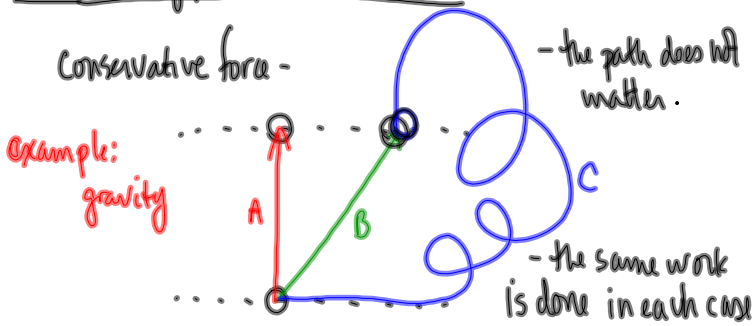
Conservation of Energy + Momentum

§7-1 Energy Transformations

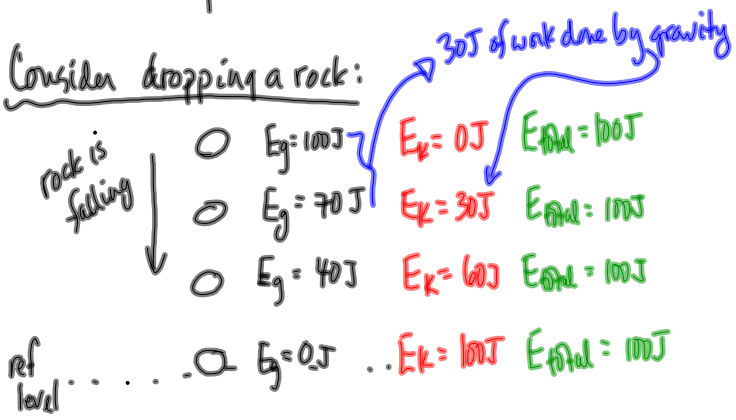


non-conservative force - the path matters.

example: friction or air resistance.

Read over p280-281.

Consider dropping a rock:



Work is being done by gravity to increase the kinetic energy. The potential energy decreases and the total energy stays the same (neglecting air resistance)

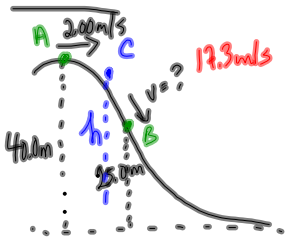
This is referred to as the Law of Conservation of Energy.

$$E_{total} = E'_{total}$$

(before) (after)

mechanical energy → $E_g + E_e + E_k = E_g' + E_e' + E_k'$

MP|285



frictionless.

a) $v = ?$ at $h = 25.0\,m$

b) $h = ?$ when $v = 10.0\,m/s$

$E_{Total} = E'_{Total}$ (Law of Conservation of Energy)

Before / After

$E_{g_A} + E_{k_A} = E_{g_B} + E_{k_B}$

$mgh_A + \frac{1}{2}mv_A^2 = mgh_B + \frac{1}{2}mv_B^2$

$(9.81\,m/s^2)(42.0\,m) + \frac{1}{2}(2.00\,m/s)^2 = (9.81\,m/s^2)(25.0\,m) + \frac{1}{2}v_B^2$

$392.4\,\frac{m^2}{s^2} + 2.00\,\frac{m^2}{s^2} = 245.25\,\frac{m^2}{s^2} + \frac{1}{2}v_B^2$

$149.15\,\frac{m^2}{s^2} = \frac{1}{2}v_B^2$

$298.3\,\frac{m^2}{s^2} = v_B^2$

a) $v_B \doteq 17.3\,m/s$

b) $E_{Total} = E'_{Total}$

$E_{g_A} + E_{k_A} = E_{g_C} + E_{k_C}$

$mgh_A + \frac{1}{2}mv_A^2 = mgh_C + \frac{1}{2}mv_C^2$

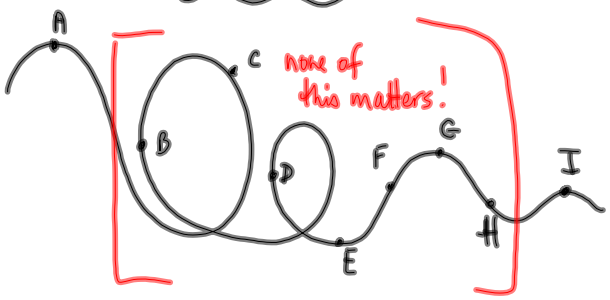
$gh_A + \frac{1}{2}v_A^2 = gh_C + \frac{1}{2}v_C^2$

$394.4\,\frac{m^2}{s^2} = (9.81\,m/s^2)h_C + \frac{1}{2}(10.0\,m/s)^2$

$394.4\,\frac{m^2}{s^2} = (9.81\,m/s^2)h_C + 50.0\,\frac{m^2}{s^2}$

$344.4\,\frac{m^2}{s^2} = (9.81\,m/s^2)h_C$

$h_C \doteq 35.1\,m$



TO DO

① PP|287|1-5

② Read 280-284