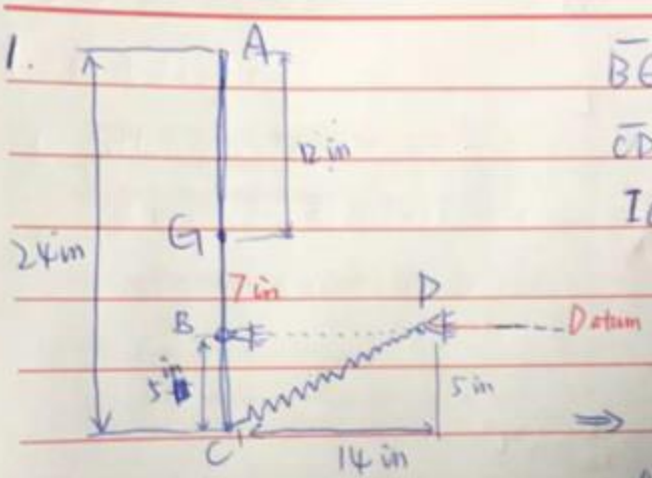
1.

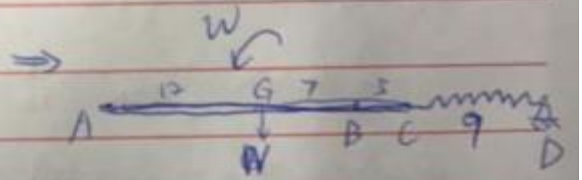


$\overline{BG} = \frac{7}{12}$ ft

$\overline{CD} = \sqrt{\left(\frac{14}{12}\right)^2 + \left(\frac{5}{12}\right)^2} = 1.239$ ft

$I_G = 0.08317$ (lb·ft·s^2)

$\Rightarrow$



$T_1 = 0.$

$V_1 = W \cdot \frac{7}{12} + \frac{1}{2}k\left(\overline{CD} - \frac{6}{12}\right)^2 = 13.44$ (lbf·ft)

$T_2 = \frac{1}{2} m V_G^2 + \frac{1}{2} I_G w^2$

$= \frac{1}{2} m (\overline{GB} \cdot w^2) + \frac{1}{2} I_G w^2$

$V_2 = 0 + \frac{1}{2} k \left(\frac{9}{12} - \frac{6}{12}\right)^2$

$T_1 + V_1 = T_2 + V_2$

$w = 11.524$ rad/S

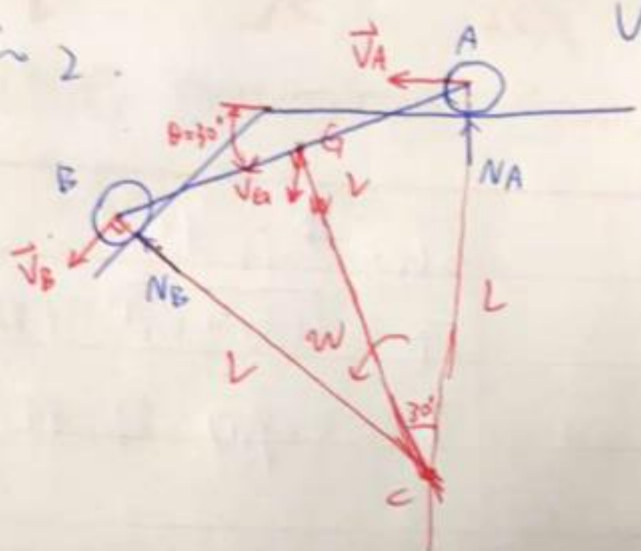
2.

3. position 1

$T_1 = 0$

$V_1 = 0$

position 2.



$V_G = L\cos 30° \cdot \omega = \frac{\sqrt{3}}{2} L\omega$

$T_2 = \frac{1}{2} I_G \omega^2 + \frac{1}{2} m v_G^2 = \frac{5}{12} m\omega^2 L^2$

$V_2 = -mg\frac{L}{2}\sin 30° = -\frac{mgl}{4}$

[redacted]

$T_1 + V_1 = T_2 + V_2$

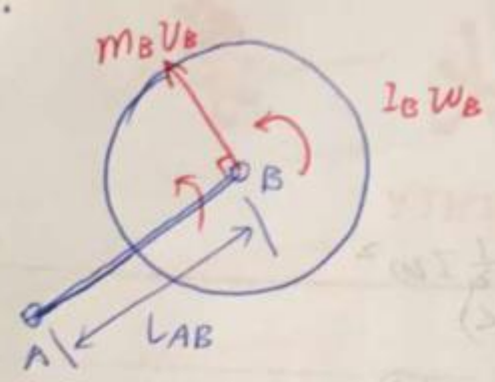
$0 = \frac{5}{12} ml^2\omega^2 + (-\frac{mgl}{4})$

$\omega = 0.7746\sqrt{\frac{g}{l}}$

$v_A = v_B = 0.7746\sqrt{gl}$

(指注方向)

4.



+↶ : moments about A:

$0+0 = m_B v_B l_{AB} + I_A w_{AB} + I_B w_B$ ①

because

$v_B = l_{AB} w_{AB} = \frac{6}{12} w_{AB}$ ②

when $w_m = 360\ rpm = 12\pi\ rad/s$

$w_B = w_{AB} + w_m$ ③

②③ → ①

$(m_B l_{AB}^2 + I_A)\, w_{AB} + I_B (w_{AB} + w_m) = 0$

$w_{AB} = -7.44\ rad/s$ ↷

So the angular velocity of the disk is

$w_B = -7.44 + 12\pi = 30.26\ rad/s$ ↶