

Indian Institute of Technology Guwahati

PH101: Physics –I

Tutorial 01

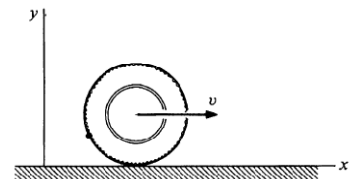
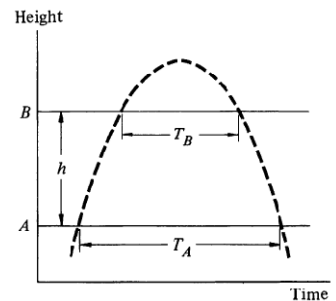
Due: Jul 31, 2012

- KK 1.5 Prove that the diagonals of an equilateral parallelogram are perpendicular.
- KK 1.8 Find a unit vector perpendicular to $\mathbf{A} = (\hat{i} + \hat{j} - \hat{k})$ and $\mathbf{B} = (2\hat{i} - \hat{j} + 3\hat{k})$.
- KK 1.11 Let \mathbf{A} be an arbitrary vector and let \hat{n} be a unit vector in some fixed direction. Show that $\mathbf{A} = (\mathbf{A} \cdot \hat{n})\hat{n} + (\hat{n} \times \mathbf{A}) \times \hat{n}$.
- KK 1.12 The acceleration of gravity can be measured by projecting a body upward and measuring the time that it takes to pass two given points in both directions.

Show that if the time the body takes to pass a horizontal line A in both directions is T_A , and the time to go by a second line B in both directions is T_B , then, assuming that the acceleration is constant, its magnitude is

$$g = \frac{8h}{T_A^2 - T_B^2},$$

- KK 1.17 A particle moves in a plane with constant radial velocity $\dot{r} = 4$ m/s. The angular velocity is constant and has magnitude $\dot{\theta} = 2$ rad/s. When the particle is 3 m from the origin, find the magnitude of (a) the velocity and (b) the acceleration.
- KK 1.19 A tire rolls in a straight line without slipping. Its center moves with constant speed V . A small pebble lodged in the tread of the tire touches the road at $t = 0$. Find the pebble's position, velocity, and acceleration as functions of time.



KK : An Introduction to Mechanics, Kleppner & Kolenkow