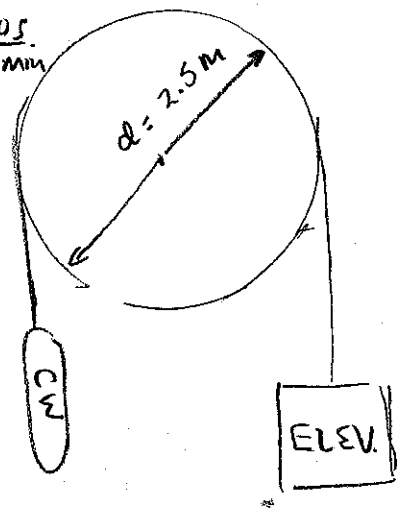
Physics 160 HW9 Solutions

9.20 a) $V = 25\ cm/s$ $\omega = \frac{V}{r} = 0.25^{-1} \times \frac{1\ rot}{2\pi} \times \frac{60\ s}{1\ min}$

$= 1.9\ rpm$



b) $\frac{1}{8}g = a$ $\alpha = \frac{a}{r} \simeq 1\ \frac{rad}{s^2}$

c) $\Delta x = 3.25\ m$ $\Delta\theta = \frac{\Delta x}{r} = 2.6\ rad.$

$= 149°$

9.49 a) $mgh = \frac{1}{2}mv^2 + \underbrace{\frac{1}{2}I\omega^2}_{K_p}$

$= \frac{1}{2}mr^2\omega^2 + K_p$ Now $K_p = \frac{1}{2}\cdot\frac{1}{2}m_p r^2\omega^2$

so we write $\frac{1}{2}mr^2\omega^2 = 2\frac{m}{m_p}K_p$

$= 2\frac{m}{m_p}K_p + K_p$

$= \left(2\frac{m}{m_p}+1\right)K_p$ so $h = \frac{K_p}{mg}\left(2\frac{m}{m_p}+1\right)$

$= \frac{4.5\ J}{15\ N}\left(2\cdot\frac{1.5}{2.5}+1\right) = 0.66\ m.$

b) $\frac{K_p}{K_m} = \frac{K_p}{2\frac{m}{m_p}K_p} = \frac{m_p}{2m} = \frac{2.5}{3} = \frac{5}{6}$

pulley has $\frac{5}{11}$ th of K_{tot}, mass has $\frac{6}{11}$.

$\frac{5}{11} \rightarrow 45.4\%$