Physics   Period B8   Date 11/23/19   Name Alex Yang

I was sick when this assignment was assigned and when it was due.

Unit 6 | Simple Harmonic Motion | Spring Simulation

Directions:

- Go to https://phet.colorado.edu/en/simulation/mass-spring-lab and begin the simulation. (Select the "Intro" simulation)

- Carry out the analysis below. ***Type your responses in a color other than black!***

Analysis:

1. Determine the spring constant *k* of Spring 1 when "Spring Constant 1" is set to **a)** the lowest tick mark, **b)** the 5th tick mark (including the one marked "small"), and **c)** the highest tick mark. **d)** Explain your method.

a) 3.066 N/m

b) 7.007 N/m

c) 12.265 N/m

d) Attach a 50g mass to the spring. Let the spring undergo damping until it reaches equilibrium (press the red button). Use the meter stick to measure the displacement from the equilibrium position in cm. Since $F_{net} = 0$ at equilibrium, $F_g+F_s=0$, so $F_g=-F_s$. Therefore, mg=-kx. Dividing both sides by -x, -mg/x=k. Therefore, to calculate the spring constant, take the mass (0.05kg) multiply it by earth's gravity, and divide it by the displacement from the equilibrium position in m.

2. Determine the mass of the unknown hanging masses: **a)** purple, **b)** blue, and **c)** orange. **d)** Explain how you found these values.

a) 137.5g

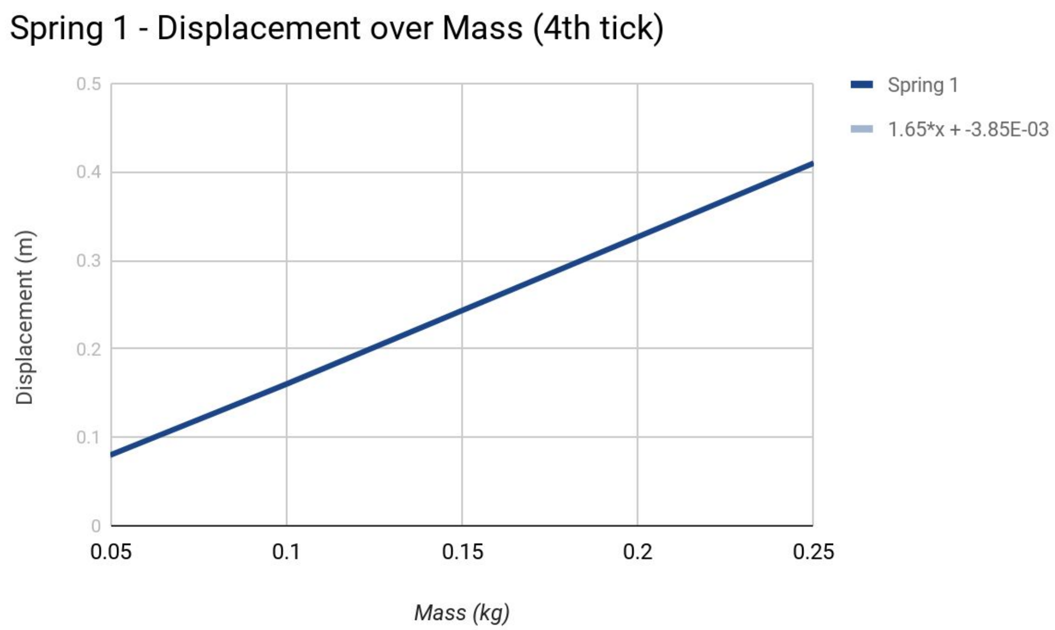
b) 162.5g

c) 200g

d) Set the spring constant to the highest tick mark (approximately 12.265 N/m), attach a mass to the spring, and let it reach equilibrium position. Since mg=-kx (the reasoning is above),

3. Using Excel, make a graph of stretch vs. mass for Spring 1 for one of the three constants analyzed above. ***Paste an image of your graph below.*** How could the spring constant be determined in this graph?

I assumed by the “three constants” you mean the three masses.



The system was at equilibrium position at the time each measurement was taken. The spring constant can be calculated by taking the slope of the line (1.65) and dividing gravity by it. Since at equilibrium, -kx=gm (the reason why is above), -g/k=x/m. x/m is the slope of the line in this case, so k=-g/(x/m), giving k=-9.81m/s2/(1.65m/kg) = 5.982N/m.