Criterion A: Planning

SL Circular Motion Simulation

Scenario

My client is an IB Physics teacher at my school. He often uses computer simulations and animations to demonstrate concepts to students. In my experience, these simulations greatly improve my understanding of each topic, so long as they are detailed enough and labeled adequately. However, some curriculum had less digital demonstration than others. In areas where students struggle to grasp concepts, my client would often point towards online resources when they were available, so I thought I could fill in some gaps. While speaking with my teacher about my idea, he noted that his students often had difficulties understanding the basics of circular motion, like the idea of acceleration pointing towards the center of the circle at all times. When I took the course last year, there was a relatively limited amount of digital demonstrations regarding circular motion. He manually created animations on his slide shows, and there was only one computer simulation used in class. This simulation only showed some behaviors of an object in circular motion and did not show the equations and calculations behind it. I decided to use this opportunity for my IA and plan to create a webpage containing simulations of this topic.

Rationale

I will be using JavaScript to create a webpage with multiple visual demonstrations and text showing the numbers used in the demonstration and how they relate to the given equation(s). My product will aim to demonstrate the applications of the main equations of circular motion and how they affect an object by taking inputted values and changing the animation accordingly. The product will be written in JavaScript (along with HTML and CSS to format the webpage) because JavaScript is run on the client's side. I will not need to access data from an external server, so JavaScript is a more efficient option. The webpage will not store any data across browser sessions and only takes numerical input, so security of private data is not a concern. JavaScript is also compatible with other languages if, for example, I need to expand the product with languages that might better support data storage. Additionally, the sheer popularity of JavaScript gives me access to numerous resources when I inevitably need assistance, and I am already somewhat familiar with the language compared to other popular web-development languages.

Success Criteria

1. The webpage runs on all major browsers without errors that stop any simulations or input.
2. The webpage is accessible to users - they can navigate the webpage, and those with a basic knowledge of the physics topic will be able to understand the content of the page.
3. The simulations behave correctly based on the displayed values and equations.
4. Simulation allows the user to input their own variables and updates the visual accordingly.
5. Dependent variables are calculated correctly from input values.
6. Simulations can be paused.

Word count: 468