Name: ______________________________

Meaning of slope of linearized graph

From last class, you should be able to calculate the slope of your best fit line and its uncertainty from your 2nd graph, which is your linearized graph. Why should we care? What does the slope do for us?

To do this, we need to study the Physics behind your experiment. The equation that describes the period of an oscillating mass is $\mathbf{T} = \boldsymbol{2\pi}\sqrt{\frac{\boldsymbol{m}}{\boldsymbol{k}}}$, where T is the period, *m* is the mass, and *k* is the spring constant.

How do you think the graph of the above equation compares with your 1st graph?
If not convinced, check out the graph below:

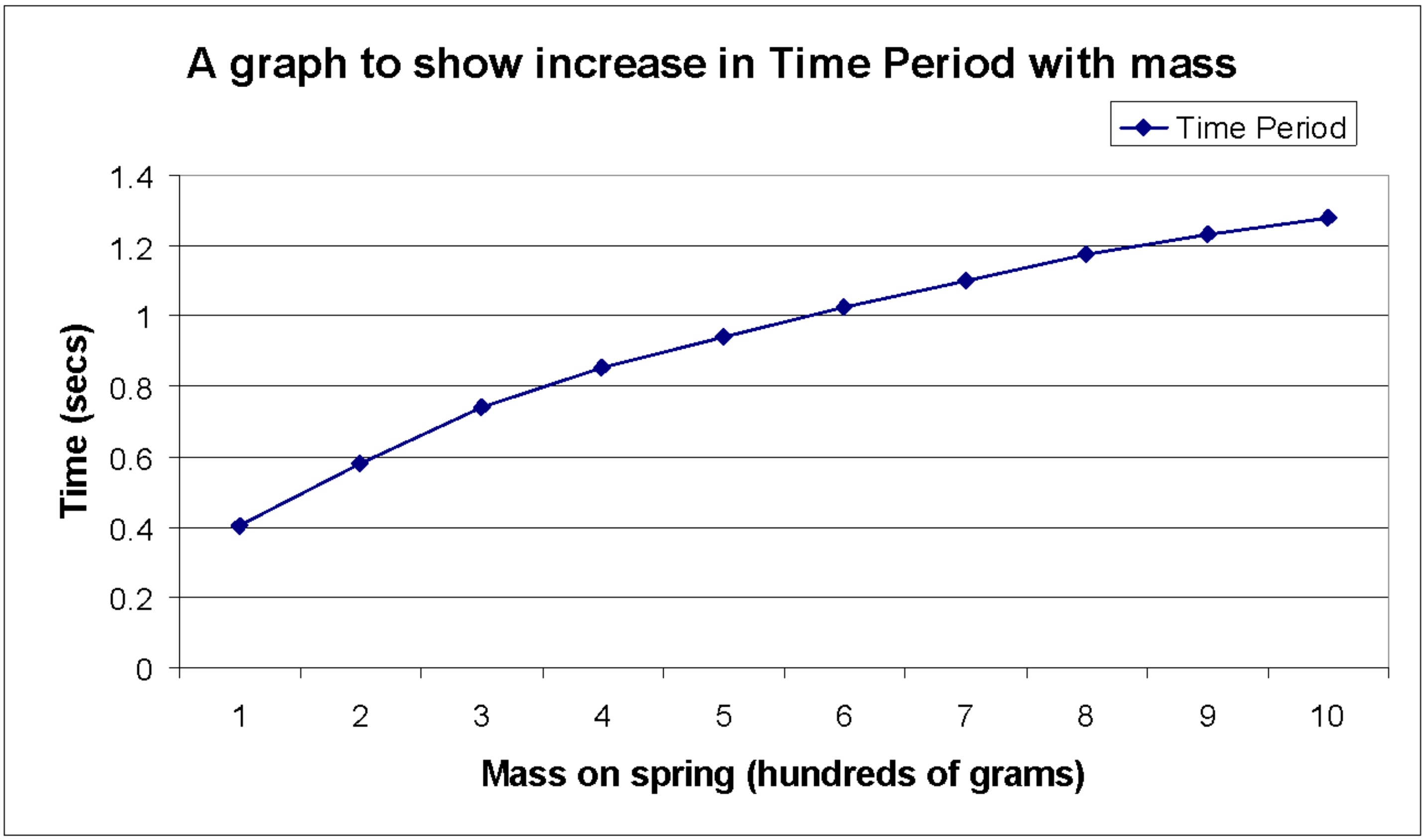

Figure 1
http://static1.mbtfiles.co.uk/media/docs/newdocs/as_and_a_level/science/physics/waves_and_cosmology/48434/html/images/image02.png

1) Then you plotted T $versus$ $\sqrt{m}$ in your 2nd graph. How would you rearrange $\mathbf{T} = \boldsymbol{2\pi}\sqrt{\frac{\boldsymbol{m}}{\boldsymbol{k}}}$ to get $\mathbf{T} = \boldsymbol{m_{best}}\sqrt{\boldsymbol{m}}$ where m_{best} contains 2π and *k*? Notice that m_{best} is slope of your linearized graph.

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2) Using your m_{best} that you calculated from your linearized graph, equate it to _________________________________, and solve for k, the spring constant.

3) Using your slope uncertainty, Δm_{best}, propagate this error to get the absolute error of the spring constant.

4) The actual spring constant is ____. Calculate the percentage difference between your value and the actual value. Does your experimental value agree with the actual value within uncertainty?

5) Based on your calculations in #4, does your lab support the relationship between period and mass in $\mathbf{T} = \boldsymbol{2\pi}\sqrt{\frac{\boldsymbol{m}}{\boldsymbol{k}}}$**?** If not, how could you use some of your qualitative observations to help you explain the difference?