Exp. 1 & 2.

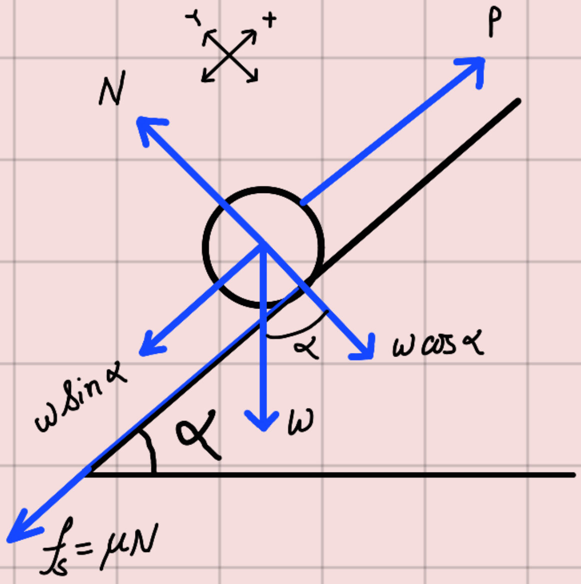
$\Sigma F_x = 0$ $\quad P = w\sin\alpha + \mu N$ ——— ①

& $\Sigma F_y = 0$ $\quad N = w\cos\alpha$ ——— ②

from eq ① & ②

$$P = w\sin\alpha + \mu w\cos\alpha$$

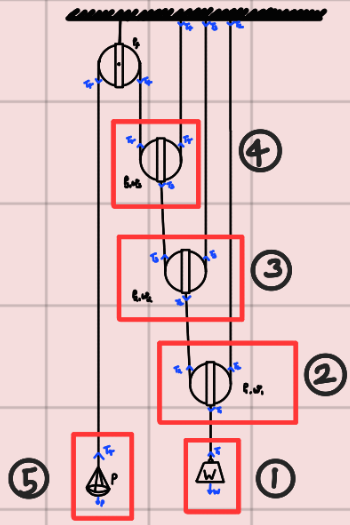
$$\boxed{\mu = \frac{P - w\sin\alpha}{w\cos\alpha}}$$

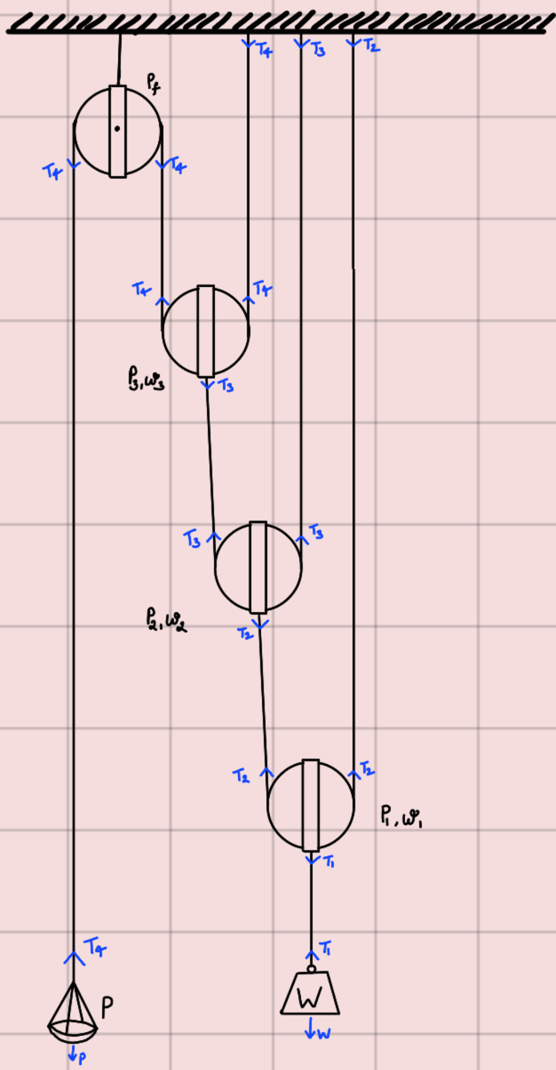


if plane is horizontal then $\alpha = 0°$

$$\boxed{\mu = \frac{P}{W}}$$

Exp. 3





by writting $\Sigma F_y = 0$ eq^n

$W = T_1$

$2T_2 = W_1 + T_1 \quad \Rightarrow \quad T_2 = (W_1 + T_1)/2$

$2T_3 = W_2 + T_2 \quad \Rightarrow \quad T_3 = (W_2 + T_2)/2$

$2T_4 = W_3 + T_3 \quad \Rightarrow \quad T_4 = (W_3 + T_3)/2$

$T_4 = P$

$$T_2 = \frac{(W_1 + W)}{2} \qquad T_3 = \frac{\left(W_2 + \frac{W_1 + W}{2}\right)}{2}$$

$$T_4 = \frac{w_3 + \dfrac{\left(w_2 + \dfrac{w_1 + W}{2}\right)}{2}}{2}$$ & $T_4 = P$ So

$$P = \frac{W}{2^3} + \frac{w_1}{2^3} + \frac{w_2}{2^2} + \frac{w_3}{2}$$

if there is n number of moveble pully

$$P = \frac{W}{2^n} + \frac{w_1}{2^n} + \frac{w_2}{2^{n-1}} + \cdots + \frac{w_n}{2}$$

Assume wt. of all pully's are equal $(w_1 = w_2 = w_3 = \cdots = w_n = w)$

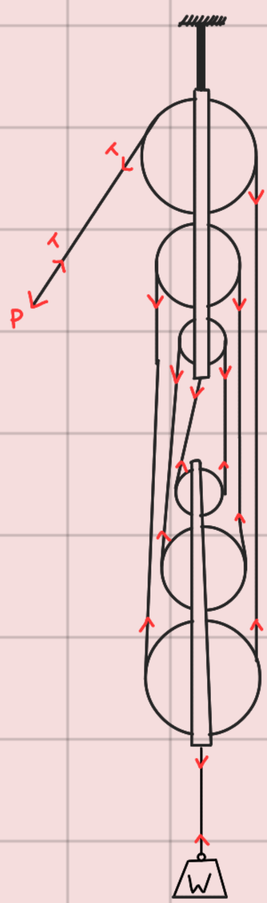
$$P = \frac{W}{2^n} + \frac{w}{2^n}(1 + 2 + 2^2 + \cdots + 2^{n-1})$$ $\left\{ \text{Sum of G.P} = \frac{a(r^n - 1)}{r-1} = \frac{1(2^n - 1)}{(2-1)} = (2^n - 1) \right\}$

$$P = \frac{W}{2^n} + \frac{w}{2^n}(2^n - 1)$$

Now $M.A. = \frac{W}{P} = \dfrac{W}{\frac{W}{2^n} + \frac{w}{2^n}(2^n - 1)} \approx 2^n$

$$\boxed{M.A = 2^n}$$

Exp. 4



from given fig. we can see that

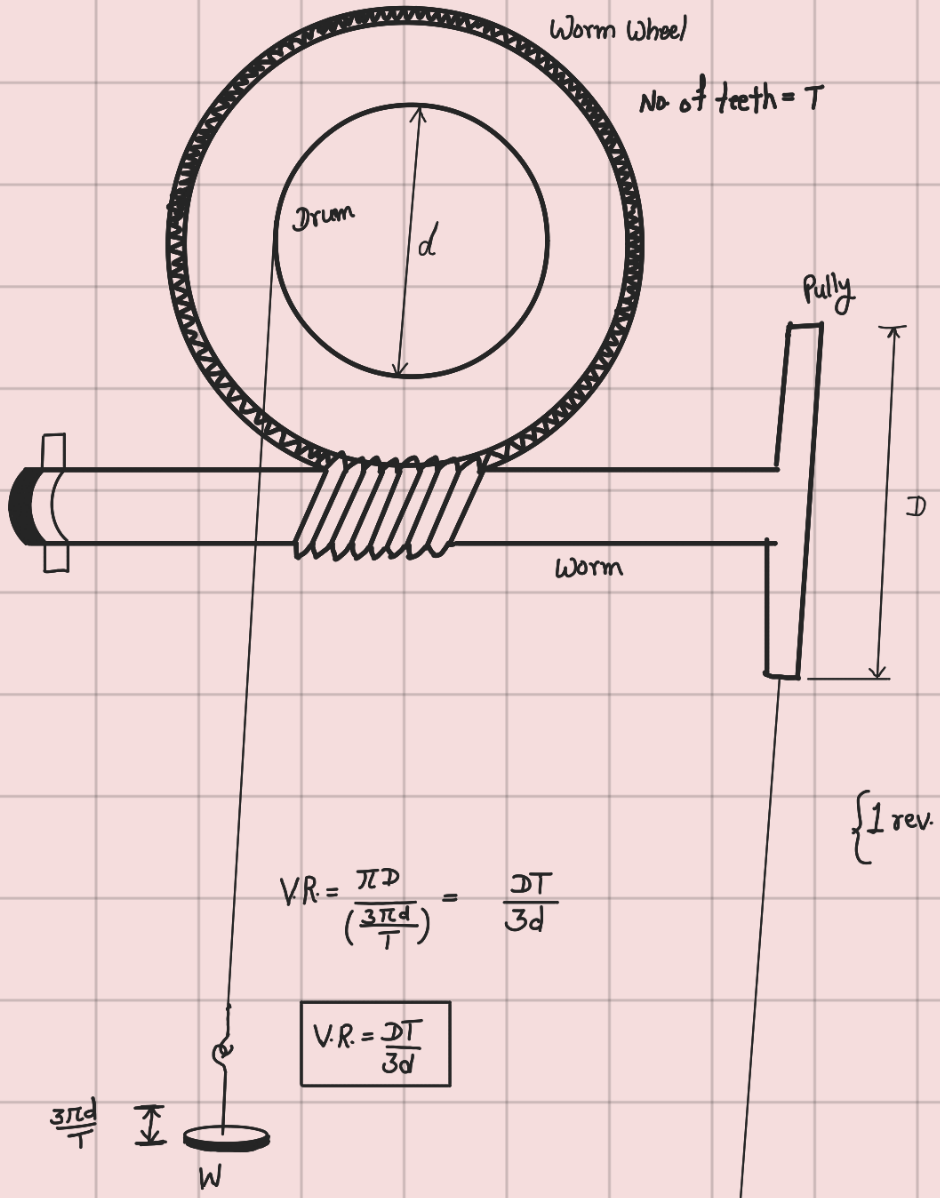
$P = T$

& $W = 6T$

which gives us $M.A. = \frac{W}{P} = \frac{6T}{T} = 6$

$$\boxed{M.A. = 6}$$

Exp. 5

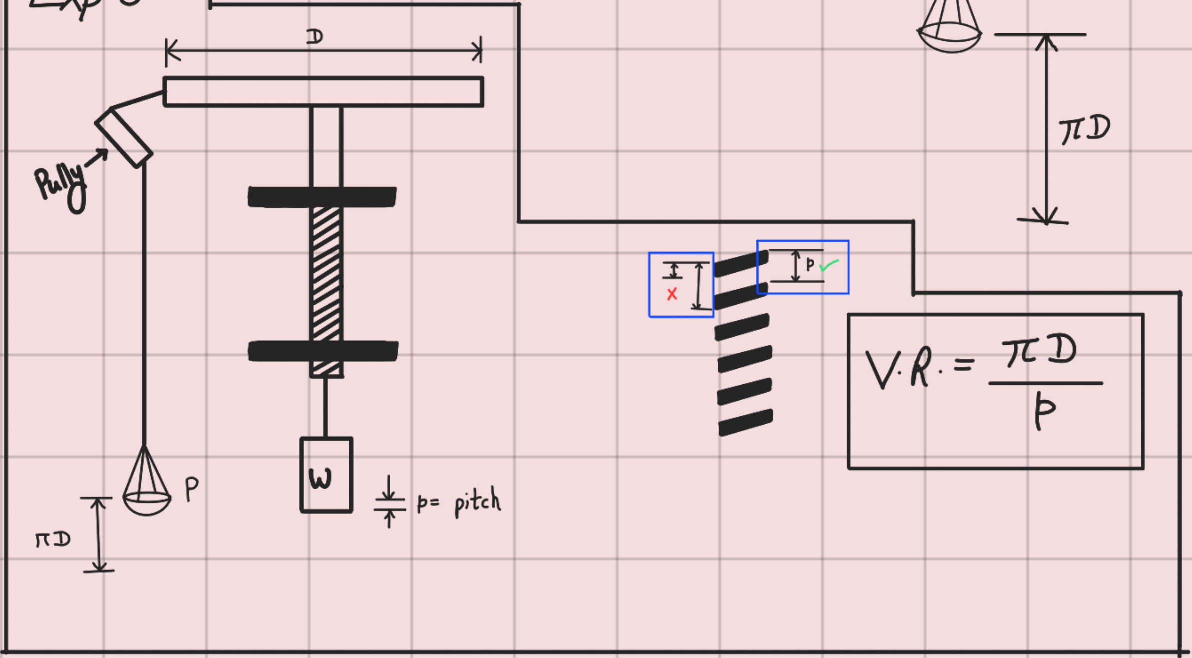


{1 rev. of pully = movement of worm wheel is three teeth.}

$$V.R. = \frac{\pi D}{\left(\frac{3\pi d}{T}\right)} = \frac{DT}{3d}$$

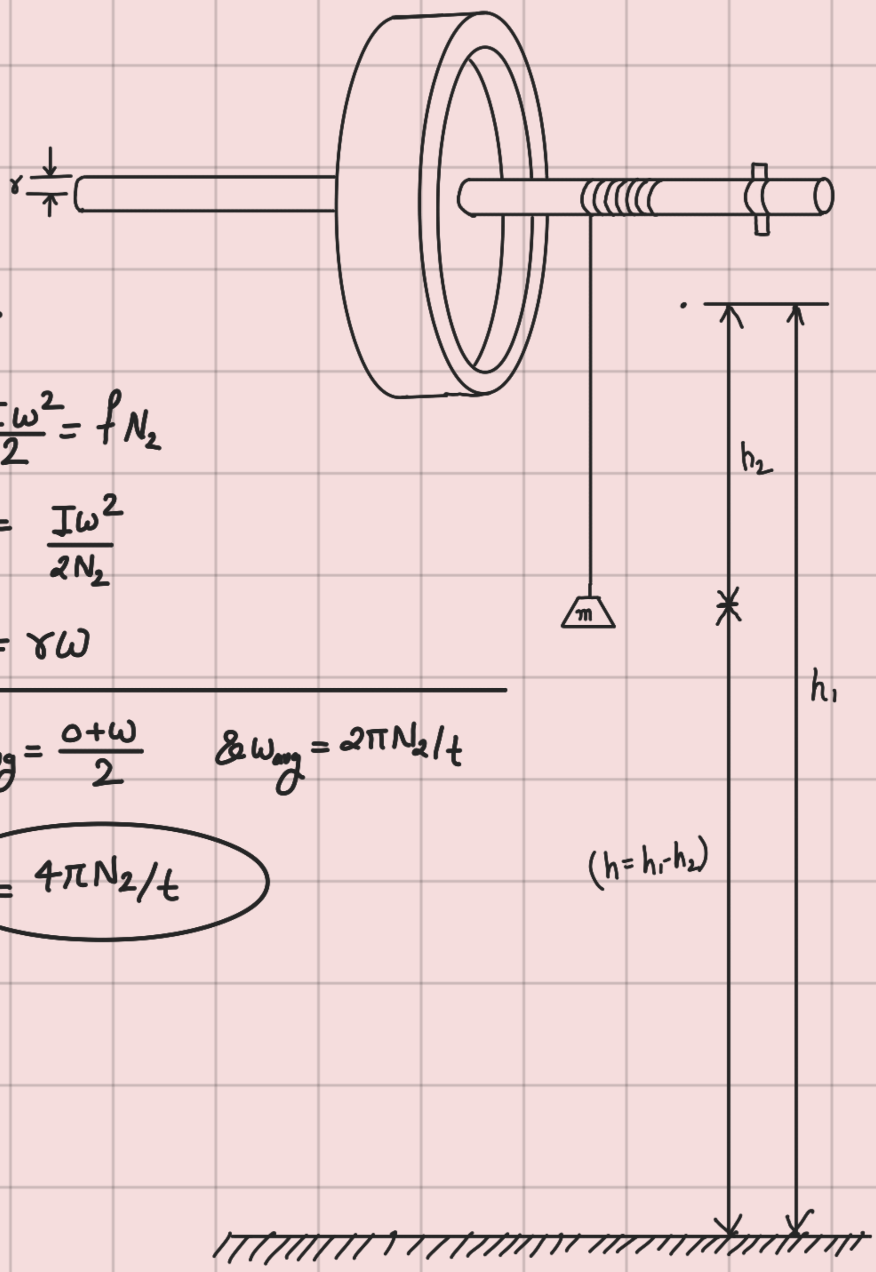
$$\boxed{V.R. = \frac{DT}{3d}}$$

Exp. 6



$$\boxed{V.R. = \frac{\pi D}{p}}$$

Exp. 7



$$P.E. = K.E.(T.E.) + R.E. + F.E.$$

$$mgh = \frac{mv^2}{2} + \frac{I\omega^2}{2} + fN_1$$

$$mgh = \frac{m(r\omega)^2}{2} + \frac{I\omega^2}{2} + \frac{I\omega^2}{2N_2}N_1$$

$$2mgh = mr^2\omega^2 + I\omega^2 + I\omega^2(N_1/N_2)$$

$$2mgh - mr^2\omega^2 = I\left(1 + \frac{N_1}{N_2}\right)\omega^2$$

$$\boxed{I = \frac{m(2gh - r^2\omega^2)}{\omega^2\left(1 + \frac{N_1}{N_2}\right)}}$$

$$\frac{I\omega^2}{2} = fN_2$$

$$f = \frac{I\omega^2}{2N_2}$$

&

$$V = r\omega$$

$$\omega_{avg} = \frac{0 + \omega}{2} \quad \& \quad \omega_{avg} = 2\pi N_2/t$$

$$\omega = 4\pi N_2/t$$