HONORS PHYSICS

Final Project Guidelines

Introduction

During the second semester, you studied the following topics:

- Work and Energy
- Momentum and Impulse
- Rotational Kinematics and Dynamics

And
- Simple Harmonic Motion
- Optics
- Circuits

For your final project, you will design a miniature golf course hole and then use the Sphero to record and analyze data to represent your knowledge and understanding of work and energy; momentum and impulse; and rotational kinematics and dynamics.

Steps to Success: Design

1. Each group will be given a Sphero Mini to use as a golf ball; all coding can be done on your phones in the Sphero Edu App.
2. Decide how you will represent your understanding of the required physics concepts by designing a low-resolution,
3. The Sphero needs to follow a path, interact with something or do something when data collection occurs.
4. Design and build (out of cardboard) any appropriate obstacles. Think creatively; instead of using a long piece of wood for a boundary, use an actual all. You may only use cardboard, glue, and popsicle sticks for construction.
5. Decide on a theme for your hole. Creativity is important!
6. Take an overhead shot of your final design. Annotate the image to show which parts of your mini golf hole demonstrate specific physics concepts

Then

7. Once you have settled on a final hole design, create a virtual reality version in CoSpaces.
8. The design should be to scale. You may create any background/environment you wish.

Due Date: May 1

Steps to Success: Data Collection

1. Use the Sphero Edu App on your phone to code your sphero to complete the course and collect data.
2. Use appropriate functions like "On Freefall" and "On Collision."
3. Your Sphero needs to change color when a new physics concept is being demonstrated and the Sphero must announce what that physics concepts is.
4. Test your code and debug as necessary.
5. Important: You will need to decide which data you need to collect, how you will represent that data and how you will analyze that data.
6. Use the data collected to demonstrate your understanding of specific concepts. For example, if the Sphero collides with another object, can you "prove" that momentum is conserved? If the Sphero launches off a ramp, can you "prove" energy is conserved?
7. You will need an overhead video of your Sphero in action completing the entire route.

Note 1: One team member may write the code and another team member may test and debug the code. Make sure you have access to each other's Sphero account.
Note 2: You may analyze the collected data together.
Note 3: Your analysis questions, conclusion paragraph and reflection must be done individually.

Analysis and Conclusions
1. Create a Google Doc named: **19HPhysLastNameFinalProject**
2. In the introduction to your report, include: your name, partner's name, physics concepts being investigated, brief description of how your project demonstrates those physics.
3. Then, insert annotated graphs to show which data you are analyzing.
4. Complete your data analysis on white unlined paper. Show all work, including formulas used and substitutions with units. Indicate your final answer. Your work must be completed in pencil and in an order fashion.
4. Then, under conclusions, respond to conclusion questions (these must be done individually).
5. In your conclusion paragraph, summarize what you have learned using the guiding questions provided.
6. Share your Google Doc with me.
7. Print your Google Doc.
8. Staple your data analysis to the Google Doc. (Google Doc first, Analysis second)

Due Date: May 23 (in class)