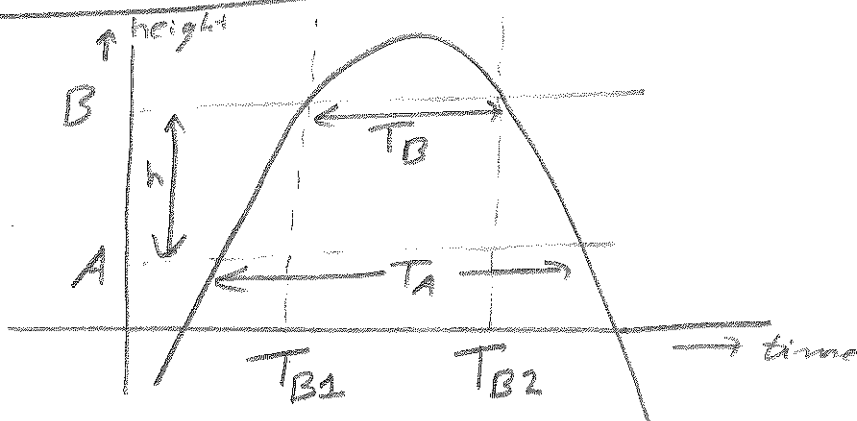


KK Ex 1.16



Let $z(0) = h_A = 0$

Then $z(t) = v_{0z}t - \frac{1}{2}gt^2$

Since $z(0) = h_A = 0$, also $z(T_A) = 0$

$$\Rightarrow z(T_A) = T_A(v_{0z} - \frac{1}{2}gT_A)$$

$$\Rightarrow T_A = \frac{2v_{0z}}{g}$$

Similarly $v_{0z}t - \frac{1}{2}gt^2 = h$ for

$$t = T_{B1} \text{ \& \& } t = T_{B2}$$

$$\Rightarrow T_{B1,2} = \frac{v_{0z} \pm \sqrt{v_{0z}^2 - 2gh}}{g}$$

$$\Rightarrow T_B = T_{B2} - T_{B1} = \frac{2\sqrt{v_{0z}^2 - 2gh}}{g}$$

Eliminate $v_{0z} \Rightarrow = \frac{2\sqrt{\frac{(gT_A)^2}{4} - 2gh}}{g}$

$$\Rightarrow T_B^2 g^2 = g^2 T_A^2 - 8gh$$

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

Problem 3.

$$\vec{A} = (2, -2, 0)$$

$$\vec{B} = (6, -6, -2\sqrt{6})$$

$$a) |\vec{A}| = \sqrt{4+4} = 2\sqrt{2}$$

$$|\vec{B}| = \sqrt{36+36+4 \times 6} = 4\sqrt{6}$$

$$b) \vec{A} \cdot \vec{B} = 12 + 12 = 24$$

$$\begin{aligned} c) \vec{A} \cdot \vec{B} &= |\vec{A}| |\vec{B}| \cos \theta \\ &= 16\sqrt{3} \cos \theta \\ &= 24 \end{aligned}$$

$$\Rightarrow \cos \theta = \frac{24}{16\sqrt{3}} = \frac{1}{2} \sqrt{3} \Rightarrow \theta = \frac{\pi}{6}$$

$$d) |\vec{A} \times \vec{B}| = |\vec{A}| |\vec{B}| \sin \theta$$

$$= 8\sqrt{3}$$

$$\vec{A} \times \vec{B} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & -2 & 0 \\ 6 & -6 & -2\sqrt{6} \end{vmatrix}$$

$$= 4\sqrt{6} \hat{i} + 4\sqrt{6} \hat{j}$$