

## Honors Proposal: Epicycles

As described by mathematical concepts, an epicycloid or hypocycloid is a plane curve produced by tracing the path of a chosen point on the circumference of a circle—called an epicycle—which rolls without slipping around a fixed circle. It is a particular kind of roulette. In this project I will be exploring the properties of cycloid, hypocycloid and epicycloids. I will delve into the history of cycloids starting with some of leading mathematicians over the past 500 years. Especially Galileo who studied the curve in detail. I will investigate the parametric equations for cycloid, hypocycloids and epicycloids and use mathematic methods to derive each equation. Since I will be using my math project as an add on for my honors project, I have decided for the honors portion in addition to a formal written paper I will, construct a visual representation in order to describe the path taken by the rolling circle and properly determine the parameters that are being used in the equation. I will also explore some mathematical problems dealing with cycloids and the method of solving these problems using what is known about cycloids.

The project will be formatted in 3 components, the first component will be a formal paper describing the history of cycloids, derivations of the parametric equations for each type of cycloids, exploring famous problems dealing with cycloids and summing up with further discussion on cycloids. The second component is a visual board with the same format as the paper, with more graphical representation. The third and final component, a real life model that will trace the path of a cycloid, hypocycloids and epicycloids.

As of last semester my advisor and I have been meeting every week, I expect that to continue and probably increase to twice a week as I get closer to completing the project. I would like to have a complete a 1<sup>st</sup> draft by February 28<sup>th</sup>, 2019 which will be submitted to my advisor for review. I would also like to have a complete final draft by March 30<sup>th</sup>, 2019 and at that time would like to submit a formal paper to my advisor and Honors college. The remainder of the time use to build a model, edit and finalized the project.

### **Tentative schedule**

February 6 <sup>th</sup>	complete mathematical derivation of cycloids
February 28 <sup>th</sup>	submit 1 <sup>st</sup> draft
March 3 <sup>rd</sup>	start the visual board presentation
March 10 <sup>th</sup>	submit visual board presentation
March 17 <sup>th</sup>	start building project prototype
March 24 <sup>th</sup>	test project prototype
March 30 <sup>th</sup>	submit final draft/ finalize prototype
April 8 <sup>th</sup>	hand in all materials and components

### **Bibliography**

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