

Answers Test 3 2011

$$2. a) v_r = c \quad v_\theta = \frac{D^2}{D+ct} \omega_0$$

$$v = \sqrt{v_r^2 + v_\theta^2}$$

$$b) \vec{c} = r F_\theta \quad \vec{c}_z = 0$$

$$\text{Bonus: } \omega = \frac{(m D^2 + I) \omega_0}{m (D+ct)^2 + I}$$

$$3. u = \frac{m_1}{m_1 + m_2} v_1$$

$$k_1 = \frac{m_1 u_1^2}{2} \quad k_2 = \frac{m_2 u_2^2}{2}$$

$$\cos \theta_1 = \frac{m_1^2 v_1^2 + m_1^2 u_1^2 - m_2^2 u_2^2}{2 m_1^2 v_1 u_1}$$

$$\cos \theta_2 = \frac{m_1 v_1 - m_1 u_1 \cos \theta_1}{m_2 u_2}$$

$$4. a) v_r = 0 \quad v_\theta = 2 v_0$$

$$b) F_r = m \left(-v_0 \sin \theta \left(\frac{v_0}{r_0} \right)^2 - v_0 (1 + \sin \theta) \frac{v_0^2}{r_0^2} \right)$$

$$F_\theta = m \left(2 v_0 \cos \theta \left(\frac{v_0}{r_0} \right)^2 \right)$$