CHEAT SHEET
TRACKER ANALYSIS SOFTWARE

Adding a video to Tracker for analysis:

1.) Either drag a video onto the Tracker screen or use the "open" button in the upper left-hand corner of the screen to find and import your video.

2.) Click OK on the error message that pops up.

Setting the start and end of video portion to analyze:

3.) Identify where the motion just-begins.

4.) With the slide-cursor located along the bottom of the video at the point identified in #3, Control-Click on the cursor. In the window that pops up, Click "set start frame." This will set your start position.

5.) Control-Clicking again on the cursor and in the window that pops up, Click "set start time." In the window that pops up, set that time to "0.0 seconds."

6.) Identify where you want to end the interval. With the slider-cursor at that point, Control-Click on the cursor. In the window that pops up, Click "set finish frame." This will set your end position.

7.) Set the *number of frames per interval* (it is shown at the bottom-right of the window).

Setting scale and axes:

8.) Click on the Calibration Tools icon on the upper ribbon and select *New Calibration Stick*. Hold down Shift and Click when the cursor is at the end of your meter stick. Then hold down Shift and Click on the other end of the meterstick. In the window that pops up, write in the distance between the marks (1.0 meters if you used the whole meter stick). Note that if you Click again on the Calibration Tools icon, the meterstick will hide.

9.) Click on the Axes icon. Place the axes wherever you want, but be sure it is parallel to the direction the object is moving. Again, if you Click again on the Axes icon, the axes will hide.

Picking points and generating data table/graphs:

10.) To pick points, place the slide-cursor back at the beginning and Click on the Create button in the top ribbon. In the window that shows, Click on *Point Mass*.

11.) Select a portion of the object you can easily identify throughout the motion. Holding down Shift, position your cursor on that position and Click. This will leave a mark and will advance the object however many frames you identified in Step 7.

12.) If you need to zoom in to 100% to get a better look at the object, do that.

13.) Continue to Shift-Click on the object in the place selected in Step 11 until the object gets to the end of its run.

14.) The table and graph generated (it will be to the right on your screen) will be for the object's Position vs Time. You can copy the tabled data into a Google Sheet or Excel Spreadsheet, your choice, headed by the appropriate labels (" time (sec)" and "position (m)").

15.) To get velocity information, Click on the graph's vertical header. It will give you a dozen or so selections of possible graphs. If the object is moving along the x-axis, as defined by your axis, click on vx. That will replace the *position vs time* graph with a *velocity vs time* graph. DOUBLE CLICKING on that graph will open a window in which both that v vs t graph and a table of time and velocity values will be displayed. You can copy the tabled data into a Google Sheet headed by the appropriate labels (" time (sec)" and "velocity (m/s)").

CHEAT SHEET
ANALYSIS USING GOOGLE SHEETS

Creating a graph from data:

1.) Enter your data in the Sheet. Your x-axis values (often "time") should be in the leftmost column, and your y-values should be to the right. If you are graphing multiple data series on the same graph, put them in columns B, C, D, etc. The top row should be your headers (e.g. "Time (s)" or "X position (m)").
2.) To create a graph (e.g. *Position vs. time* if column A is "time" and column B is "position"), highlight your "time" and "position" data (including header cells), then from the INSERT menu, select Chart. A graph will appear.
3.) In the CHART EDITOR window that appears to the far right, click on CHART TYPE and select SCATTER CHART (if not already selected).
4.) The x-axis should read "time (sec)" and the Series entry should be "position (m)." If not, you have the columns switched. Check step 1 again and redo step 2.

Editing graph title, axes, and adding a trendline:
5.) In the CHART EDITOR window, click on CUSTOMIZE (top right of window). To access the CHART EDITOR window if it isn't open, click the three vertical dots in the upper right corner of the graph and select EDIT CHART.
6.) In the CUSTOMIZE window:
a.) Under CHART TITLE, enter a descriptive title for your graph as you wish;
b.) If you need to edit your axis titles, use the dropdown menu where it says CHART TITLE and select the axis you wish you relabel.
b.) Under SERIES, click on TRENDLINE. If you are dealing with a *Position vs Time* graph, this should be POLYNOMIAL. If it's a *Velocity vs Time* graph, it should be LINEAR. If you don't know what kind of data you are looking at, play with the settings.
c.) Finally, under LABEL, click on USE EQUATION. This will give you the equation for the graph you are looking at. (Note about that equation: Google Sheets uses a generic format for this expression, assigning the variable "x" to the horizontal axis and "y" to the vertical axis . . . even if the graph is actually graphing TIME along the "x" axis and x-POSITION along the vertical. That means an equation that should look like "x = .25 + .32t + .4t^2 " will read ".25 + .32x + .4x^2 ". This unfortunate coding oversight means that if you ever need to use an equation generated by a Google Sheet program (or an Excel Spreadsheet program, for that matter), you need to re-write the equation once you have it using appropriate variables.