Spiral Spring -B-

Purpose:

To determine the spring constant **k**, by its period of oscillation in response to different masses.

Apparatus:

- Spiral spring
- Slotted weights
- Retort stand and clamp
- Meter rule
- A pointer
- Stop watch

Method:

1. Weigh the spring on a balance and record its mass on your data sheet.
2. Hang an approximate 10g mass from the spiral spring.
3. Start the oscillation in a vertical direction by pulling gently down on the mass and releasing it (an initial displacement of 2-3 cm works best).
4. Measure the amount of time required for ten complete oscillations with a stopwatch, and records it as t_1 on your data sheet.
5. Repeat step 2-3 three times and find the average. Record this as t_{avg} on your data sheet.
6. Calculate T, the system's period for one oscillation, dividing t_{avg} by 10 and Record this on your data sheet.

7. Repeat step 2-5 for different masses.
8. Calculate the values of T and record them in the appropriate column on your data sheet.

Readings & Results:

Use this table below to record your results

Masses /g	**Time for 10 oscillations**		**(t_1+t_2) / 2**	**T= t/10**	**T^2/s^2**
	t1 / s	**t2 / s**	**t / s mean**		
10					
15					
20					
25					
30					

By plotting m in x-axis against T^2 in y-axis, you will obtain a straight line find the slope = T^2/m. The straight line don't pass through origin point (0,0) why ?

$T = 2\pi (m\lambda / g)^{1/2}$

$T^2 = 4\pi^2 (m\lambda / g)$

$T^2/m = {}^{slope} = 4\pi^2 (\lambda /g)$

$g = 4\pi^2 (\lambda /slope)$

$F = - kx$

$m*g = - kx$

$k = (m /x) \times g$

$k = g / \lambda$ note that the spring constant k without minus sign, why?

Find the percentage error of (g) compare with the real value of g = $9.81 m/s^2$.