materials to make turns?
5. Provide the student with an opportunity to explore the various materials to determine which would be best suited for each section of the roller coaster track. Remind the student that they are not building the entire roller coaster at this time but experimenting with the properties of the different materials to see which ones work best for specific features of the coaster.
 - This is a great opportunity for the student to practice problem-solving and experience how a problem can have multiple solutions. For example:
 - Paper towel and toilet paper tubes work great for long, flat stretches or the downward slope of hills.
 - Paper plates can be cut to form loops or turns.
 - Pool noodles or insulation can be used for straight stretches as well as curled to form loops or turns.



Closure

After providing the student with ample time to explore the materials, discuss his/her thoughts.

- Which material(s) do you think will work best for straight track/loops/hills/turns? Why do you think this?

Explain that tomorrow, he/she will be designing a roller coaster. He/she will need to select an object to roll along the track as well as materials to make the track. This activity will assist him/her in making those selections.

Extension

Explore how quickly a rolling object travels across the various track materials.

- Do some materials cause the object to roll faster or slower than others? Why?
- How might this impact the materials selected when creating the roller coaster?