

### **The Scenario:**

The client is struggling with grasping the concepts of projectile motion in their physics class. They find it particularly challenging to understand how different launch angles and the weight and size of projectiles can affect the distance and trajectory of a launch. This difficulty is exemplified in homework problems, such as determining the optimal launch angle to hit a target, where the abstract nature of the calculations makes it hard for them to visualize and comprehend the outcomes.

After consulting with them, I suggested that we develop an interactive game-based application. This solution would allow the client to visually explore and experiment with projectile motion by adjusting variables such as launch angle, power, weight, and size in a controlled, simulated environment. The game would feature a variety of projectiles and targets, offering immediate visual feedback on the trajectory and impact of each launch.

### **Rationale for Solution:**

To address the client's struggle with understanding projectile motion concepts in physics, an interactive game-based application will be developed using Unity and C#. This application aims to visually demonstrate the effects of changing variables like launch angle, power, weight, and size on the trajectory of projectiles. Unity is chosen for its robust graphical and physics simulation capabilities, making it suitable for creating engaging educational content. C# will be used for scripting due to its integration with Unity, allowing for complex logic and physics calculations that underpin the game's mechanics.

The product will enable users to interactively adjust parameters affecting projectile motion, providing real-time feedback and visualizations of trajectories. This hands-on approach is designed to enhance comprehension of physics principles, transforming abstract concepts into tangible experiences. By leveraging the strengths of Unity and C#, this solution directly targets the client's learning challenges, offering an engaging and effective tool for mastering the intricacies of projectile motion.

### **Success Criteria :**

1. The client can select from a variety of projectiles with different weights and sizes.
2. The client can adjust the launch angle and power for each projectile.
3. The application visualizes the trajectory of each launch in real-time.
4. The application provides immediate feedback on the success of hitting a target after each launch.
5. The program allows the client to see a summary of the physics principles demonstrated by each launch.
6. The application includes levels of increasing difficulty, introducing obstacles and requiring the application of learned concepts.