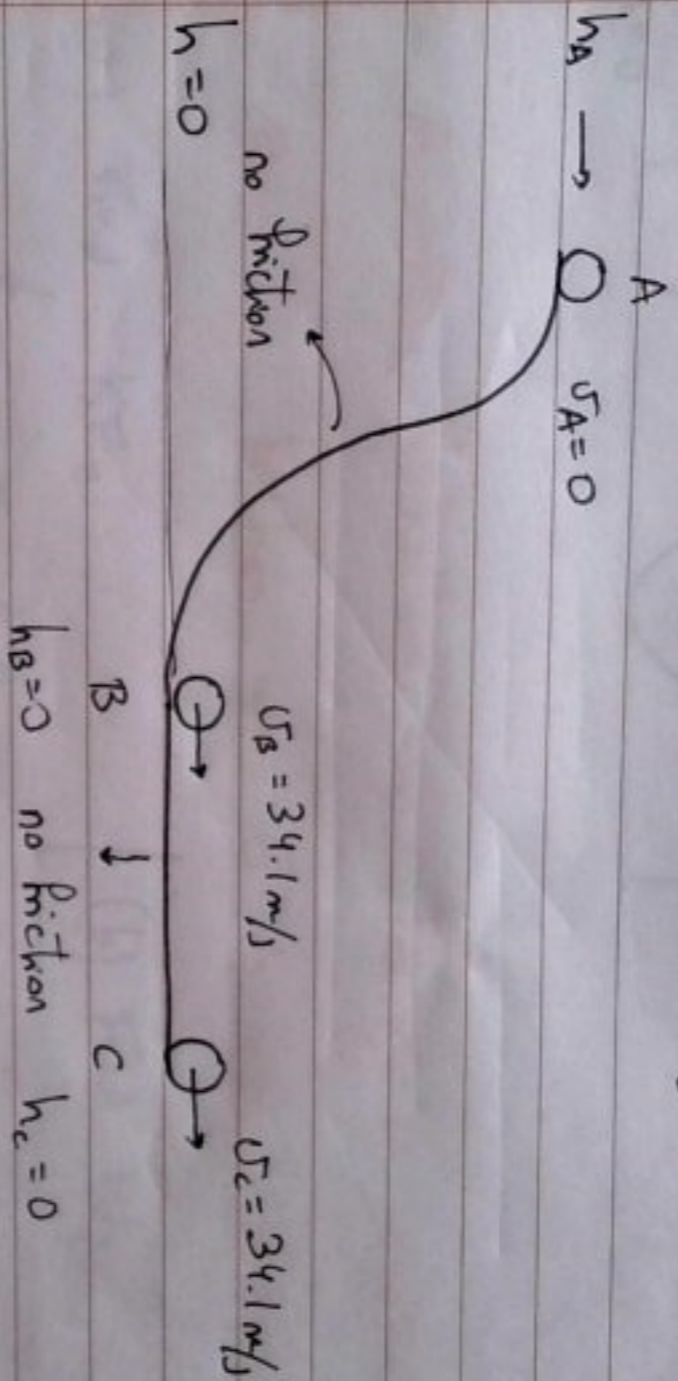


Lecture 13 - Phys 203

11

## Chapter 6 - Energy

From previous obs: find  $v_c = ?$



$$\frac{1}{2} m v_B^2 + mgh_B = \frac{1}{2} m v_C^2 + mgh_C$$

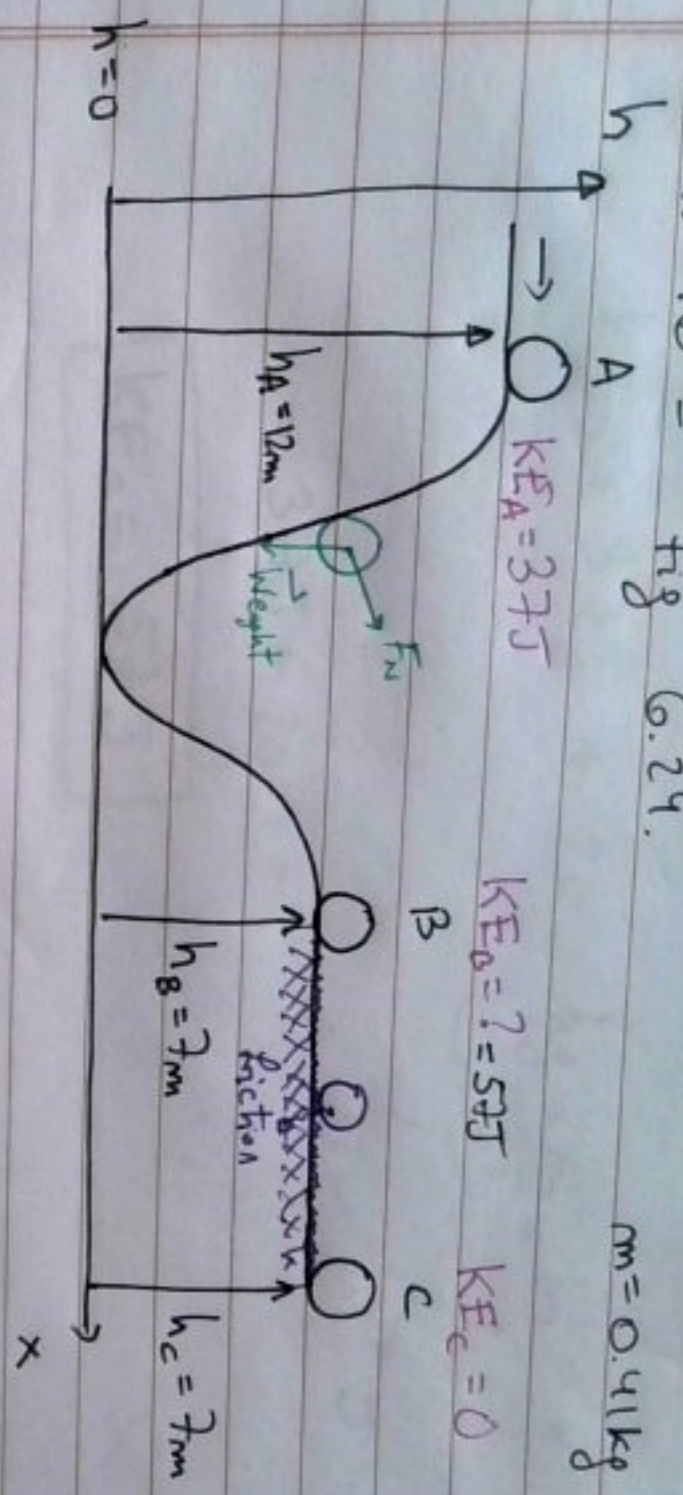
$v_B^2 = v_C^2 \Rightarrow v_B = v_C$

$W_{nc}^{B \rightarrow C} = 0$

Ex 16 - Fig G.24.

$m = 0.41 \text{ kg}$

2



A → B : frictionless ⇒ Energy is conserved

B → C : friction ⇒ E is not conserved

(a) Find  $KE_B$



$E_A = E_B$

(b) Find  $W_{friction}^{B \rightarrow C}$

From A → B there is a NC →  $\vec{F}_N$

$KE_A + PE_A = KE_B + PE_B$

$37 \text{ J} + mgh_A = KE_B + mgh_B$

$KE_B = 37 \text{ J} + mgh_A - mgh_B =$

$KE_B = 37 \text{ J} + mg(h_A - h_B)$

$KE_B = 37 \text{ J} + 0.41 \text{ kg} \times 9.8 \text{ m/s}^2 \times 5 \text{ m} =$

is  $W_{F_n} = 0$ ?

yes, because

$\vec{F}_n \perp \vec{s} \Rightarrow$

$W_{F_n} = 0$

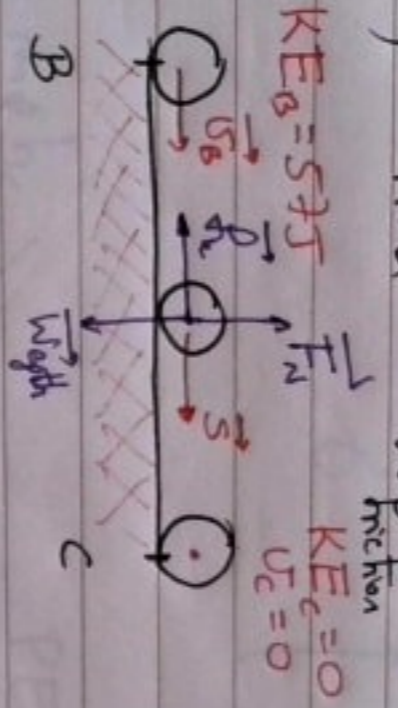
then E is conserved

$$KE_B = 37J + 20 \frac{\text{kg} \times \text{m}}{\text{s}^2}, \text{ m} =$$

$$= 37J + 20J =$$

$$KE_B = 57J$$

(b) Find  $W_{B \rightarrow C}$



1) is there any NC force?

is there NC force?

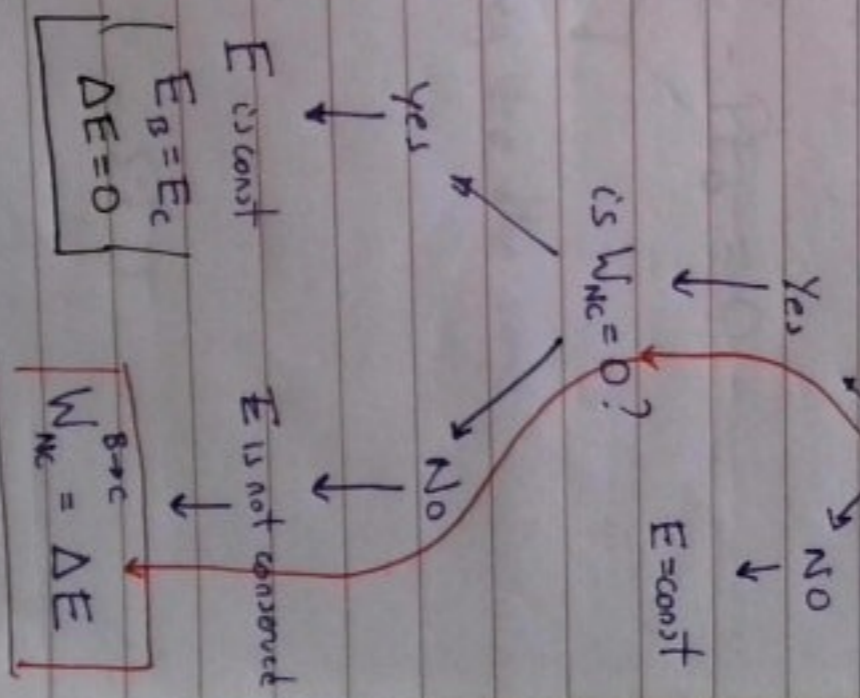
Yes:  $\vec{f}_f$  and  $\vec{F}_N$

$W_{F_N}^{B \rightarrow C} = 0$  because  $\vec{F}_N \perp \vec{s}$

$W_{friction}^{B \rightarrow C} \neq 0 \rightarrow$  Find

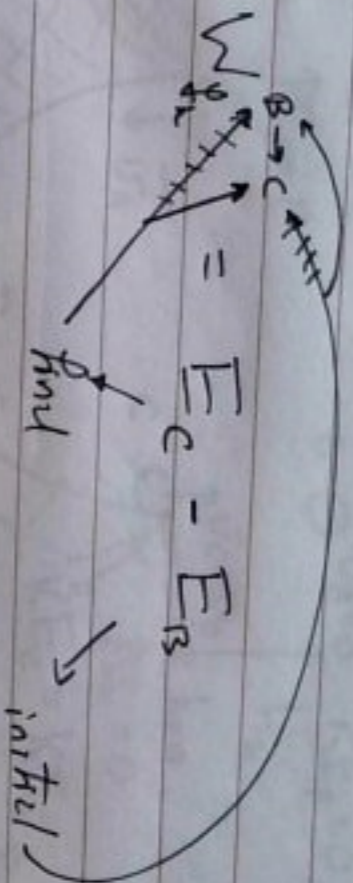
$$W_{NC} = W_D^{B \rightarrow C} < 0$$

$$W_{f_f}^{B \rightarrow C} = \Delta E$$



BACK -> 11:03 AM

$$W_{fr}^{B \rightarrow C} = \Delta E$$



$$W_{fr}^{B \rightarrow C} = (KE_C + PE_C) - (KE_B + PE_B)$$

they are non-zero

$$PE_C = mgh_c$$

$$PE_B = mgh_b$$

$$PE_C - PE_B = 0$$

they are the same

$$PE_C - PE_B = mg(2m) - mg(2m) =$$

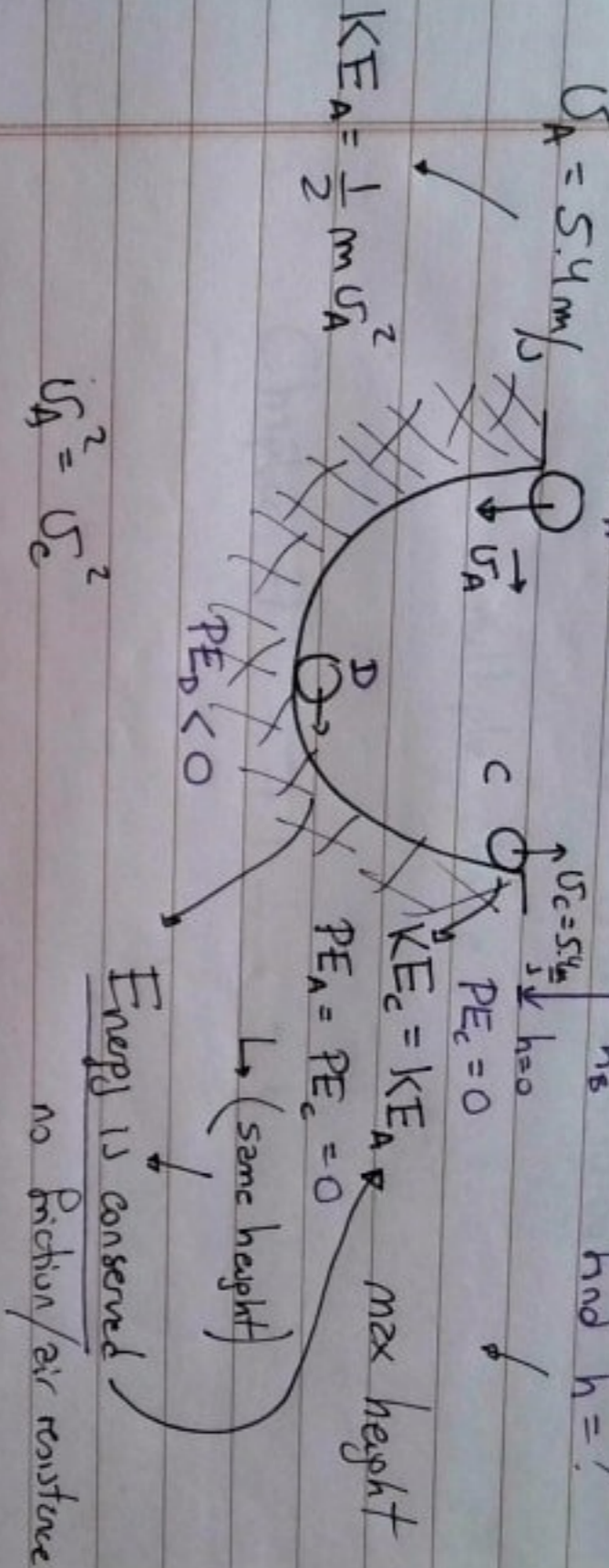
$$= 0$$

$$W_{fr}^{B \rightarrow C} = -KE_B = -57 \text{ J}$$

Ex #40 (homework) PE<sub>B</sub> = mgh<sub>B</sub>

B ⊙ U<sub>B</sub> = 0 KE<sub>B</sub> = 0  
h<sub>B</sub> and h = ?

U<sub>A</sub> = 5.4 m/s  
PE<sub>A</sub> = 0  
KE<sub>A</sub> = 1/2 m U<sub>A</sub><sup>2</sup>



U<sub>C</sub> = -U<sub>A</sub>    U<sub>A</sub> = -U<sub>C</sub>

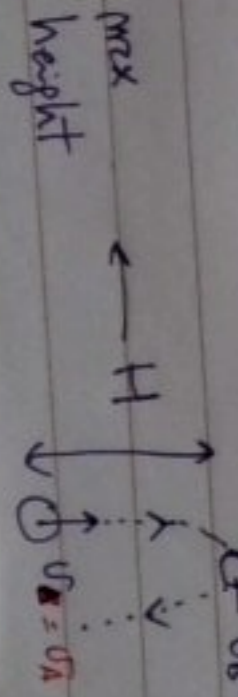
and h = ?    KE<sub>A</sub> + PE<sub>A</sub> = KE<sub>B</sub> + PE<sub>B</sub>

1/2 m U<sub>A</sub><sup>2</sup> + 0 = 1/2 m U<sub>B</sub><sup>2</sup> + mgh<sub>B</sub>

1/2 m U<sub>A</sub><sup>2</sup> = mgh<sub>B</sub>

h<sub>B</sub> = U<sub>A</sub><sup>2</sup> / 2g    U<sub>A</sub> = √(2gh<sub>B</sub>)

Chapter 2  
got the same result



Test #1 → Mid term:

March 25 come at 10:00 AM.

multiple choice.

Chapter 7: 7.1 → 7.4.