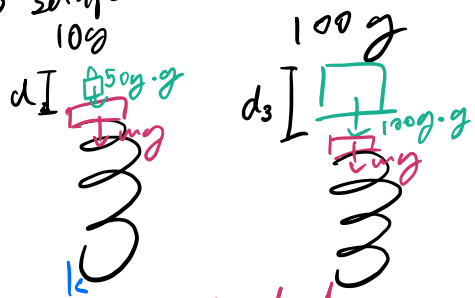
2. Hooke's law: $F = -kx$

$$k = -\frac{F}{x}$$

3 setups:

no mass

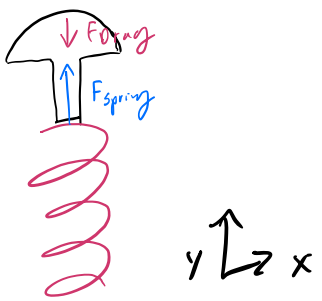


unknown: k

measured on test day: d_1, d_2, d_3

$$k = -\frac{g(50g)}{d_2} = -\frac{g(100g)}{d_3}$$

3.



4. $a_x = 0$ $\quad \Sigma F_x = F_{spring} - F_{drag} = 0$

$$F_{drag} = F_{spring}$$

$$F_{drag} = k\,d$$

k will be found in prior exp,

d is displacement of ball during current exp

5. $F_{drag} = C_D \frac{1}{2} \rho_\infty U_\infty^2 A$

$\rho_\infty = 1.293\ kg/m^3$

$U_\infty = 50\ m/s$

$\varnothing$ of sphere (half) $= .25\,in = .00635m$

$A = \frac{\pi}{4}(.00635)^2 = 3.167 \cdot 10^{-5}\ m^2$

$$C_D = \frac{2F_{drag}}{\rho_\infty U_\infty^2 A}$$

$F_{drag} = kd$

$$C_D = \frac{2kd}{\rho_\infty U_\infty^2 A}$$

k and d will both be determined experimentally

6. For curve forward:

$F_D = .108\,N \leftarrow \sin\theta$

$$C_D = \frac{2 \cdot .108\,N}{1.293\,kg/m^3\,(50\,m/s)^2 \cdot 3.167 \cdot 10^{-5}\,m^2}$$

$$= 2.10$$