

A Wild Ride! Week 2: Grades K-2

Day 3: My Wild Ride: Ask and Imagine

Teacher/Parent Background

Scientists and engineers are always faced with challenging questions and problems. In order to best explain the world around them or propose valuable solutions, scientists and engineers follow steps to accomplish these goals. In engineering fields, engineers use the Engineering Design Process to propose solutions to problems in order to make the world a better place or to provide some much needed fun!

Overview

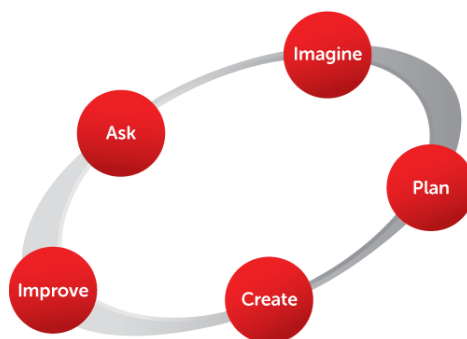
In this activity, young learners will use their experiences with force (pushes and pulls) and motion (a change in position) to make decisions about which objects would work best to design a roller coaster.

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

- matter - the “stuff” that everything is made of
- force - a push or a pull
- motion - a change in the position of an object
- engineers - people who design and/or build things to solve problems
- engineering design process - a set of steps engineers use to propose solutions to problems



The Engineering Design Process

- blueprint - a design plan

Materials List

- 3D objects which can roll from Day 1
- roller coaster track supplies from Day 2
- Imagine handout
- crayons or pencils
- 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 explored during Day 1 and the track materials explored during Day 2.
 - We have been exploring different types of matter (stuff).
 - We explored objects that can roll or slide.
 - What did we decide those objects had in common?
 - Round or nearly round shape
 - We explored matter or materials that could be used to create a track for our round objects to travel on.
 - What type(s) of matter or material(s) did we decide could be used to create a hill?
 - Paper towel/toilet paper rolls, pool noodles, insulation, etc.
 - What type(s) of matter or material(s) did we decide could be used for long, straight sections of track?
 - Paper towel/toilet paper rolls, pool noodles, insulation, straws, etc.
 - What type(s) of matter or material(s) did we decide could be used to make loops or turns?
 - Paper plates, pool noodles, insulation, etc.
2. Remind the student that he/she has been exploring matter and its properties, including how it reacts to forces, in order to figure out how to design a roller coaster.
 - Today we are going to be engineers! Engineers are people who design and build things to solve problems.
 - We have a fun problem to solve today. We are trying to build our very own roller coaster!

3. Before the student can begin building his/her roller coaster, first he/she must begin the engineering design process by asking questions. Guide your student through asking questions that are important to designing and building a roller coaster given the available materials.
 - Before an engineer can start solving a problem, he/she needs to ask questions. An engineer asks questions about the problem, what materials are available, how long he/she has to solve the problem, etc.
 - As an engineer of a roller coaster, what questions do you have about the challenge?
 - How big can my roller coaster be?
 - What can I use to build my roller coaster?
 - Where am I building my roller coaster?
 - How much time do I have to build my roller coaster?
 - Is someone helping me build my roller coaster?
4. Now that the student has asked and received answers to various questions about the designing and building of a roller coaster, it is time to facilitate imagining what the roller coaster will look like given the constraints (space, size, materials, etc.) To do this, provide the student with a copy of the Imagine handout. Prompt him/her to draw his/her ideas.
 - Engineers record their design ideas on paper so they can look at them while they are building and so they can share their ideas with others.
 - These design plans have a special name called a blueprint.
 - You are going to create a blueprint for your roller coaster. Using crayons or pencils, draw what your roller coaster is going to look like on this paper (Imagine handout).
 - Draw more than one idea. Engineers need to consider multiple ways to solve the same problem. What are two ways you could create a roller coaster?
5. Provide the student with time to draw his/her roller coaster plans. Frequently check in with the student to encourage him/her to include as much detail as possible. You may decide to give the student constraints such as requiring a certain number of hills or loops or using only certain materials depending on what you have available.

Closure

Once the student has completed his/her blueprints, discuss the plans while helping the student to label key attributes (hills, loops, tunnels, etc.) and materials (paper towel tubes, straws, etc.) as needed.

- Describe your plan. Tell me what will happen from the start to the end of the ride.
- What material(s) will you use to build _____ (i.e., hill, tunnel, loop, etc.)? Why do you think that material is best?
- How will you keep the different parts of the track together (i.e., tape, glue, etc.)?

- How is Plan 1 different from Plan 2? Why did you design it that way?

Encourage the student to make necessary revisions based on thinking that might have changed during his/her conversation with you. The goal is to have detailed plans that the student can follow when building. Making changes during the actual building process will be discouraged. The student will have time to consider and make changes to his/her design during the Improve stage of the engineering design process.

Extension

Encourage storytelling by creating a theme for the roller coaster. What story can your roller coaster tell? Include related decorations on tunnels or loops. Create a catchy name. The sky's the limit!

Imagine Handout

Draw two different roller coaster designs here. Remember to label the:

- different parts of the track (hills, loops, turns, and tunnels)
- starting and stopping point
- materials used (straw, paper plate, etc.)

Idea #1

Idea #2