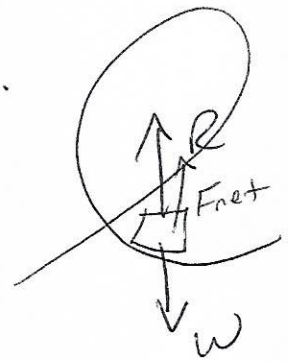
9.




$F_{net} = R - w$ $\quad F_{net} = \frac{mv^2}{r} = F_c$

$R = F_{net} + w$

$R = \frac{mv^2}{r} + mg$

$R = \frac{220\,kg\,(14\,m/s)^2}{23\,m} + 220\,kg\,(9.81\,m/s^2)$

$R = 4032\,N$ $\boxed{4.0\times10^3\,N}$

10.


$E_i = E_f$

$mgh = \frac{1}{2}mv^2 + \frac{1}{2}I\omega^2$ $\quad v = r\omega$

$mgh = \frac{1}{2}mv^2 + \frac{1}{2}\left(\frac{2}{5}\right)mr^2\omega^2$

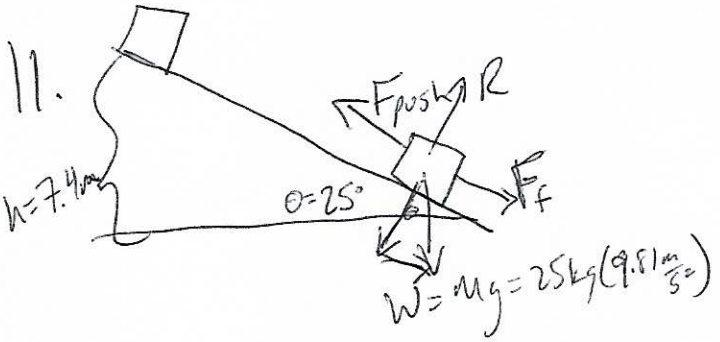
$mgh = \frac{1}{2}mv^2 + \frac{1}{5}mv^2$

$mgh = \frac{7}{10}mv^2$

$v = \sqrt{\frac{10}{7}gh}$ $\quad v = \sqrt{\frac{10}{7}\left(9.81\,\frac{m}{s^2}\right)7.4\,m}$

$\boxed{v = 10.\,\frac{m}{s}}$

11.




$F_{min} \Rightarrow F_{net} = 0$ $\quad F_f = \mu R$

$F_{net} = 0 = F_{push} - F_f - mg\sin\theta$

$F_{push} = \mu mg\cos\theta + mg\sin\theta$

$F_{push} = (0.30)(25\,kg)\left(9.81\,\frac{m}{s^2}\right)\cos 25° + (25\,kg)\left(9.81\,\frac{m}{s^2}\right)\sin 25°$

$\boxed{F_{push} = 170\,N}$