Investigative Study - To study the factors affecting the range of a projectile

Task outline:

Prior knowledge of projectile motion is required.

In this investigation, you are going to make an air table or other apparatus suitable for studying projectile motion and design experiments to show that the range of projection of an object is proportional to v^2 and $\sin(2\theta)$ of the projection . You should collaborate with your group-mates to complete the task. You should apply your knowledge and skills in Physics to solve the problems and draw conclusions based on the results obtained.

The investigation is divided into five stages.

1. Searching for and defining questions for investigation
2. Developing an investigation plan
3. Conducting the investigation
4. Organising and analysing data for a justified conclusion
5. Presenting the investigation findings with a written report, posters and other means

Apparatus:

The following apparatus and materials will be provided:

- Air blower
- Disc moving on the air table
- Digital video camera
- Metre rule

Students are recommended to propose other apparatus and materials that may be useful.

Discussion:

1. Propose the factors that can affect the range of a projectile. Are these factors changeable in the experiment ? Identify the independent variables, dependent variables and control variables in your experiment.
2. Carry out a book and web search. Collect more information about projectile motion.
3. Design a series of experiments in which you can check your hypotheses.
4. Carefully examine the feasibility and validity of your experiments.
5. Carry out a risk assessment to identify the safety precaution(s) needed to be taken.

Assessment:

Your work will be assessed in the following areas.

Design of the experiment (marks to be given in the report)

1. Make an air table or other apparatus for studying projectile motion
2. Decrease the acceleration of the disc so that slow motion can be demonstrated
3. Make the emitter for the projectile

This part should be submitted before the experiment. Comments will be given and your revised plan should be included in the report.

Implementation

1. Implementation of action plan with understanding
2. Proper use of apparatus
3. Proper experimental skills
4. Group work and time management
5. Ability to deal with problems encountered independently.

Questions may be asked during the experiment to verify understanding.

Report

1. Theory
2. Experiment Design and Procedure
3. Apparatus

} is required to submit one set only

4. Data presentation and graph plotting
5. Analysis and conclusion drawn according to experimental results
6. Record of reference materials

} **Individual** work. To be attached to the end of group work.

Record format for reference materials if any

Book / Website : _____ Author : _____ Publisher / Organisation : _____ Year : _____ Reading / Browsing Date : _____ Time spent on studying the information : _____
Relevant information:

Work Schedule:

6 Nov 2010	Submission of Experiment Design
13 Nov 2010	Trial/Preliminary experiment
20 Nov 2010	Experiment
27 Nov 2010	Submission of Report