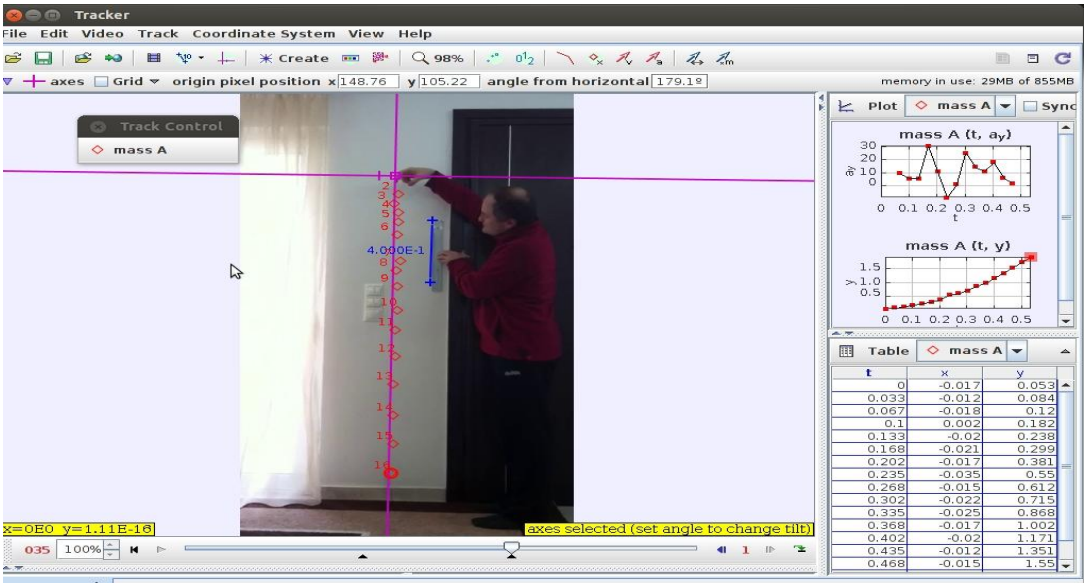
FREE FALL with TRACKER

We will use the software "tracker" which is a free software and can be dowloaded by the site: https://www.cabrillo.edu/~dbrown/tracker/ .After the setup we are ready to study the desired motion. For example we can study the motion of a falling ball or the motion of a moving rope.

Instructions: We need a mobile phone or camera, pc, a ball, a ruler and a friend!!

1st step: We leave a ball to fall. Using a camera we record the motion of the ball (See the picture) We have also include in the video a ruler for calibration reasons.
2nd step:
We start in our computer the tracker program. We load the recording video.



3th step: In clip setting se set the first frame and the last (we cut the useless frames, e.g. the first frames or/and the last where the motion is not free fall).
4nd step: We set the calibration stick according to the ruler on the video.
5nd step: From the button track, new, point mass a cursor appears and follow the ball as it fall. We have to include a lot of points in order to have accurate graphs. (shift button has to be pressed)
6th step: At the right of the desktop we can observe the points of height versus time taken from the previous step.
7th step: Now, we can proceed to make a graph. For example to perform a graph of the position of the ball as a function of time.

Questions:
1. How the points of the ball are captured in the video. (e.g. points that have greater distance between them as time passes?)

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2. What do you expect as concerns the graph of the height of the ball versus time?

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3. What do you expect as concerns the graph of the velocity of the ball as a function of time?

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4. What do you expect as concerns the graph of the acceleration of the ball as a function of time?

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5. What quantity is the slope of the graph $\upsilon(t)$? Is it possible to compute using the graph?

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6. Some points/graphs don't give the expected results. Could you think why is this occurs?

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