**Carleton University**

**Laboratory Report**

**Course #:** PHYS1003-A **Experiment #: 01**

**Experiment Title**

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**Lab Period:** A5

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**Station #:** 14

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Purpose:

This experiment was performed in order to calculate the spring constant (k) of a spring using two methods.

Theory:

From Hooke’s law, an ideal spring has a linear relationship between force applied and the change in length of the spring.

(F = kΔx)

By adding mass to the spring

|  |
| --- |
| (Δ𝑀)𝑔=𝑘𝑠Δ𝑥 |

Apparatus:

-Spring

-Vernier Force Sensor (0.05N)

-Vernier Motion Sensor 2 (0.002m)

-Vernier Lab Quest Mini

-Set of Masses (1g)

Observations:

See attached tables.

Calculations:

Spring constant: Static method

From Hooke’s law (F = kΔx), K = Δx/F

See attached page.

Results:

The static spring constant was 15.70 ± 0.24.

The dynamic spring constant was 15.90 ± 0.099.

The y intercepts were both negligible. (0.0084, and 0.0045 respectively)

The weighted mean for the spring constant is 15.73 ± 0.092

Discussion:

Both methods are expected to give the same answer.

They should also be statistically consistent.

The dynamic method was more precise in practice.

However, I would trust the linear method more, as the bouncing mass was hard to keep from swinging.

The final average spring constant appears to be rather accurate.

The accuracy of the dynamic method could be improved by having a machine or mechanism cause the oscillations, so they are more consistent and have less of a pendulum.

The accuracy of the static method could be increased by increasing mass in smaller intervals.

If there were no force and motion sensors available, the static method could be performed by measuring the displacement with a ruler. The dynamic part could be done by recording the time elapsed per cycle.