An Empirical Law

*Objective:-

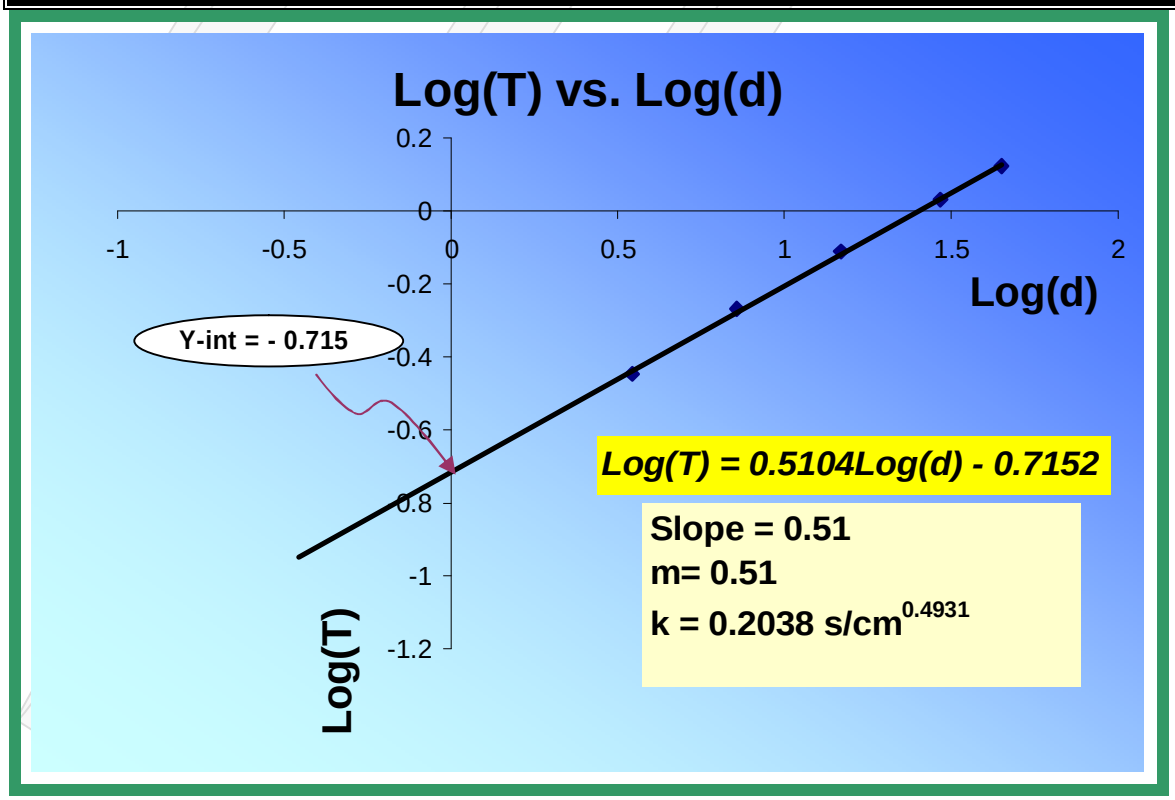
1- Pull together experimental data.
2- Study graphically the data collected.
3- To be aware of the utility of a log-log plot.
4- To find out the empirical law linking the physical variables of the experiment.

*Theory:-

$T \propto d^m$ ➡ $T = kd^m$ ➡ $\log(T) = \log(k) + m \log(d)$, where $y = \log(T)$, $x = \log(d)$, slope = m & log (k) = y-inte.

*Data and Analysis:-

Ring#	d(cm)	Time for 10 oscillations, t(s)			Time period T=t/10(s)	T_{av}	Log(d)	Log(T)
1	44.8	13.52	13.18	13.3	1.33	13.3	1.65	0.123
2	29.4	10.73	10.71	10.91	1.078	10.78	1.468	0.032
3	14.8	7.63	7.87	7.66	0.772	7.72	1.170	- 0.112
4	7.2	5.31	5.48	5.36	0.538	5.38	0.857	- 0.269



*Source of Errors:-

There are many errors, we will mention just two:-

1- The roller reading is not as accuracy as we need.

2- The different sensitive to pull the ring has influence to the result.

*conclusion:-

From this experiment the equation was $T = 0.2038\ d^{0.4931}$

*Exercises:-

1- $T = 0.2038\ (3.5)^{0.4931}$ ➡ $T = 0.3779s$

2- What is the unit of "k"?

Second = k (cm) $^{0.4931}$ which equal $K = s/cm^{0.4931}$.

4- By determining the slope of the line. Or using (ln – ln) grapgh.

5- By taking the (ln) for both sides you will get :

ln(V) = lv(V0) **–** (1/RC) **t,**

so you have (ln(v) vs. t).