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Final Project: Connections & References

“Lecture 5: Newton's Laws & Gravity” details various learning objectives surrounding gravity, which apply closely to my final project submission. I list two such learning objectives below, providing detail as to how they connect to my project.

“Explain what determines the strength of gravity.”

In my game, gravity is continuously calculated using Newton’s Law of Universal Gravitation. The distance between the satellite and earth, as well as the actual mass of earth, are used in this dynamic calculation. As one plays the game, they will notice that the force of gravity quickly becomes weak as the satellite moves farther from earth. This exemplifies how gravity is proportional to the square of distance, a crucial concept to teach in the study of gravity.

“Explain how an object (such as a satellite) can be put into orbit around Earth.”

The objective of my game is to launch a satellite from earth, such that it enters a perpetual orbit. To do so, one must choose the appropriate launch angle and speed, showing the user what launching a satellite might entail in real life. One can watch as their satellite is pulled by the force of gravity, changing its course in a realistic fashion. The game is quite difficult -- I myself was only able to get the satellite to orbit a couple of times -- illustrating the precise nature of real life satellite launches. If you launch the satellite too hard, it will soar off the screen, into deep space. Too soft, and it will come spiraling into earth. This is consistent with real life satellite launching difficulties, and exemplifies the precision of the calculations that must be made in order to achieve orbit.

References:

The following resources were consulted for the gravitational portion of the project:

https://en.wikipedia.org/wiki/Newton%27s_law_of_universal_gravitation

https://www.space.com/classical-gravity.html

The following resources were consulted for the coding portion of the project:

https://www.quickprogrammingtips.com/python/how-to-create-canvas-animation-using-tkinter.html

https://stackoverflow.com/questions/12250117/how-to-draw-images-in-tkinter-window

https://www.python-course.eu/tkinter_events_binds.php

https://zetcode.com/tkinter/drawing/

https://stackoverflow.com/questions/42333288/how-to-delete-lines-using-tkinter

https://stackoverflow.com/questions/46137397/how-to-make-moveable-image-rotate-to-follow-mouse