UNIVERSITI TEKNOLOGI MARA

CAWANGAN TERENGGANU

MEC299

DEVELOPMENT AND KINEMATIC ANALYSIS OF ROCKET LAUNCHER WITH DIFFERENT BALL PARAMETER

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ABSTRACT

This project involves designing, fabricating and calculations of a rocket launcher and which exhibits vertical projectile motion. For a rocket launcher to be made it first need to be designed and brainstormed for the ideas of the design first. The final design is then made into 3D by using the Solidwork software. After that, the design will be fabricated step by step by using the acquired material at the UiTM's facilities and workshop. The finished product is then tested to test its performance and it is then used to achieve the objectives. As the title suggests, this project is used to determine the acceleration, velocity, and height of three different ball with different weight and size.

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INTRODUCTION

1.0 INTRODUCTION

This project is based on the concept of projectile motion, which includes both dynamics and physics. [3] Many processes are also involved, such as the design and fabrication of an instrument or product that will be used to determine the projectile motion components, such as velocity, Maximum height, and time taken, which will be utilized to launch an object. As for this project it will uses three different types of balls with different parameters such as tennis ball, Ping pong ball and golf ball. This project can also be used in the near future as a learning instrument to be used by teachers and lecturers in their respective schools and university and also as coordinate search method. [22]

Gravity also played a significant role in this project as when the ball is launched it will move vertically into the air and will eventually fall again when the velocity has reached zero. The gravity then will pull the ball back with its gravitational pull and due to the ball's weights. The value for gravity is $a_y = g = 9.81\ m/s^2$

It concentrated on the equations used in motion analysis for projectile motion analysis. The formula is still a subject in this project because it is needed to fulfil the objective criterion of determining the beginning velocity and maximum height. It is necessary to employ a formula to determine the beginning velocity based on the data collected from the test run. [1]

1.1 BACKGROUND OF STUDY

This project focused on the uses of projectile motion in real life and how it could benefit everyone. For the product used are a tennis ball, ping pong ball and a golf ball. The three types of balls is picked as it is the easiest to obtain and suitable for the project as it has different weight and size. The product will use the concept of a real-life rocket launcher and will launches the balls with different parameters from the ground to the air vertically

with a certain force

1.2 PROBLEM STATEMENT

The goal of this project is to solve an issue in a school laboratory for students. Because there is no example of a projectile launcher in the school laboratory, students are unable to examine the application for projectile motion. Students must have a real-life simulation for further understanding of how projectile motion works. This is because they must know how to calculate the ball's initial velocity, horizontal and vertical distances, and time taken for projectile motion.

1.3 OBJECTIVES

1. To design a rocket launcher by using Solidworks software.

2. To fabricate , simulate and calculate height, velocity and acceleration of a rocket launcher that uses projectile motion as a launch system and for use in projectile experiments. [2]

1.4 SCOPE OF WORK

The scope of work in this study/ research as the following:

1. Kinematic analysis is only limited to projectile motion as further work could be unrelated to the project.

2. Fabrication design is focused on rocket-based design.

3. Simulation using Solidwork software

4. Direction of launch is vertically and will not involve any angle.

5. 3 different variety of ball weight which is tennis ball, golf ball and ping pong ball to simulate min. mass, medium mass and max mass and to establish range of mass to