Computing & Data Analysis

Key ideas for data analysis in the classroom

Key ideas for data analysis in the classroom

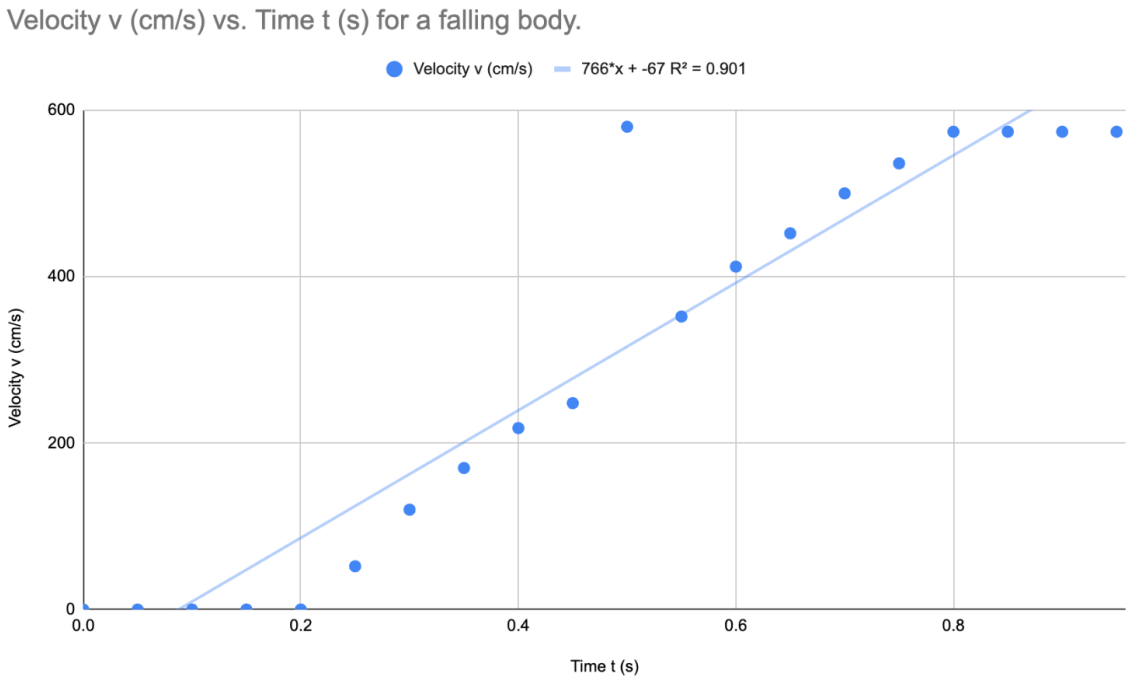
HE SPECIALIZES IN DRAWING CONCLUSIONS

The not so easy side of computing and data analysis

Here are a few challenges for our students:

- Identifying appropriate data analysis techniques
- Using software like Excel to help create data tables, graphs, slopes, etc.
- Noise reduction

Example from a past student of Eric's:



(Don't worry, the student was severely punished!)

Useful resources to address some data analysis challenges

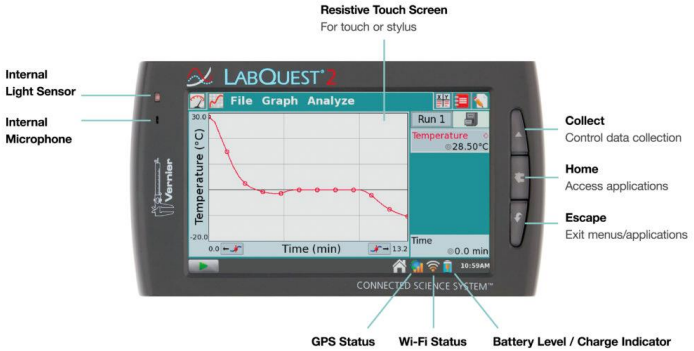
phyphox
physical phone experiments

Tracker
Video Analysis and Modeling Tool

Excel

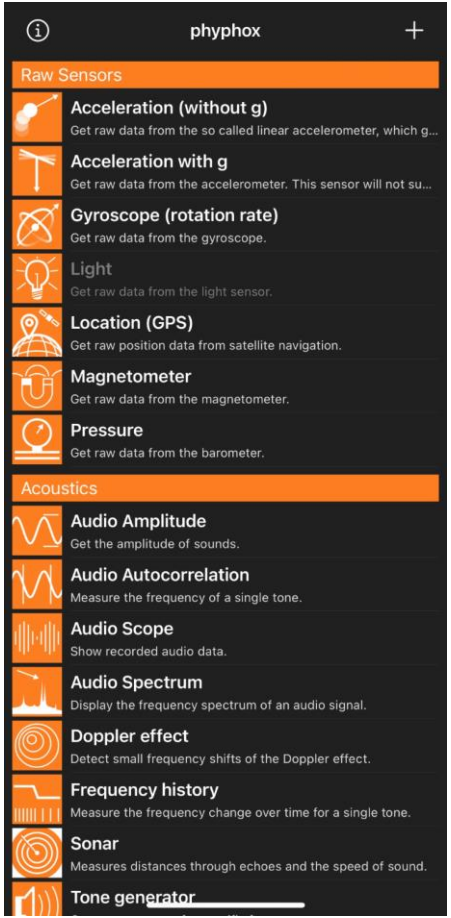
TOPCAT

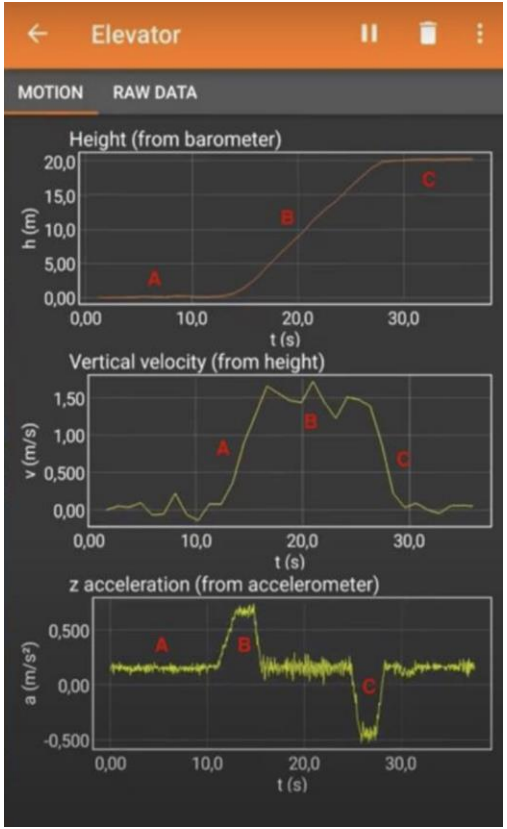
Physics Toolbox Sensor Suite 4+
Chrystian Vieyra
4.0, 7 Ratings
Free



Google Sheets

phyphox
physical phone experiments



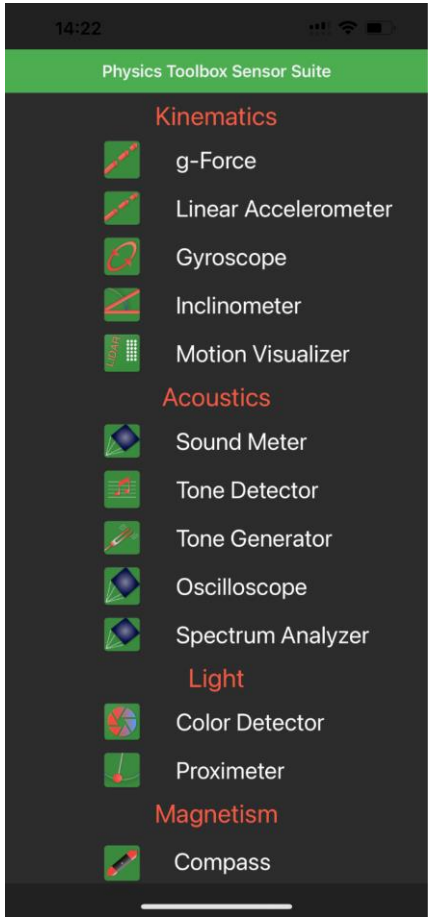


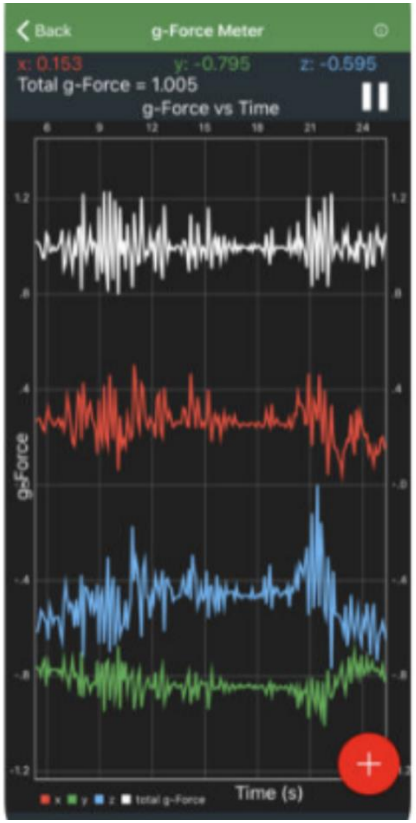
Physics Toolbox Sensor Suite 4+

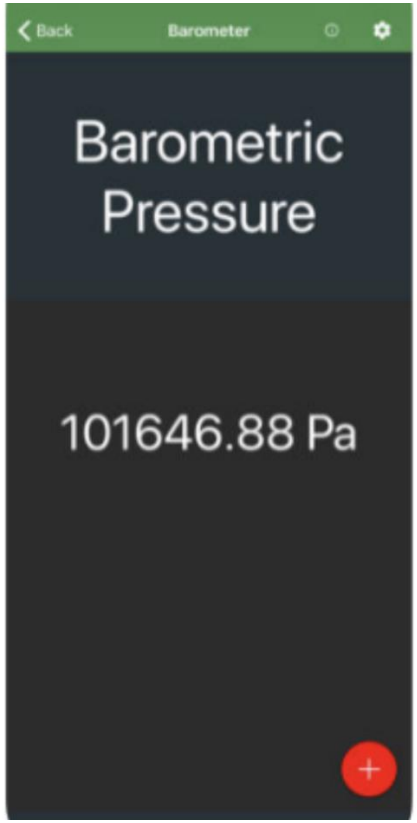
Chrystian Vieyra

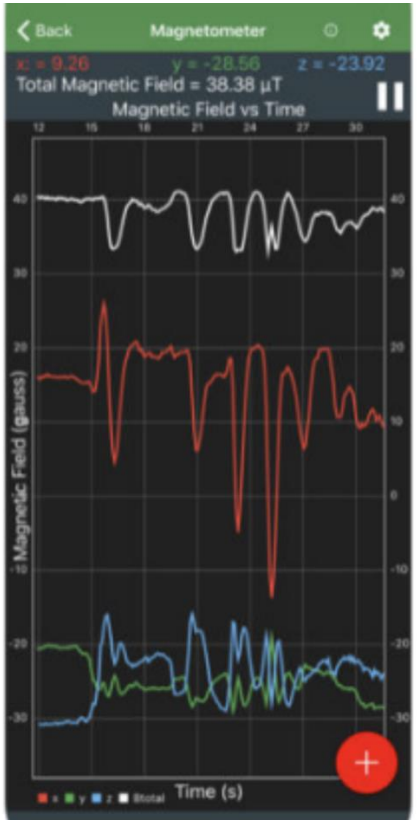
★★★★☆ 4.0, 7 Ratings

Free



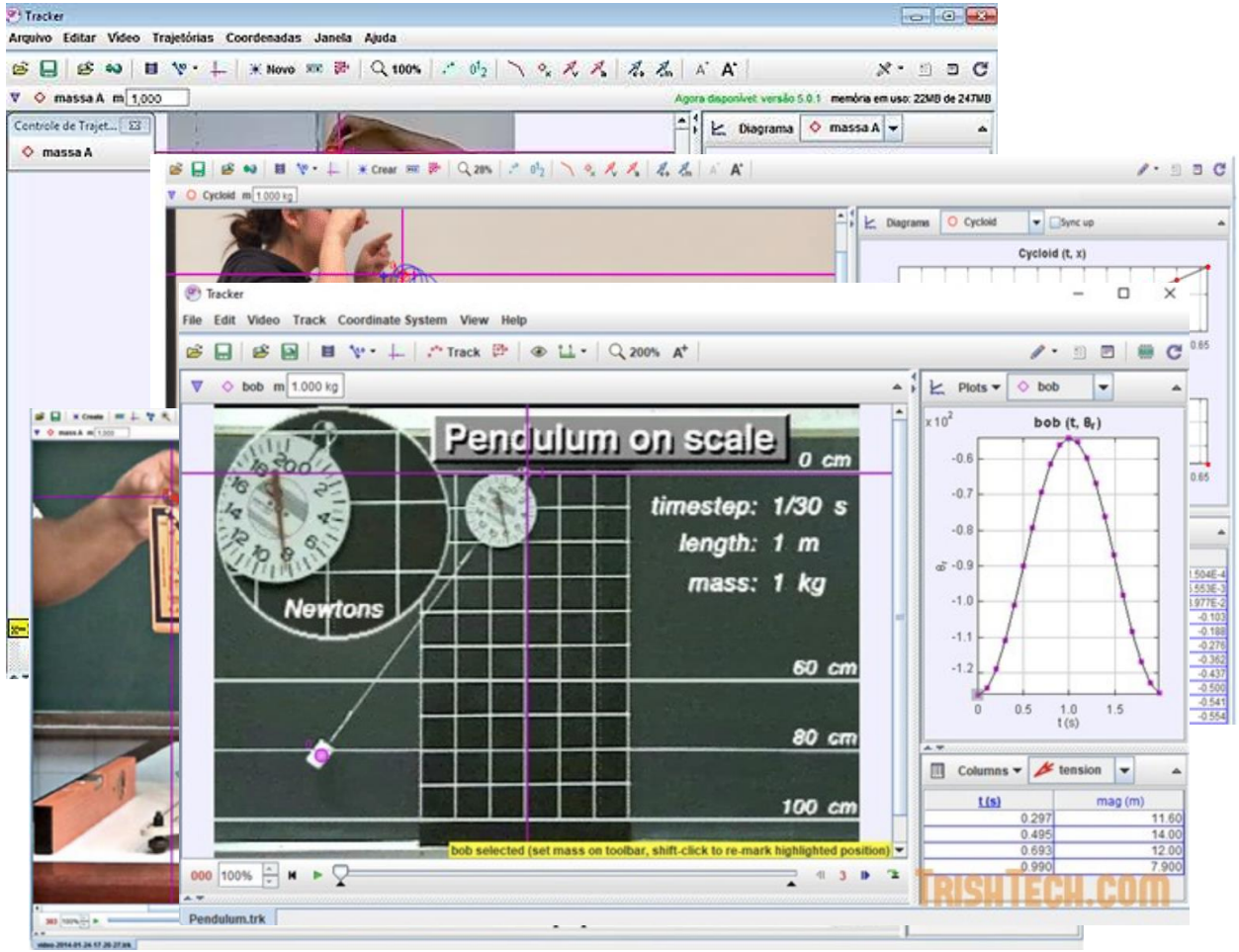






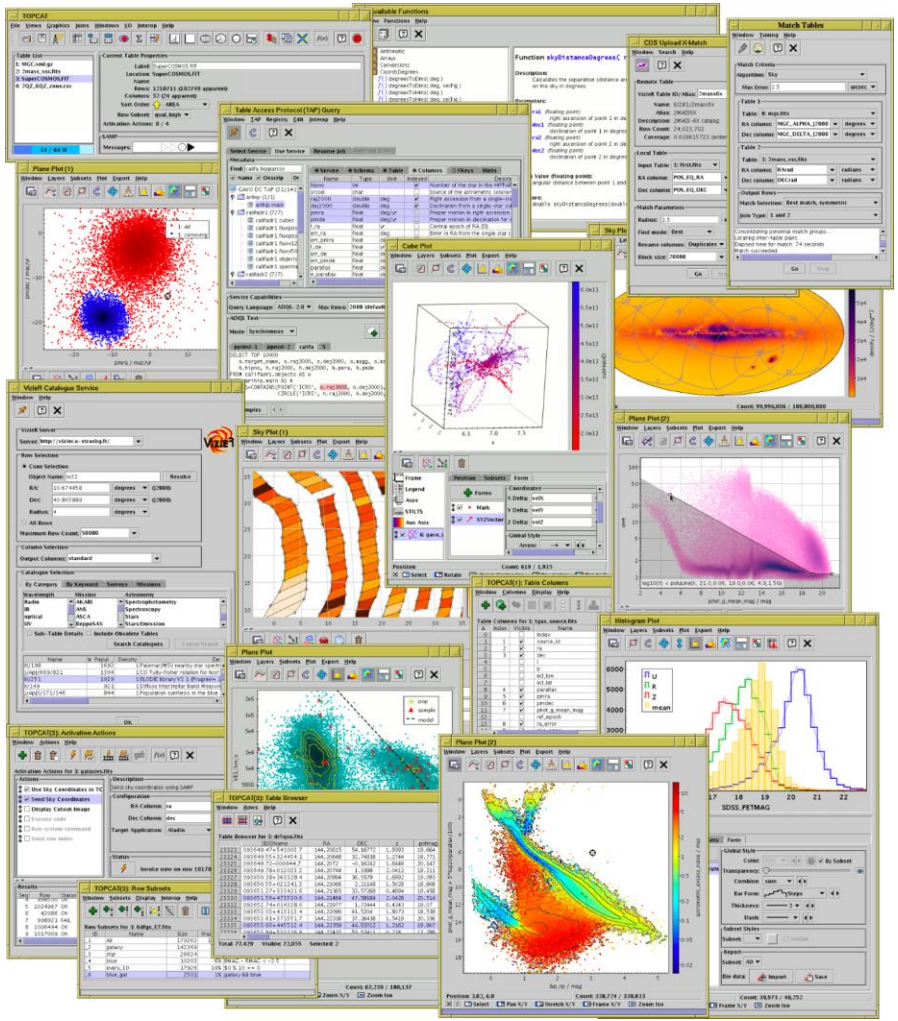
Tracker

Video Analysis and Modeling Tool



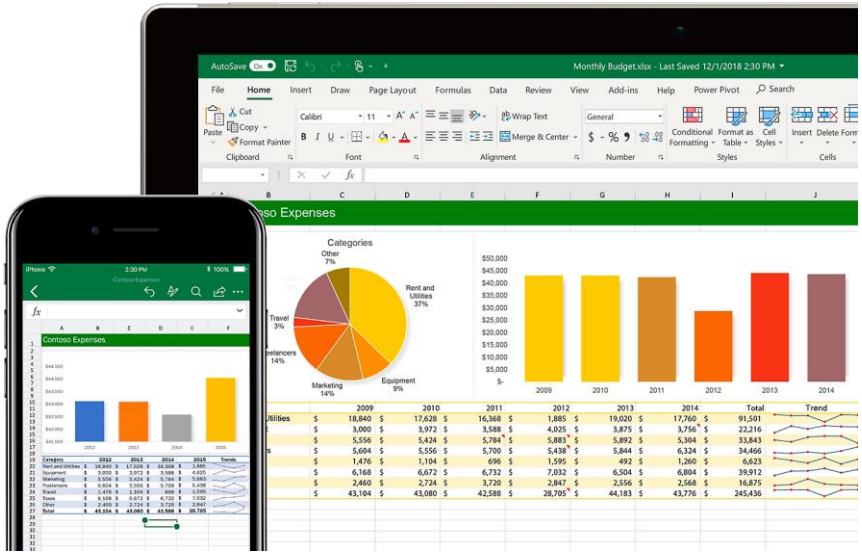
TOPCAT

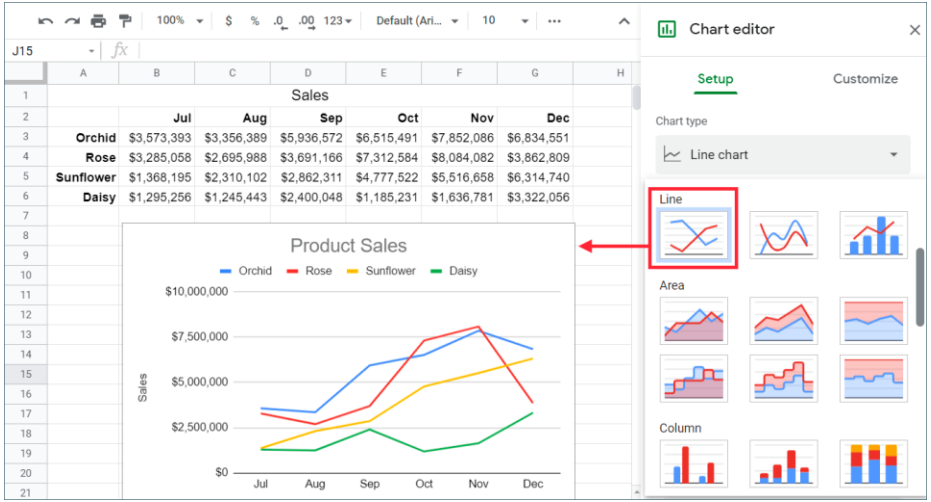
*Tool for **OP**erations on **C**atalogues **A**nd **T**ables*



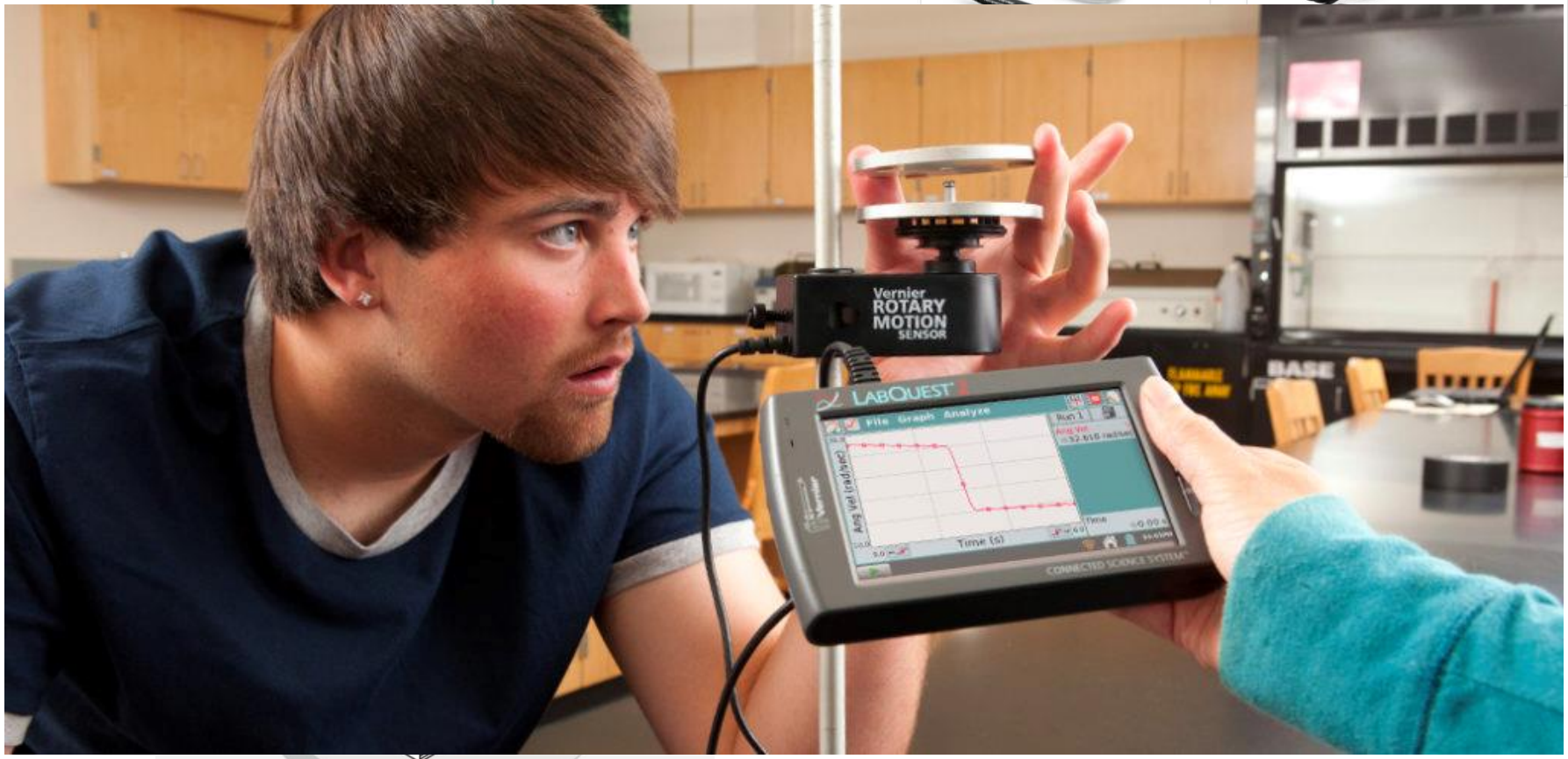
Excel

Google Sheets





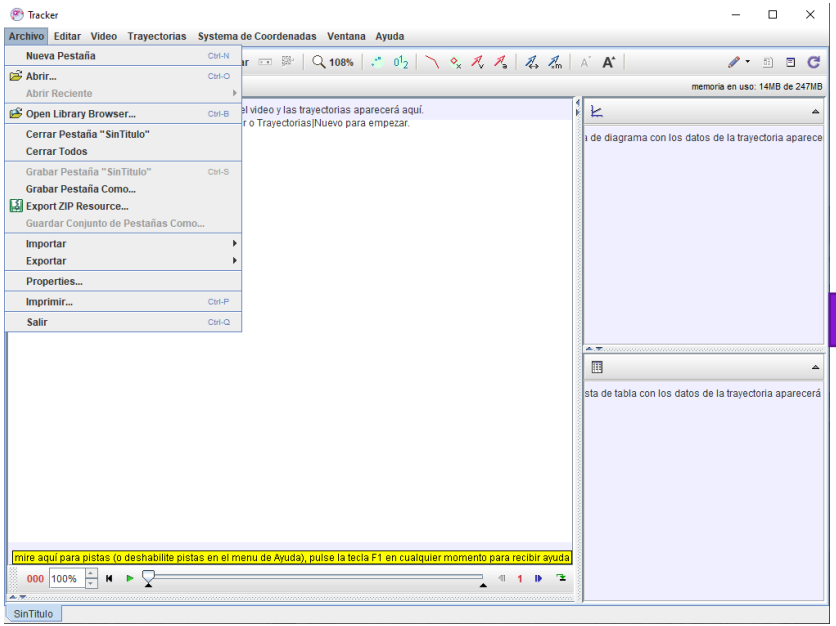
Resistive Touch Screen
For touch or stylus

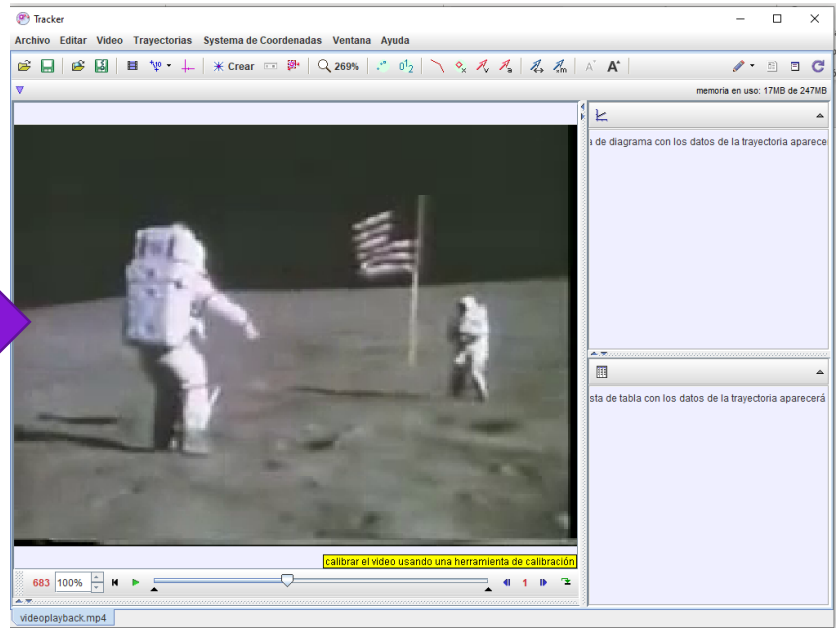


Using Tracker at class

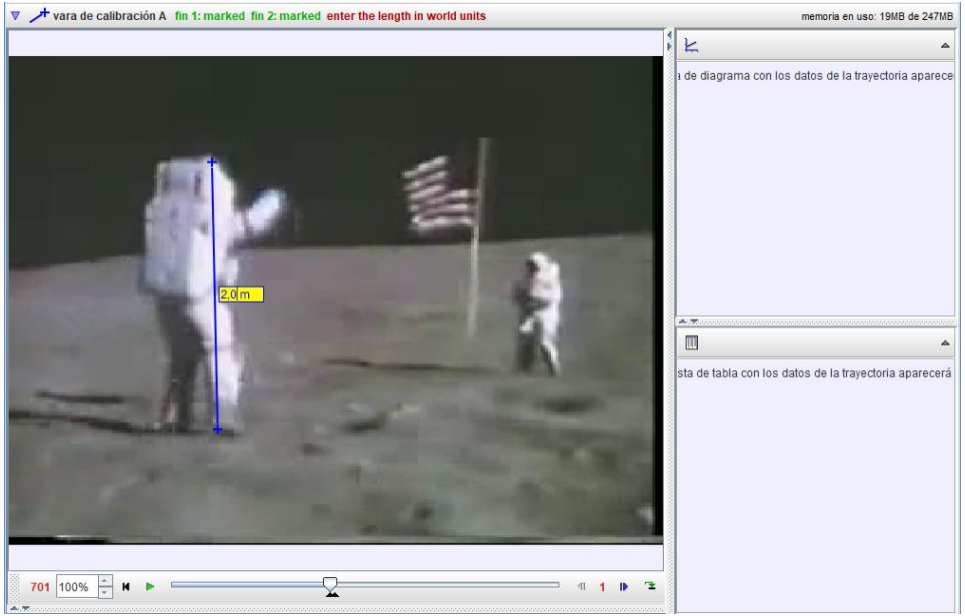
Video Analysis and Modeling Tool

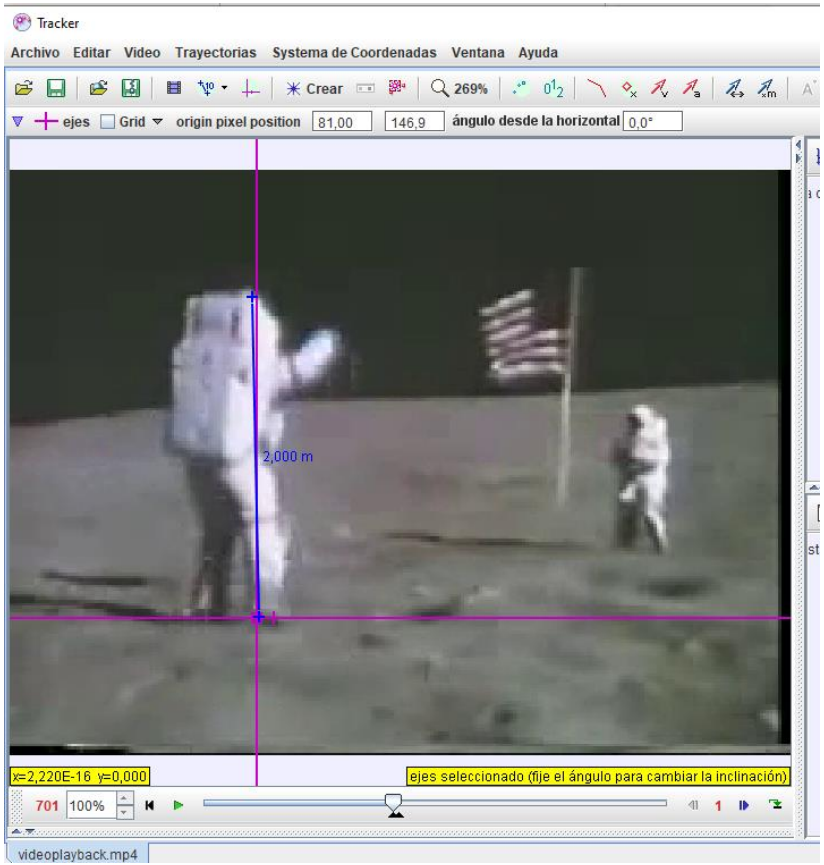
1. Open and upload a video you want to track. Define frames.

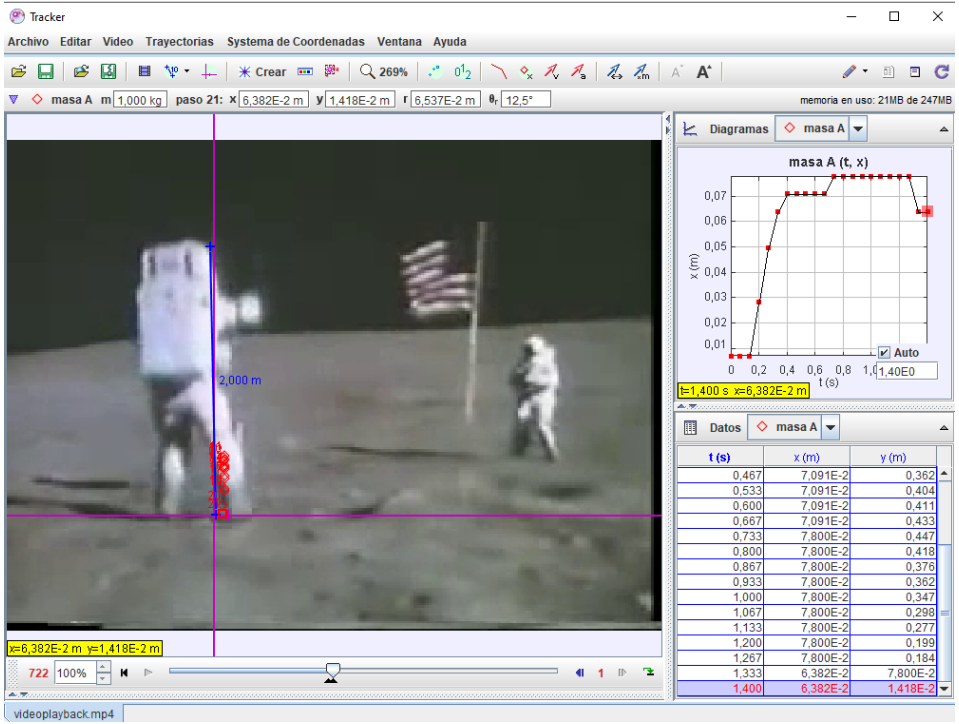




2. Add calibration bar. Define x and y axis

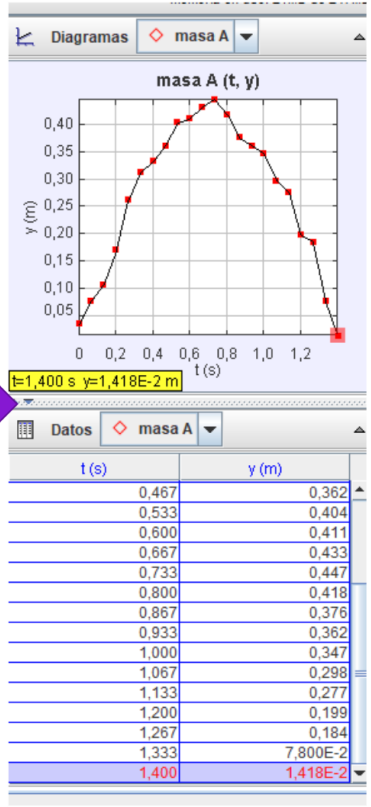


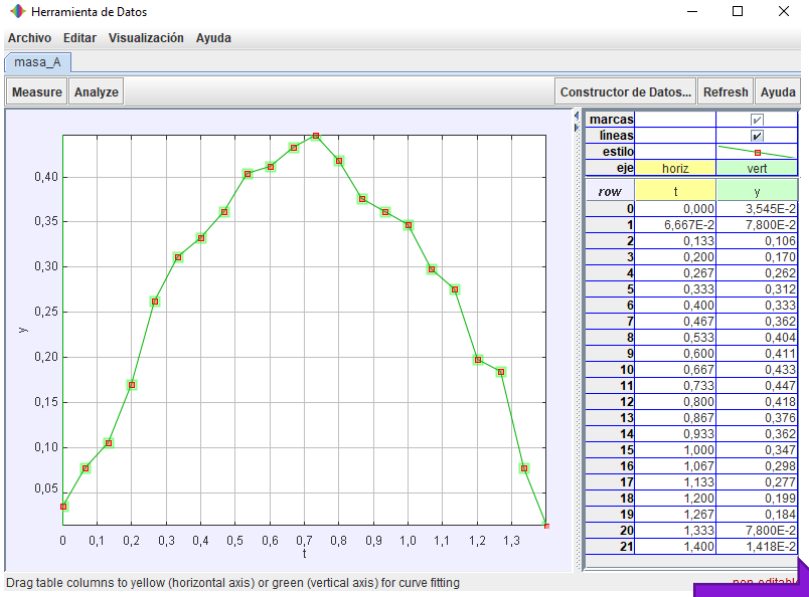




3. Track

4. Data processing



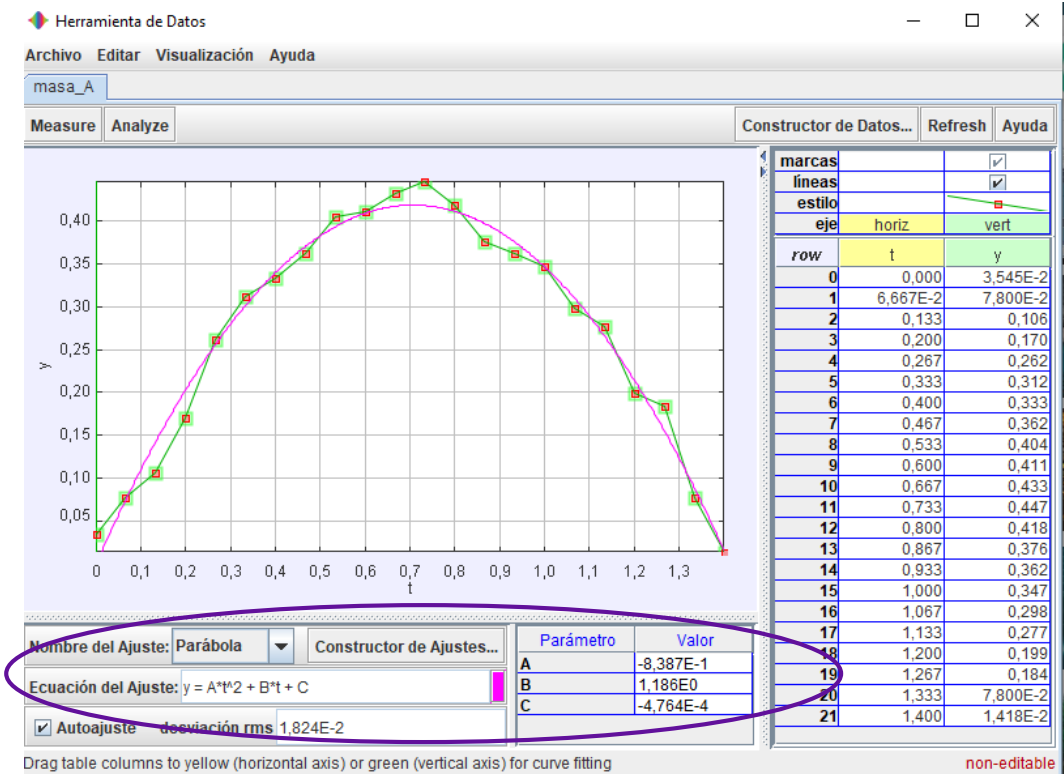


$$y = y_0 + v_0 t + \tfrac{1}{2} g t^2$$

Moon's gravity (experimental value): 0,08387 *2 = 1.677 m/s^2

Moon's gravity (theoretical value): 1.625 m/s^2

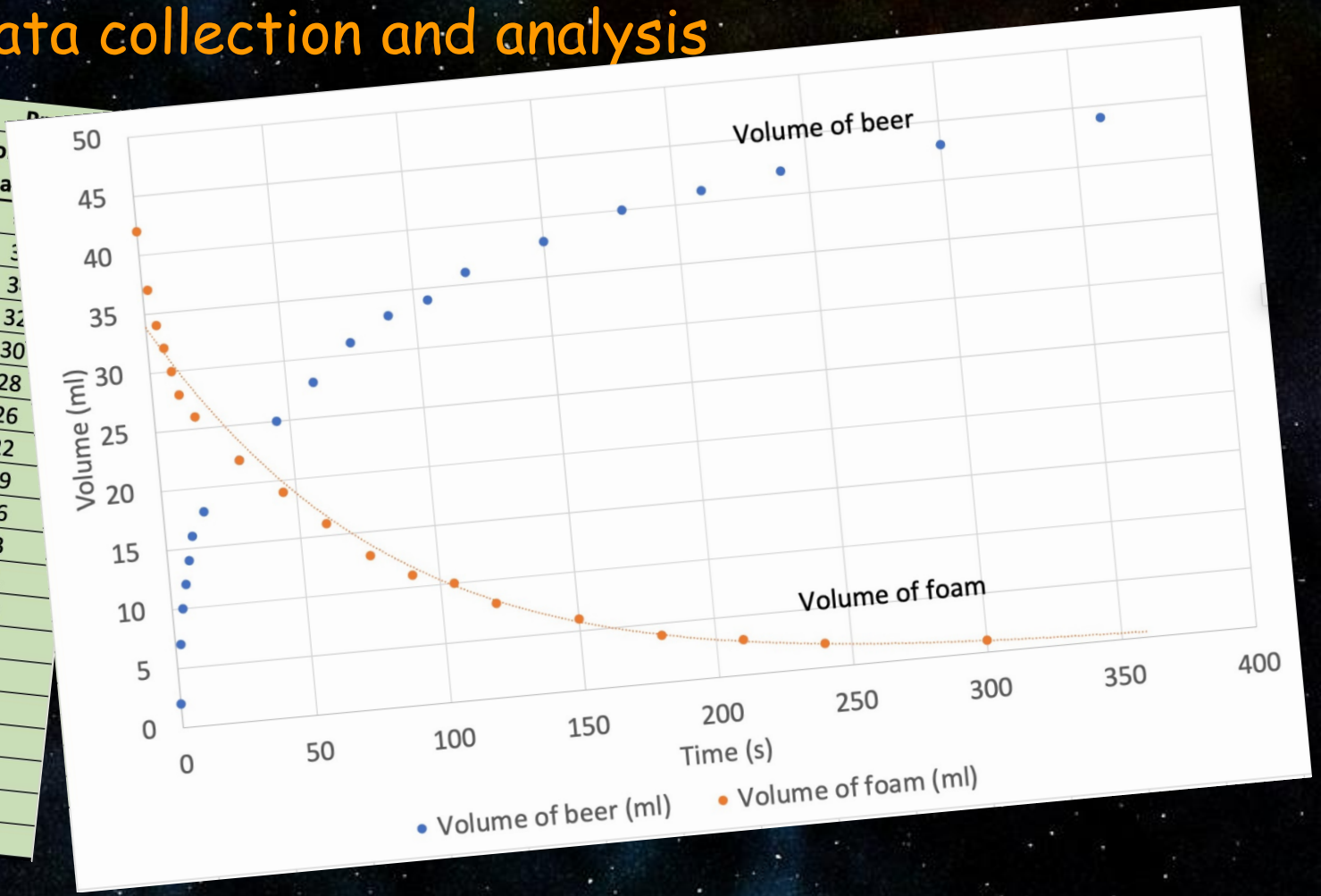
5. Analyse



Best practice example - Law of Radioactive decay

Data collection and analysis

Raw data	
Time (s)	Volume of beer (ml)
0	2
2	7
4	10
6	12
8	14
10	16
15	18
30	22
45	25
60	28
75	31
90	33
105	34
120	36
150	38
180	40
210	41
240	42
300	43
360	44

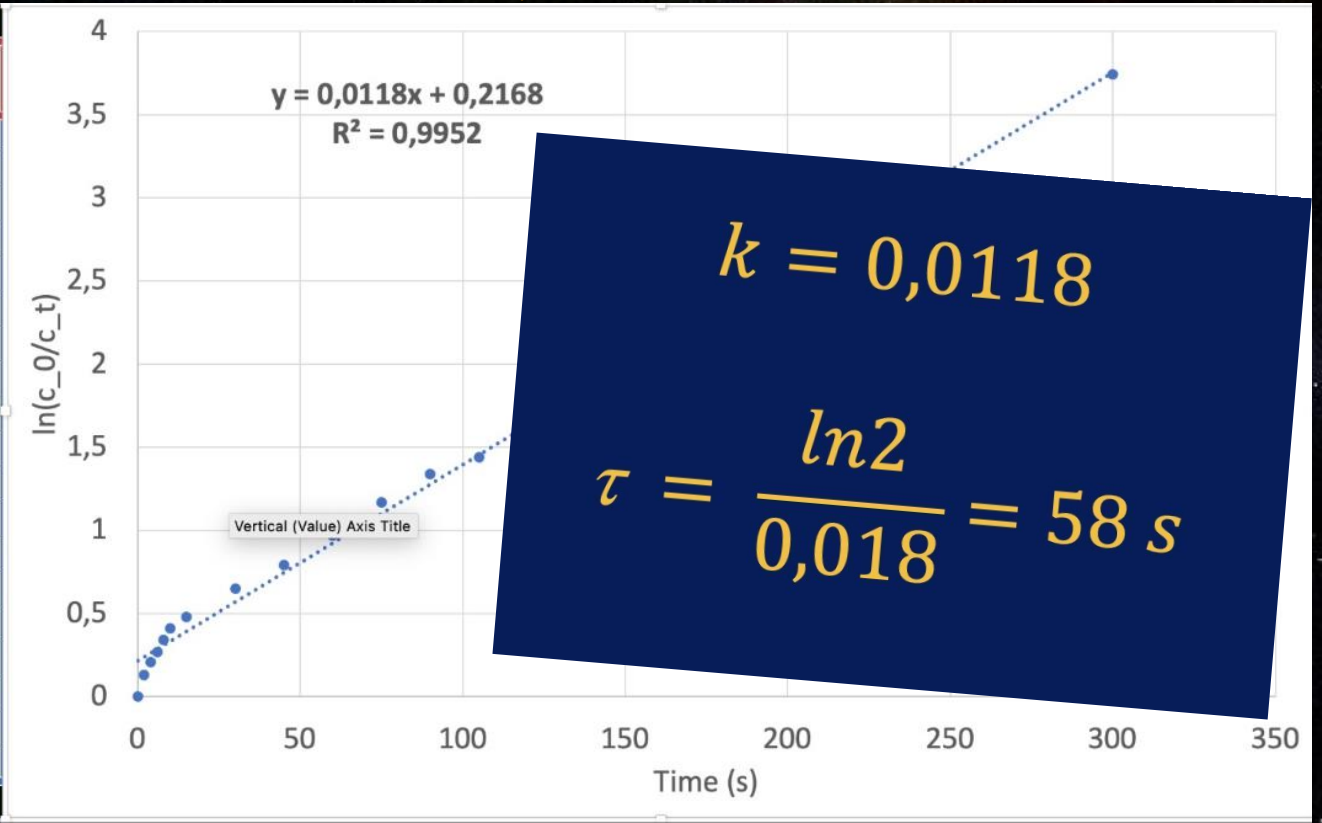


Advanced data analysis

$$\ln\frac{c_0}{c_t} = kt$$

$$\tau = \frac{\ln 2}{k}$$

Raw data		adata	
			(V_0/V_t)
			0
			0,13
			0,21
			0,27
			0,34
			0,41
			0,48
			0,65
			0,79
			0,97
			1,17
			1,34
			1,44
120	36	8	1,66
150	38	6	1,95
180	40	4	2,35
210	41	3	2,64
240	42	2	3,04
300	43	1	3,74
360	44		



$$k = 0{,}0118$$

$$\tau = \frac{\ln 2}{0{,}018} = 58\ s$$

Tech Triggers:

8
9
10
32
33
34
40
41
42
43

L1 Triggers:

L1_DoubleEG1
L1_EG10_Jet15
L1_EG5_TripleJet15
L1_MinBias_HTT10
L1_MuJQE8_EG5
L1_SingleEG1

Thank you!

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