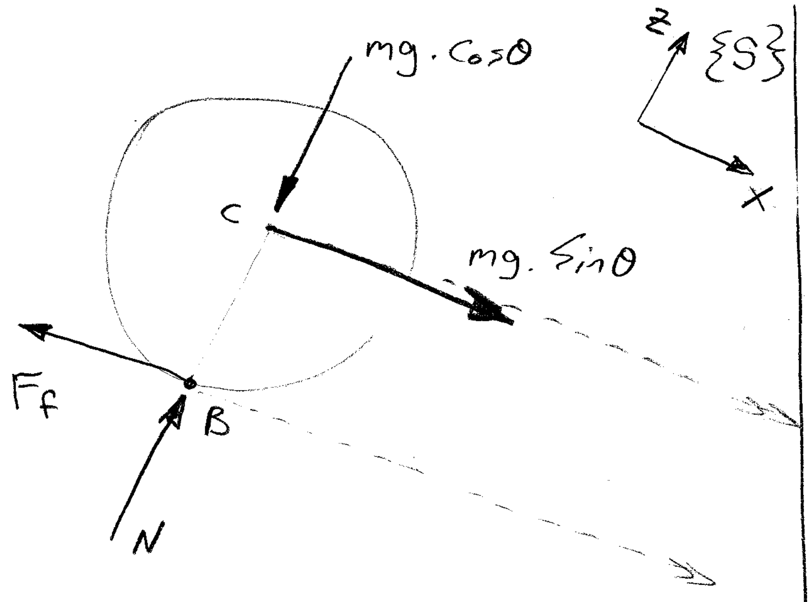


NEWTON'S 2ND LAW:-

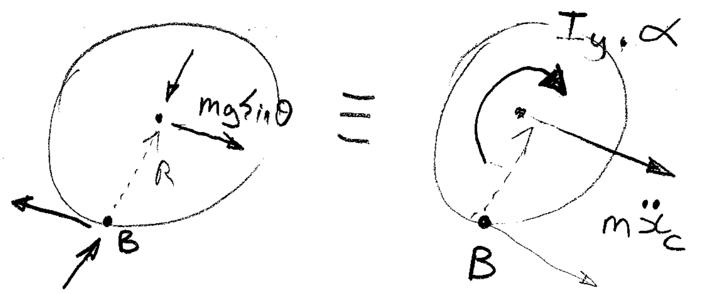
$$\sum F_z = m\ddot{z} = 0$$

$$\therefore N - mg\cos\theta = 0$$

$$\therefore \boxed{N = mg\cos\theta} \quad (1)$$

$$\sum F_x = m\ddot{x}_c$$

$$\therefore \boxed{mg\sin\theta - F_f = m\ddot{x}_c} \quad (2)$$



$$\sum M_B = mgR\sin\theta$$

and

$$\sum M_B = I_y.\alpha + R.m\ddot{x}_c$$

$$\therefore mgR\sin\theta = I_y\alpha + Rm\ddot{x}_c$$

For NO-SLIP we have

$$\boxed{\ddot{x}_c = R.\alpha} \quad (2b)$$

$$\therefore mgR\sin\theta = \alpha(I_y + mR^2)$$

$$\therefore \alpha = \frac{R.mg\sin\theta}{I_y + mR^2}$$

For a sphere we have

$$I_y = \frac{2}{5}mR^2$$

$$\therefore \alpha = \frac{mg\sin\theta.R}{\frac{2}{5}mR^2 + mR^2}$$

$$\therefore \alpha = \frac{g\sin\theta.R}{\frac{7}{5}R^2}$$

$$\boxed{\alpha = \frac{5g\sin\theta}{7.R}} \quad (3)$$

$\therefore$ Sub (3) and (2b) into (2).

$$\boxed{F_f = mg\sin\theta - mR\alpha} \quad (4)$$