The graphs in the sub folders (steel and plastic) are in response to a problem posed by tap-l member. (Subject: **[PTSOS] Slinky and Oscillation Time)**

The poster found disagreement w/the spring osc. formula using a slinky and one and four washers hanging from the end of the slinky:

"I tried to demo a slinky with a single washer and the same slinky with four washers hanging off the end. The equation T = 2*(pi)*[sqrt (m/k)] tells me the time for four washers to oscillate would be twice that of one washer, but when we time them with cell phones, we notice ~9 sec. and ~14 sec. with ten oscillations. Where have I failed with this demo? Does a slinky have constant k? Should I avoid using precise time measurements? Avoid so many oscillations? Is my understanding of physics wrong?"

Another poster claimed the K was not constant:

"K is not constant for a variety of reasons."

Being very suspicious of this claim I measured the position of the end of a hung **steel** slinky as a function of the added mass. That data graphed is the Slinky Force Constant (K).tiff

During this time several posters correctly advised that the mass of the slinky was not negligible, a usually unacknowledged assumption in high school labs for the usually used much greater force constant springs. * After reading them, I then measured the frequencies w/added masses: Slinky Osc. f(m) corrected.tiff is corrected for the hangar system mass, and replaces the previous one.

The freq.(m) experiment used only a portion of the slinky, as the ceiling is too low for the range of weights (masses) I used. Therefore, in order to compare the Ks found by the two methods required my remeasuring the K directly. That graph is: Slinky Force Constant for freq.tiff

I have also included a *cliché* of the app. Note the crudeness viz. the poorly supported end of the slinky, and the v. crude method of measuring the spring's extension.

Note the 18% discrepancy in the fitted K from the frequency data and as measured directly.

Instead of "redoing" this experiment more carefully, I, w/some more care, repeated the experiment using a plastic slinky.

* The force constant (K) / mass of spring is the "operative" factor. Typical steel springs have K's > 10 N/m, which is much larger than the portion of the slinkies I used. (steel ~1.2 N/m and plastic ~0.4N/m.) Their respective "operative" factors for my typical spring, steel, and plastic slinkies are: 5,000N/m-kg, 14N/m-kg, and 9N/m-kg.

bc, TV room physicist

p.s. The weights (masses from a dismantled analytic balance) and the slinkies I used are from Resource Area For Teachers