## **Measurements Lab - Vernier Calipers**

Explore the links in the course map to learn details on how to operate Vernier Calipers. There is a description of operation as well as a geogebra applet of a set of Vernier Calipers to help you understand the operation without having to individually have a pair. Note the material on the zero reading; however, I believe lab calipers are currently calibrated for zero (ensure this is so yourself every time you get a fresh pair of calipers).

You will be replicating/restoring a physical object within a virtual environment with the intent to have the virtual object printed and compared/tested. If the physical object is broken in an obvious manner, use symmetry principles when creating the virtual object so it is in a pristine state.

## Objects: (broken) tray connector

- 1. Discuss within your group what measurements will need to be taken and decide on a convention of variable names for the measurements. Have each group member make a separate paper data table for recording the measurements.
- 2. Individually and independently measure all dimensions of these objects with lab calipers.
- 3. Create a geogebra spreadsheet with each row labeled with your chosen variable names and each column containing a group member's paper data table entries. note if there is 'significant' variation amongst the measurements that might indicate a systematic error.
- 4. Calculate the average value of each row in an additional column
- 5. Create a proportional representation of the 2D base layer in geogebra using the average values
- 6. Place a physical ruler against the screen along an axis and adjust the viewport so that the numbers match
- 7. Hide axii and grid to have a clear and clean view of your base layer and export image as: **Tray-base-LN123.png** (where LN123 represents hyphenated sequence of lastnames)
- 8. Enable 3D view in geogebra and add additional points and structures to finish the object
- 9. Open the .png file you saved earlier in a graphics program and print the file on paper.
- 10. Compare the paper printout with the screen image and the original object. Do they each match? If not, what would you need to do to match them all to the original object dimensions? Type a short answer in your geogebra file.
- 11. Save final .ggb file as:

## Tray-3D-LN123.ggb