

# Test 3

1b.  $F_r = m(2k - 4kb^2t^4)$

$$F_\theta = 10mkbt^2$$

2. a)  $H = \frac{m_b^2}{(m_b + m_1)^2} S(1 - \cos \theta_0)$

b) 
$$\left\{ \begin{aligned} m_b v_b &= m_1 u_{1x} + m_b u_{bx} \\ \frac{m_b v_b^2}{2} &= \frac{m_1 u_1^2}{2} + \frac{m_b u_b^2}{2} \quad (\text{elastic}) \\ \frac{m_b u_b^2}{2} &= m_b g h \end{aligned} \right.$$

3. a)  $F = 2mS \frac{\omega_0}{t_0}$  (on the right weight  $\otimes$   
on the left weight  $\odot$ )

b)  $\omega = 16\omega_0$

c)  $\omega = \frac{2mS^2 + I_{\text{max}}}{2m\left(\frac{S}{4}\right)^2 + I_{\text{max}}} \omega_0$

4. a)  $\tilde{c} = mg \frac{S}{2}$

c)  $\tilde{c} = 0$

b)  $a_r = 0$   
 $a_\theta = \frac{mgS^2}{2I}$  (down)

d)  $a_r = -S\omega_f^2$   
or  $|\vec{a}| = S\omega_f^2$  (up) vertical