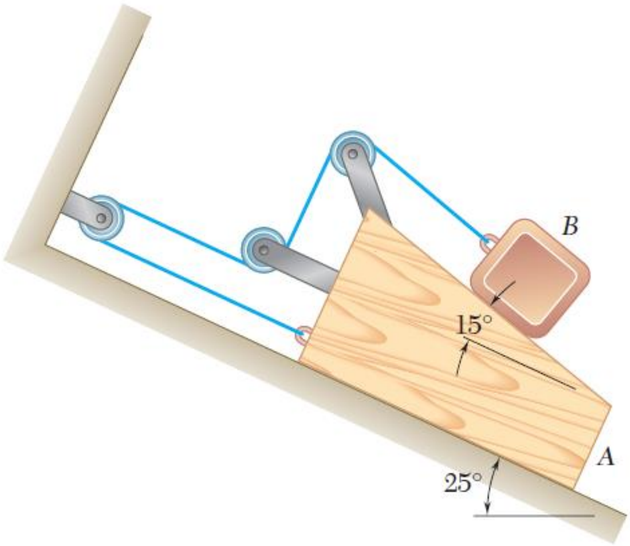
	YILDIZ TECHNICAL UNIVERSITY **FACULTY OF CIV. ENG. - DIV. OF CIV. ENG.** **MECHANICS DIVISION**	**2017-2018 FALL** **DYNAMICS** **HOMEWORK 1**

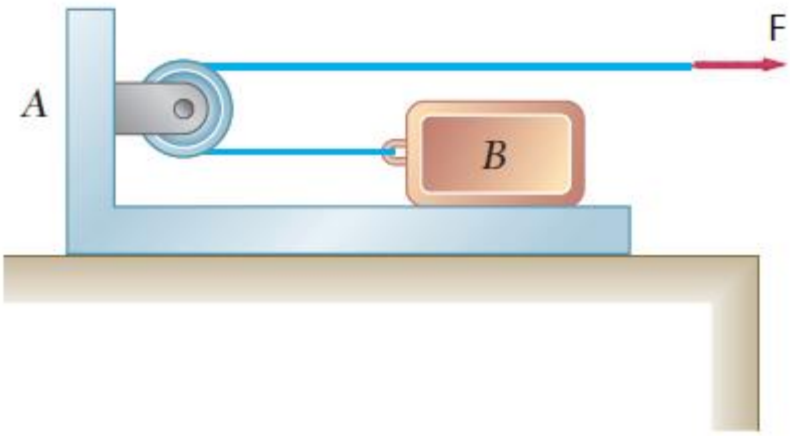
NAME:	**NO:**	**GROUP:**

DEADLINE: 07.11.2017 GROUP: 1 – 2 **DEADLINE: 08.11.2017 GROUP: 3 – 4**	**NOTE: Any homework submitted after the deadline will be void.**

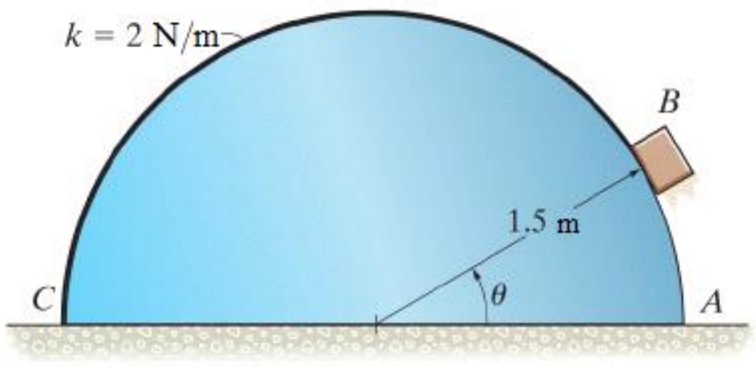
1) Knowing that at the instant shown block *A* has a velocity of 8 m/s and an acceleration of 6 m/s^2 both directed down the incline, determine (*a*) the velocity of block *B*, (*b*) the acceleration of block *B*. **(Answer:** $\boldsymbol{v_B = 8.53\ m/s}$ **,** $\boldsymbol{a_B = 6.40\ m/s^2}$ **)**



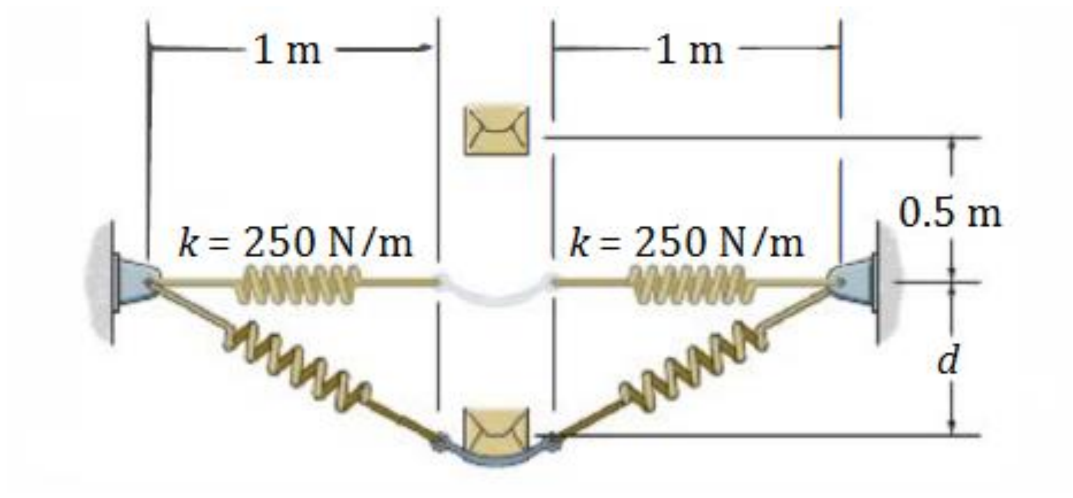
2) A 10-kg block B rests on a 5-kg bracket A, as shown below. The coefficients of friction are $\mu_s = 0.40$ and $\mu_k = 0.30$ between block B and bracket A, and there is no friction in the pulley or between the bracket and the horizontal surface. (a) Determine the maximum force F that can be applied if block B is not to slide on bracket A. (b) Determine the corresponding acceleration of the bracket A. **(Answer :** $\boldsymbol{F_{max} = 24\ N}$ **,** $\boldsymbol{a_A = 1.6\ m/s^2}$ **)**



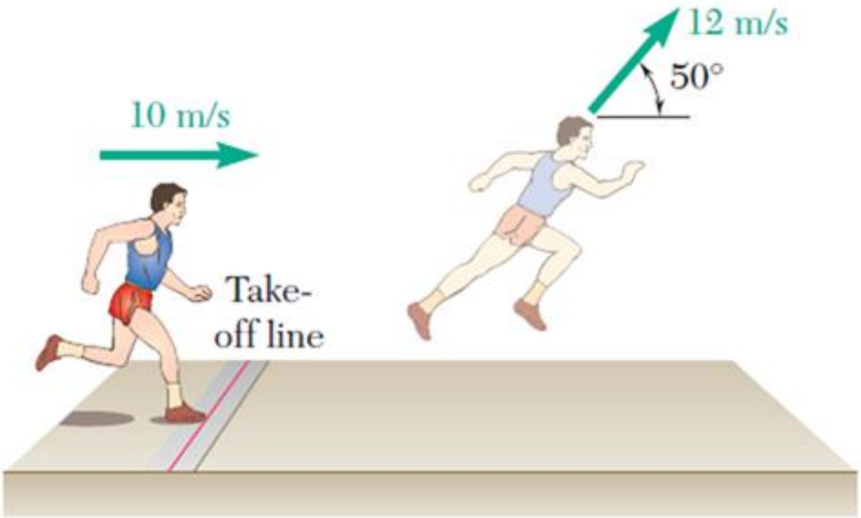
3) A 0.3-kg block rests on the smooth semicylindrical surface. An elastic cord having a stiffness k = 2 N/m is attached to the block at B and to the base of the semicylinder at point C. If the block is released from rest at A(θ = 0º), determine the unstretched length of the cord so that the block begins to leave the semicylinder at the instant θ = 45°. Neglect the size of the block. **(Answer: $l_o = 2.13\ m$)**



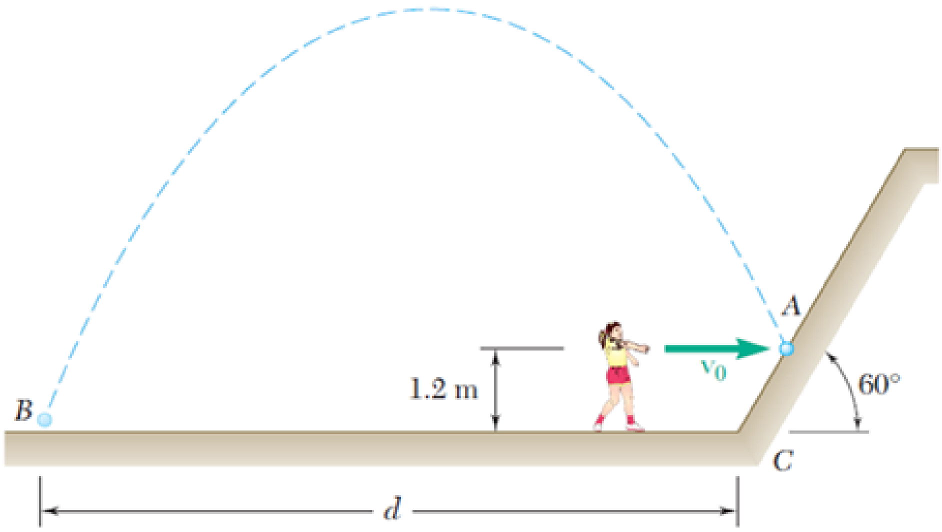
4) A pan of negligible mass is attached to two identical springs of stiffness k = 250 N/m. If a 10-kg box is dropped from a height of 0.5 m above the pan, determine the maximum vertical displacement d. Initially each spring has a tension of 50 N. **(Answer: d=1.34 m)**



5) The triple jump is a track-and-field event in which an athlete gets a running start and tries to leap as far as he can with a hop, step, and jump. Shown in the figure is the initial hop of the athlete. Assuming that he approaches the takeoff line from the left with a horizontal velocity of 10 m/s, remains in contact with the ground for 0.18 s, and takes off at a 50° angle with a velocity of 12 m/s, determine the vertical component of the average impulsive force exerted by the ground on his foot. Give your answer in terms of the weight W of the athlete. **(Answer: 6.21 W)**



6) A girl throws a ball at an inclined wall from a height of 1.2 m, hitting the wall at A with a horizontal velocity v_o of magnitude 15 m/s. Knowing that the coefficient of restitution between the ball and the wall is 0.9 and neglecting friction, determine the distance d from the foot of the wall to the point B where the ball will hit the ground after bouncing off the wall. **(Answer: d=15.94 m)**



HOMEWORK HOURS

Assist. Prof. Zeynep ALEMDAR (GROUP: 1) 07.11.2017 11:00 – 17:00
Assoc. Prof. Murat ALTEKİN (GROUP: 2) 07.11.2017 11:00 – 17:00
⇒ Res. Assist. Yurdakul AYGÖRMEZ Room: 2 – 030

Assist. Prof. Çağrı MOLLAMAHMUTOĞLU (GROUP: 3) 08.11.2017 13:00 – 18:00
Assist. Prof. Yıldırım Serhat ERDOĞAN (GROUP: 4) 08.11.2017 13:00 – 18:00
⇒ Res. Assist. Yurdakul AYGÖRMEZ Room: 2 – 030

NOTE: Homeworks will be delivered by hand.