Physics
Quiz # 9

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Q1.

$\rho = 2.4m$

$N_B = mg + ma_n = mg + m\frac{v^2}{\rho}$

$= 2 \times 9.81 - 2 \times 3.5^2 \div 2.4$

$= 9.41N$

Block doesn't leave path a point A, $N_A = 0$

$N_A = mg - ma_n = mg\cos 30 = \frac{mv^2}{\rho}$

$v = \sqrt{g\cos 30\,\rho} = 4.52m/s$

Q2.

(a)

$G = mg = 10 \times 9.81 = 98.1N$

$\sum F_n = G - ma_n = 98.1 - 10 \times \frac{v^2}{\rho} = 62.1N$

$\sum F_t = -ma_t + F_n\,\mu_k = 0N$

$= -10a_t + 62.1 \times 0.3$

$0 = -10a_t + 18.63$

$a_t = 1.86m/s^2$

(b)

$\sum F_n = ma_n = N_s - mg\cos 30 = m\frac{v^2}{\rho}$

$N_s = mg\cos 30 + m\frac{v^2}{\rho}$

$= 10 \times 9.81\cos 30 + 10 \times \frac{4^2}{5}$

$= 116.96N$

$F_f = N\mu_k = 35.08N$
$ma_t = G_t - F_f = 49.88N$
$a_t = \frac{F}{m} = 4.99m/s^2$

Q3.
$m = 50g = 0.05kg$
$ma_n = G_n = mg = 0.05 \times 9.81 = 0.49N$
$ma_n = m\frac{v^2}{\rho}$
$v = \sqrt{g\rho} = 3.13m/s$
$T = mg + ma_n = 0.49 + 0.49 = 0.98N$

Q4.
$\dot{\theta} = 3\ rad/s,\ \ddot{\theta} = 0$
$\dot{r} = v = 1.2m/s$
$F_\theta = ma_\theta = m(r\ddot{\theta} + 2\dot{r}\dot{\theta})$
$= m2\dot{r}\dot{\theta}$
$= 0.1 \times 2 \times -1.2 \times 3$
$= -0.72N$

$G_\theta = mg\cos 30 = 0.1 \times 9.81\cos 30 = 0.85N$
$N = G_\theta + F_\theta$
$= 0.85 - 0.72$
$= 0.13N$