ROLLING ROBOTS

Overview

Book: *Rosie Revere, Engineer* by Andrea Beaty

Grades K-2

Rosie loves to build things. Sometimes they work and sometimes they don't. In this inter-disciplinary lesson, students will create a "robot" and then try out different objects to see which will best help their robot creation roll down a ramp. The lesson can easily be divided into 2 sessions, one for creating the robots and one for the testing sequence.

Standards

K-2-ETS1-3	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
2-PS-1-2	Analyze data from testing different materials to determine which materials have the properties that are best suited for an intended purpose.
SL.1-2.6	Produce complete sentences when appropriate to task and situation in order to provide requested detail or clarification.
Fine Arts	
VA:Cr1.3.K	Engage collaboratively in creative art making in response to an artistic problem.
VA:Cr2.1.1	Explore uses of materials and tools to create works of art or design.
VA:Cr2.3.2	Repurpose objects to make something new.

Objectives

Students will repurpose a box and use various materials to create a robot.

Students will test at least 3 different objects to determine which one will make their robot move the best.

Students will describe the results of their tests in complete sentences.

Materials Required

- One smooth board or incline plane to act as a ramp
- Object to prop up one end of the board
- Empty cube shaped facial tissue boxes or empty cylindrical oatmeal boxes (one per group)
- Various art supplies that might include, crayons, markers, foil, duct tape, Contact paper, Styrofoam pieces, craft sticks, toothpicks, chenille stems, construction paper, fabric, buttons, google eyes, stickers, paper plates, scissors, glue, and masking tape.
- A tennis ball *plus* at least five of the following: soft ball, golf ball, still full soup can, still full tuna can, 1 inch diameter dowel rod cut to width of boxes, large marble, smallest size still full water bottle, small still filled peanut butter jar, heavy paper weight, or hockey puck (these will be inserted in the bottom of the robots to propel them down the ramp).
- Large paper for marking test runs

Preparation

1. Cut off the tops of the cube shaped tissue boxes. Remove the lids from the oatmeal boxes. The open end of the boxes now becomes the bottom of the robot.

Procedure

1. Explain to students that scientists and engineers test out different materials and objects the same way that Rosie tried different things in her inventions.
2. Show students some of the illustrations from the book and ask them to name some things that Rosie tried to use.
3. Tell the class they are going to create at robot and then try different things to help the robot roll down the ramp. Show the students the ramp.

4. Divide the class into groups or pairs.
5. Have students turn the boxes upside down so the open side is now the bottom of the robot.
6. Allow time for the students to use the art materials to create robots. Encourage students to use at least three different types of materials.
7. Once all of the robots are completed set up the ramp. Place a large piece of paper at the bottom of the ramp. You will use this to mark the distance that each robot travels on the different attempts.
8. Insert the tennis ball under the first robot. Start the robot at the top of the ramp and let it roll. Mark the progress.
9. Show students all the various objects they might use to propel their robots. Ask students to predict which ones they think will work best in the robot.
10. Let students discover whether to use the cans, bottles, or jars in their upright position or on their sides.
11. Let each group select an item and try out their robot. Mark the progress of the robots on the paper.
12. Continue until each robot has been tested with three different items.
13. Once the tests are complete talk about the characteristics of the most successful attempts.
14. Ask students to pair share with another group of students and talk about their robot tests. Remind students to respond in complete sentences.

Extensions

1. Set up ramps of varying lengths and inclines. Repeat the tests.
2. Put all the robots together to form one giant robot. Ask students to make up a story about the robot.
3. Have students draw a robot that has everything on it that starts with a particular letter. (Example: S - stars, silver, stripes, stickers, spoons or B-buttons, blue, bows, bracelets, black, etc.)

Rubric

Note: This is mainly an exploratory activity. However, if a rubric is required here is one that can be applied.

RUBRIC	Exceeds (3)	Meets (2)	Partially Meets (1)	Does Not Meet (0)
Robots	Creation included 4 or more types of materials	Creation included 3 types of materials	Creation included 2 types of materials	Creation included 1 type of material
Ramp test	Robot successfully rolled down the ramp 3 times and achieved one of the furthest distances	Robot successfully rolled down the ramp 2-3 times	Robot successfully rolled down the ramp 1 time	Robot did not successfully roll down the ramp
Report	Student is able to explain the robot testing accurately with descriptive words and in complete sentences.	Student is able to explain the robot testing accurately in complete sentences.	Student is able to explain the robot testing, but does not use complete sentences or details are inaccurate	Student is unable to explain the robot testing
Total N/9				