Procedure, Data, and Calculations

1. Use a triple-beam balance and measure the mass of the spring and the mass of the weight holder. Record these values below and on the data table.

Mass of spring (m_s): 3.5 g

Mass of weight holder (m_{wh}): 24.5 g

2. Suspend the spring from the stand. Attach the weight holder to the lower end of the spring. The pointer should be adjusted until it is very near the scale without actually rubbing the scale. Adjust the scale, so that the pointer indicates a zero reading.

3. Add a 50 g slotted mass to the weight hanger. Read the new position of the pointer (s) and record on the data table. Add additional 50 g masses until a total of 250 g has been added to the weight holder. Read the position of the pointer after adding each mass and record your readings on the data table.

4. Calculate the force in dynes applied to the spring at each step in part 3. Show a sample calculation below for a 50 g mass sitting on the weight hanger. (m_w = 50 g, g = 980 cm/sec^2) Then make the other calculations on scratch paper and transfer your results to the data table.

$F = (m_w + m_{wh})\, g$

$= (50 + 24.5) \times 980$ (Substitute)

$= 73010$ dynes (Final answer)

5. Calculate the values of ΔF and Δs corresponding to the addition of each 50 g mass. Record the results of these calculations on the data table. ΔF is calculated by subtracting successive values of F on the data table. Δs is calculated from s in a similar manner. Include sample calculations below for the case where m_w changes from 50 g to 100 g.

ΔF = 122010 dynes − 73010 dynes (Substitute)

= 49000 dynes (Final answer)

Δs = 5.6 cm − 2.8 cm (Substitute)

= 2.8 cm (Final answer)

6. Calculate the spring constant k below for the interval in which m_w changes from 50 g to 100 g.

$k = \dfrac{\Delta F}{\Delta s} = \dfrac{49000}{2.8}$ (Substitute)

= 17500 dynes/cm (Final answer)