Mathematical SL Proposal: The Exploration—Initial planning	Due:

Name: Exemplar 1

1   Mathematical area of interest

Conic Sections – specifically ellipses

2   Your specific topic and aim of exploration

- a carpenters trammel – a tool that draws out ellipses for a carpenter.

Also called Trammel of Archimedes or an ellipsograph.

When I'm done I hope to be able to state the settings on a trammel to ensure an ellipse with a major axis length of 5 and a minor axis length of 3.

3   Reason for choice (personal engagement is part of Criteria A)

-my uncle is a carpenter and he's made some pretty cool tables. So I'm interested in how this tool makes an ellipse. What are the properties of an ellipse that makes this tool make an ellipse.

4   Three areas you plan to explore

1. **Definition of an ellipse, including a proof as to why the trammel produces an ellipse.**

2. **the parameters within the general ellipse equation and how they affect an ellipse.**

3. **How settings on the trammel affect the ellipse.**

5   How will you explore these areas mathematically

    1. I will "make" a trammel with a ruler and pencil to see how the mechanisms work. I have this book that explains the construction of a simplistic model of a trammel.

    2. I will explore a GSP construction of an ellipse that models the carpenters trammel. With this GSP construction explore how the settings affect the ellipse and how this connects to the equation $\dfrac{(x-h)^2}{a^2}+\dfrac{(y-k)^2}{b^2}=1$ **of the ellipse and the affects of each parameter on the shape of the ellipse. I will prove why this particular construction produces an ellipse.**

    3.My final step will be to reconnect the GSP construction to a carpenters trammel to show how the device works and actually produces an ellipse, complete with equations and justifications. In this part of the paper I will consider the limitations of a trammel and the limitations of the GSP construction as well.

6   Resources / Sources

Geometer's Sketchpad - GSP

Exploring Conic Sections with Geometer's Sketchpad – Key Curriculum Press pg 19
Algebra and Trigonometry – Dulciani McDougall – Littel.
http://web.mat.bham.ac.uk/C.J.Sangwin/Publications/WonkyTrammel.pdf
http://www.mathcaptain.com/geometry/ellipse.html