SASTA OLIPHANT SCIENCE AWARDS

SOUTH AUSTRALIAN SCIENCE TEACHERS ASSOCIATION

Prize Winner

Models & Inventions

Year 7-8

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Lower Eyre Peninsula Home School Group

Government of South Australia
Department for Education

SASTA South Australian Science Teachers Association

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The Not-So-Simple Ball Machine

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My model is a Lego creation that moves balls using simple machines. It displays the six simple machines

1. Wedge
2. Wheel and Axle
3. Screw
4. Inclined Plane
5. Lever
6. Pulley

Scientific principle

The scientific principle of my model is to show how simple machines work, what they do and their different parts. Simple machines change the direction or magnitude of a force using mechanical devices.

How my model was made

My model was made with

- balls
- books
- Lego beams
- axles
- cogs
- motors
- batteries
- and other Lego parts

I started building my model in March but stopped in May. My model took a lot of building and then testing, modifying, making it better. I had no help from any other person whatsoever. I came up with the idea of a model by myself but I have seen some ball machine modules on display at Brickvention, a Lego convention, and some online but had no further instructions and constructed it, by my own design, with the pieces I had.

Problems

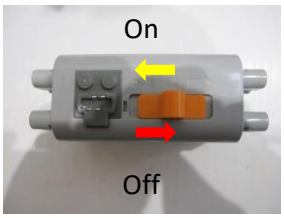
The problems I had mainly consisted of small adjustments I had to make to the mechanisms which made the balls move.

- With the inclined plane (4), the problem I had was trying to get the slope of my inclined plane at the right angle because if the angle was too steep the balls would fall back down instead of being propelled to the lever.
- With the lever (5) the motor wasn't strong enough to lift the platform so I had to gear it down. Also I added a rubber band so when the platform went down the

rubber band stretched and had potential elastic energy, so when the platform went up it was assisted by the energy stored in the rubber band.

- Finally the main problem at the end was that the balls entered and exited the modules at different heights; I wanted the balls to run down small inclined planes into the next module by gravity so I had to raise some of the modules up by stacking books under them to get them at the right height.

How to operate



1. To operate my model turn it on by sliding the two switches on the battery packs from the centre position towards the cables plugs.
2. Then add the balls one by one at the start of the Screw (3).
3. As the machine is going move the handle on the pulley (6) up and down to lift the balls up.
4. If any balls get stuck, use the hook too take the balls out and add them in at the start of the Screw (3).
5. Lastly turn the model off, slide the two switches back into the middle and collect the balls.

Video of the Machine operating:

YouTube link: https://youtu.be/RF6b_iOljXM