Rotations & Projectile Motion in 3 Dimensions

PHYS1521

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# Introduction

\*NOTE\* - Minimum of two, maximum of four, paragraphs outlining the topic. Include the rationale for why this topic was chosen and what the report covers \*NOTE\*

# Rotations in 3 Dimensions

\*NOTE\* - Minimum of two sections outlining the details of the topic chosen. The sections must include cited research \*NOTE\*

## Euler Angles and Gimbal Lock

\*NOTE\* - Minimum of two fully explained examples showing detailed steps from initial values to final answer \*NOTE\*

## Quaternions

Quaternions were discovered by Sir William Rowan Hamilton on the 16 October 1843.

To understand quaternions, we should begin with Complex Numbers (Expand on this.)

### Complex Numbers and the Complex Plane

### Quaternions are 4D numbers

# Projectile Motion in 3 Dimensions

\*NOTE\* - Minimum of two sections outlining the details of the topic chosen. The sections must include cited research \*NOTE\*

## Vector Math

## Applying Vector Math to 3D scenarios

\*NOTE\* - Minimum of two fully explained examples showing detailed steps from initial values to final answer \*NOTE\*

# Conclusion

\*NOTE\* - Minimum of two, maximum of four, paragraphs outlining the lessons learned during this project. Include how this topic could be included in the content for PHYS1521\*NOTE\*

# References (Make APA Citations)

\*NOTE\* - Minimum of three references. The references must exclude You Tube videos, blogs or forum posts. Wikipedia may be used, but there must be two other supported references. References must be cited using either APA or MLA report style both in the body of the report and in a references section (last page of the report) \*NOTE\*

<https://www.johndcook.com/blog/2012/02/15/dot-cross-and-quaternion-products/>

<https://www.3dgep.com/understanding-quaternions/>

<https://users.ncsa.illinois.edu/kindr/emtc/quaternions/>

<http://www.arielnet.com/presentations/show/adi-ppt-01001/visualizing-orientation-using-quaternions>

<http://www.euclideanspace.com/maths/algebra/realNormedAlgebra/quaternions/>