



NAME:

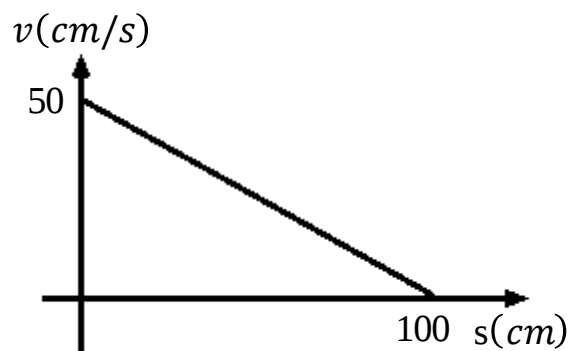
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GROUP:

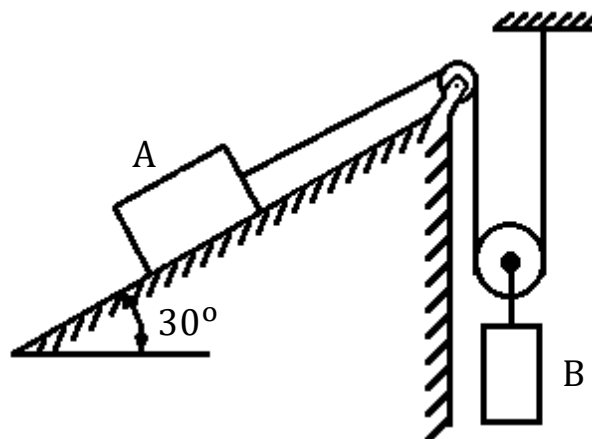
**NOTE:** Any homework submitted after the deadline will be void.

- 1) In a linear motion of a particle,  $v = v(s)$  graph is given in the figure. Knowing that  $s = 0$  at  $t = 0$ , (a) find  $s = s(t)$  expression, and (b) determine the acceleration when  $s = 50 \text{ cm}$ .

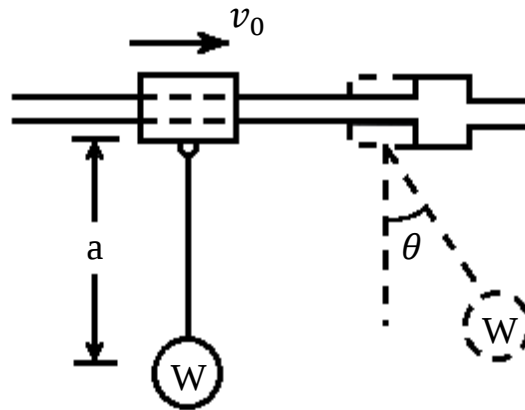
(Answer:  $s = 100 \left(1 - e^{-\frac{1}{2}t}\right)$ ,  $a = -12.5 \text{ cm/s}^2$ )



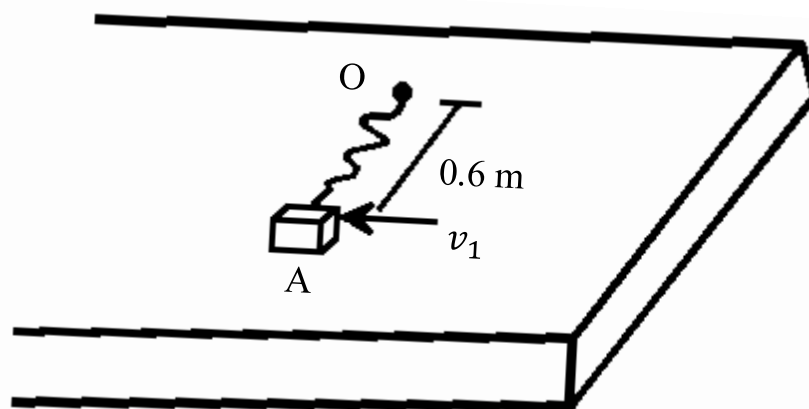
- 2) In the figure knowing that the coefficient of kinetic friction is 0.25 between the surface and the 1-kN block A, a) determine the weight of the block B in order to cause the block A to move and b) determine the accelerations of the blocks and the tension in the cable if the block B has a weight of 2 kN. Neglect the weight of the pulleys and cord. (Answer:  $W_B \leq 0.57 \text{ kN}$  or  $W_B \geq 1.43 \text{ kN}$ ,  $a_A = -1.85 \text{ m/s}^2$ ,  $a_B = 0.93 \text{ m/s}^2$ ,  $T = 0.91 \text{ kN}$ )



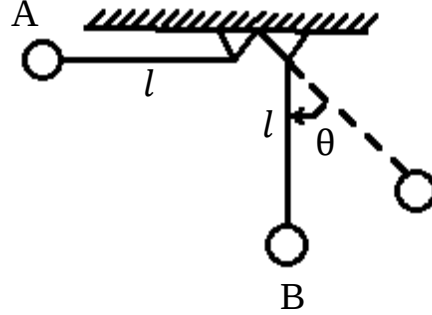
3) A collar with negligible weight and the weight  $W$  connected to the collar slide on a frictionless pipe with the velocity  $v_o$  as shown in the figure. When the collar hits the obstacle seen in the figure; a) determine the maximum  $\theta$  angle of the weight  $W$  in the oscillation, b) determine the velocity  $v_o$  when  $\theta_{max} = 30^\circ$  and  $a = 2\text{ m}$ . (Answer:  $\theta = \arccos[1 - v^2/(2ga)]$ ,  $v = 2.29\text{ m/s}$ )



4) An object with a weight of  $10\text{ N}$  is attached to the point  $O$  by an elastic rope on a frictionless table in the figure. The distance of the object to the point  $O$  is  $0.6\text{ m}$ , the unstretched length of the rope is  $1.3\text{ m}$  and the spring constant is  $k = 5\text{ N/cm}$ . A velocity  $v_1$  is given to the object perpendicular to the direction that connects the object to point  $O$  as in the figure. Find the initial velocity  $v_1$  in which the maximum stretch in the spring is to be  $1.8\text{ m}$  and find the velocity  $v_2$  of  $A$  when the stretch in the spring is  $1.8\text{ m}$ . (Answer:  $v_1 = 11.74\text{ m/s}$ ,  $v_2 = 3.91\text{ m/s}$ )



5) After the 5-N sphere A is released from rest in the position shown, it collides with the 5-N sphere B. Knowing that the coefficient of restitution between the two spheres is  $e=0.70$ , determine the  $\theta$  angle which determines the highest position where the sphere B can reach after the collision. Note:  $l = 1\text{ m}$  (**Answer:  $\theta = 73.74^\circ$**  )



### HOMEWORK HOURS

Assoc. Prof. Zafer KÜTÜĞ (GROUP: 2) 16. 11. 2018 10:00 – 12:30 }  $\Rightarrow$  Res. Assist. Yurdakul AYGÖRMEZ  
Assoc. Prof. Murat ALTEKİN (GROUP: 3) 15. 11. 2018 13:00 – 15:30 } Room: 2 – 030

Assist. Prof. Çağrı MOLLAMAHMUTOĞLU (GROUP: 1) 13. 11. 2018 14:30 – 16:30 }  $\Rightarrow$  Res. Assist. Yurdakul AYGÖRMEZ  
Assist. Prof. Yıldırım Serhat ERDOĞAN (GROUP: 4) 13. 11. 2018 10:00 – 12:30 } Room: 2 – 030

**NOTE: Homeworks will be delivered by hand.**