Paper Ball Run Challenge

Introduction

- The Paper Ball Run Challenge is an engineering challenge requiring participants to design and construct paper and tape structure that maximizes a ball's travel time from a start point at least 10 inches high to an exit at least 1 inch tall.

- The design must manage potential energy (height) and kinetic energy (speed), with friction serving as a key factor in slowing the ball down.

Question And Hypothesis

Problem Statement

How can we design a paper track that uses gravity to move a paper ball from the top to bottom as slowly as possible without stopping?

Hypothesis

If we add more curves,longer paths,or other obstacles,the ball will take more time to reach the bottom of the track.

Procedures And Testing Procedures

First, sketch the shape you are gonna make or craft, then grab the materials you need to make the track of your choice.After you are done making the design and making it test to see if your track works for the ball, make sure your ball is not getting jammed or stuck on an obstacle.If it does get jammed or stuck, try to loosen the obstacle or just change the shape of the obstacle a little bit.When it is ready, start from the top and enjoy it make sure to make it go as slow as possible.

1. Place the ball at the top of the track
2. Release without pushing
3. Time how long it takes to reach the bottom
4. Record the results
5. Redesign and improve the time
6. Test again
7. Compare version 1 and version 2, see how redesign improves performances

Results And Data Visualization

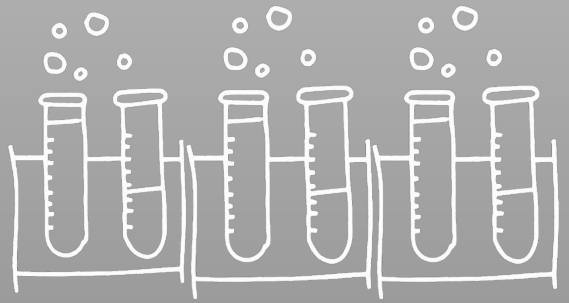
My results show that each time I improved my track, the ball took longer to reach the bottom.Version 1 was the fastest due to less turns, Version 2 slowed the ball with a longer path and more turns.My hypothesis was supported because adding more friction and longer paths increased the travel time.

DATA

TRACKS	TRIAL 1	TRIAL 2	AVG TIME
Version 1	1.5 S	1.4 S	1.5 S
Version 2	4.2 S	3.9 S	4.0 S

Discussion And Interpretation

- My hypothesis was correct, adding curves, friction bumps and longer paths increased the travel time of the ball.

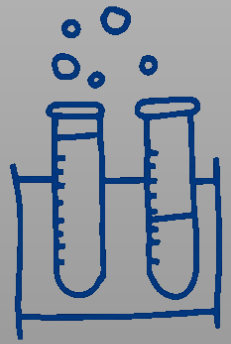


The reasoning behind this is because Version 1 has more turns and has a longer path causing it to be slower to get to the bottom.Version 2 had less turns and a shorter path causing the ball to get down the track the fastest out of both tracks.

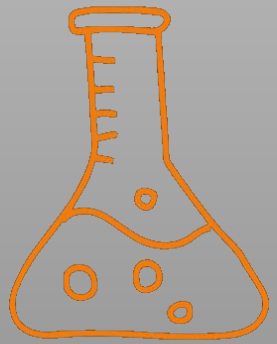
Implications And Ideas For Future

- Experiment with innovative, non-linear, or complex, or maze-like paths to determine the maximum possible time.A ball can travel within a set constrained space.

- Analyze the conversation of potential energy to kinetic energy and identify which ramp angles and features (e.g.,jumps,spirals) results in the lowest energy loss.



- Research the most efficient structural designs for stability, such As testing different support structures (trusses vs. columns) to minimize paper usage while maximizing height.



References
(Resources And Publications)

The resource that I used was Science Buddies.I found the Paper Ball Run Challenge really interesting for all the tracks I saw and making the project was really fun to try and make the ball go as slow as possible.

Website On How to Make And Work

2022 Paper Ball Run Challenge | Science Project
Science Buddies