Principle of work & kinetic energy: $\boxed{T_1 + U_{1\to 2} = T_2}$ (***)

Conservation of mechanical energy: $\boxed{T_1 + V_1 = T_2 + V_2}$ (Col.)

T_1 : kinetic energy of the body at time 1, $T_1 = \frac{1}{2} m v_1^2$

T_2 : " " " " " " " 2, $T_2 = \frac{1}{2} m v_2^2$

$U_{1\to 2}$: work done on the body during its motion from position 1 to position 2

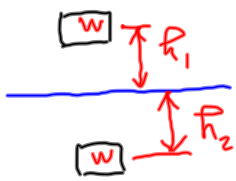
V_1 : potential energy of the body at position 1.

V_2 : " " " " " " " 2.

Potential energy of a body at a given position is equal to the amount of work received by the body from the conservative force during its motion from its current position to the reference datum.

($V_g = -\frac{GMm}{r}$ for a spacecraft where the reference datum is at ∞.)

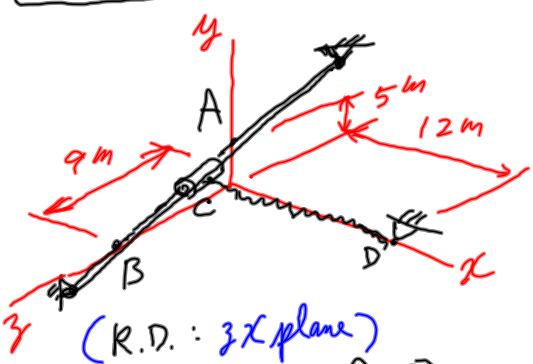
($V_e = \frac{1}{2} k x^2$ for a body in the elastic force field)



$V_g = W h_1$

$V_g = -W h_2$

$\boxed{13.49}$ (Prob. 13.19)



(R.D. : zx plane)

$W = mg$ (m), (N), (2)

$\overline{AD} = 13$ m $\quad V_e = \frac{1}{2} k x^2$

$\overline{BD} = 15$ m $\quad \therefore v_B = \square$

$T_1 + V_1 = T_2 + V_2$

$L = 10$ m $\quad k = 120$ N·m

$m_c = 20$ kg $\quad v_A = 0 \quad v_B = ?$

$T_A + V_A = T_B + V_B$

$T_A = 0, \quad T_B = \frac{1}{2}(20) v_B^2$

$V_A = (V_A)_g + (V_A)_e$

$= 20(9.81)(5) + \frac{1}{2}(120)(13-10)^2$

$V_B = (V_B)_g + (V_B)_e$

$= 0 + \frac{1}{2}(120)(15-10)^2$

$\boxed{v_B = \square \text{ m/s}}$