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| PHYS1521  **Math and Physics for Games**  Project Report  Digital Media and IT  School of Applied Sciences and Technology |

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# Introduction

Throughout PHYS1521 – Math and Physics for Games, there was an emphasis on Newton’s Laws and how to convert mathematical equations into code. One such lesson focused on circular motion and how it is calculated. This is important for many games as there is often a need to calculate what it is like to move in a circular motion, think how a game object would swing around in a rope (like in Uncharted 4, Ratchet and Clank, or Cut the Rope), or games involving heavy physics simulation where calculating circular motion is imperative for them to work (G-Mod, Bad Piggies).

This project will expound on how games calculate circular motions, focusing on how force is affected by mass, radius, acceleration, and velocity in a non-linear way. This will be done by executing real life math and physics learned in class and researched online into code using the Unity game engine and seeing how they would work in a simulated environment. Unity has its own physics engine, which will be used to speed up the process of calculations but most of the code will be done by me to get a better understanding of how these systems work. All of this will expound on what was learned in class while deepening the understanding of how circular motion works in video games in general.

# Concept

The concept of the project involves

Here you will have several paragraphs outlining the concept(s) of your project. You will need to go into depth on your project, i.e. outline all the key points relevant to Game Programming. For each key point below be sure to include diagrams/figures along with any math/code that is relevant to the key point. The diagrams and figures will need to be updated in the Table of Figures.

## Linear and Angular Velocity

Section for Key Point 1 (you need to rename the heading for this sub-section).

## Key Point 2

Section for Key Point 2 (you need to rename the heading for this sub-section). Repeat this as many times as required for your report

# Conclusion

Summarize the report by restating the reason for this topic and how the key points (covered above) make this topic relevant to Game Programming.

# References

Idema, T. (2020, December 30). *5.1: Rotation basics*. Physics LibreTexts. https://phys.libretexts.org/Bookshelves/University\_Physics/Mechanics\_and\_Relativity\_(Idema)/05%3A\_Rotational\_Motion\_Torque\_and\_Angular\_Momentum/5.01%3A\_Rotation\_Basics

OpenStax. (2025, March 16). *4.5: Uniform circular motion*. Physics LibreTexts. https://phys.libretexts.org/Bookshelves/University\_Physics/University\_Physics\_(OpenStax)/Book%3A\_University\_Physics\_I\_-\_Mechanics\_Sound\_Oscillations\_and\_Waves\_(OpenStax)/04%3A\_Motion\_in\_Two\_and\_Three\_Dimensions/4.05%3A\_Uniform\_Circular\_Motion

Sundstorm, T., & Schlicker, S. (2021, January 2). *1.4: Velocity and angular velocity*. Mathematics LibreTexts. https://math.libretexts.org/Bookshelves/Precalculus/Book%3A\_Trigonometry\_(Sundstrom\_and\_Schlicker)/01%3A\_The\_Trigonometric\_Functions/1.04%3A\_Velocity\_and\_Angular\_Velocity