PHY131 - Class 14 - Mon. Oct. 31, 2011

Elastic collisions: conservation of $\vec{p}$

before mv_b^2

after mv_a^2

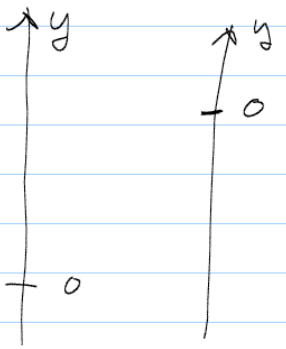
} equal

$\frac{1}{2}mv^2 \equiv$ kinetic energy K

Potential Energy:

Units: kg $m^2/s^2 \equiv$ joule J

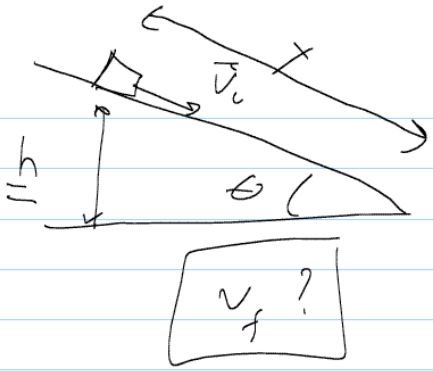
$U_g = mgy$ $y \equiv$ vertical distance above ?



$\Delta K = -\Delta U$

makes no difference

Example



$\theta = 30°$

$h = 5.0\ m$

$v_i = 2.0\ m/s$

Kinematics

$a_{down\ plane} = g \sin\theta$

$\sin\theta = \frac{h}{x} \Rightarrow x = \frac{h}{\sin\theta}$

Chapt 2 $\left(v_f^2 = v_i^2 + 2ax \right)$

$\Rightarrow v_f^2 = v_i^2 + 2(g \sin\theta) \times \frac{h}{\sin\theta}$

$\Rightarrow \boxed{v_f^2 = v_i^2 + 2gh} \Rightarrow v_f = 10.\ m/s$

Cons. of mechanical energy

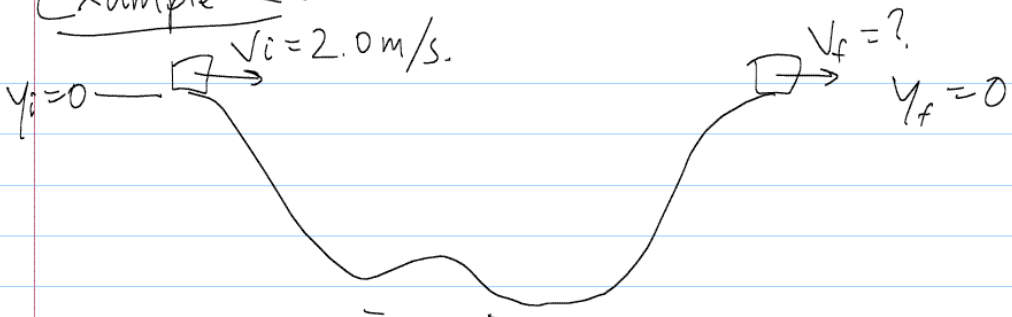
$U_{g_i} + K_i = K_f$

$U_g = 0$ at bottom

$U_{g_i} = mgh$

$mgh + \frac{1}{2}mv_i^2 = \frac{1}{2}mv_f^2$

Example 2.



$$E_i = E_f$$

$$\frac{1}{2}mv_i^2 + mgy_i = \frac{1}{2}mv_f^2 + mgy_f$$

$$\frac{1}{2}mv_i^2 = \frac{1}{2}mv_f^2$$

$$v_i = v_f = 2.0\ m/s$$

Racing Balls Demo