Forces and Motion

Lesson Plan for Grade 3

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OVERVIEW & PURPOSE

Students will investigate the effects of balanced and unbalanced forces on the motion of an object by building a ramp on a teeter-totter with gates at each end that are attached to a Makey Makey and Scratch program to measure speed as the ramp gets steeper.

EDUCATION STANDARDS

(Next Gen. Science) 3-PS2-1 Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.

OBJECTIVES

1. Students will build a teeter totter (or an adjustable ramp) with an opening and closing gate to connect to the Makey Makey.
2. Students will measure the angles of their ramp using a protractor.
3. Students will graph the data they record from running the experiment through multiple tests.
4. Students will analyze and evaluate their data to determine the results of their experiment.

- “Vehicle” can be a hot wheels car, a ball, or a cylinder that can roll down the track.

MATERIALS NEEDED

1. Makey Makey
2. 4 Computers with internet access and updated flash player
3. Access to scratch.mit.edu : Makey Makey Hot Wheels Timer program https://scratch.mit.edu/projects/116199867/
4. Hot Wheels tracks and entry gates
5. Variety of Hot Wheels vehicles, marbles, small balls, etc.
6. Aluminum foil and/or aluminum tape
7. Copper tape

8. Cardboard or cardboard

ACTIVITY

Students will work in groups to build an adjustable ramp (or a ramp on a teeter totter) with an opening and closing gate that can connect to the Makey Makey. They will use aluminum foil, aluminum tape or copper tape and cardboard/cardstock to create opening and closing gates for their length of track. This is will allow them to get accurate times for their vehicle races. The opening and closing gates will need to complete a circuit when the car passes through them to start and end the Scratch program that will measure the time.

Students will use a protractor to measure the angle of the ramp.

The students will connect their Makey Makey to the computer and the race track and open the Makey Makey Hot Wheels Timer program in Scratch. They will measure the time it takes for a vehicle* to run the length of the track.
https://scratch.mit.edu/projects/116199867/

Students will then adjust the angle of the ramp, using the protractor.

Students will again use the Makey Makey Hot wheels timer program to measure the time it takes for the vehicle to run the length of the track. This can be repeated as many times as needed.

Students will graph their results and then analyze and evaluate their data.

* "Vehicle" can be a hot wheels car, a ball, or a cylinder that can roll down the track.

EVALUATION

1. Students construct a track with an adjustable incline.
2. Students construct a functional opening and closing gate to successfully run the Makey Makey program.
3. Students use observations and data to compare and contrast the speed of the vehicle as the incline of the ramp changes.
4. Students successfully graph their observations using a spreadsheet program like Excel or Google Sheets.