



جامعة المنصورة

كلية الهندسة

قسم الرياضيات والفيزياء الهندسية

٤١٢

التاريخ: ٢٠١٣/٦/٦

المادة: ميكانيكا هندسية

"الفصل الدراسي الثاني للعام الجامعي ٢٠١٢/٢٠١٣"

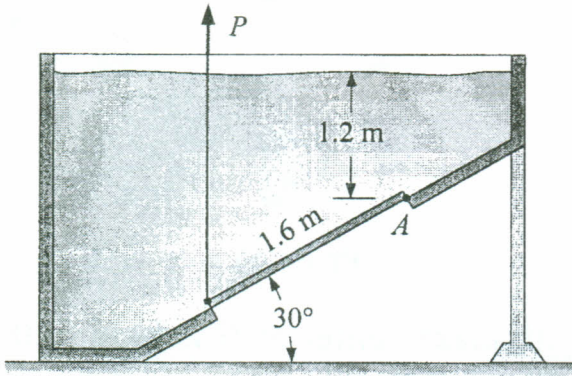
الزمن: ساعتان

(طلبة الفرقة الإعدادية)

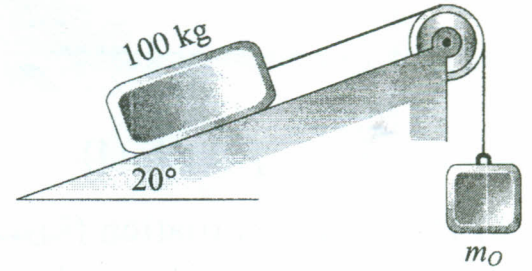
أجب على جميع الأسئلة - الامتحان في صفتين

- 1] The cross section of a fresh-water tank with a slanted (مائل) bottom is shown. A rectangular door 1.6 m by 0.8 m (normal to the plane of the figure) in the bottom of the tank is hinged at  $A$  and is opened against the pressure of the water by the cable under a tension  $P$  as shown. Calculate  $P$ . (density of water =  $1.0 \text{ Mg/m}^3$ )

[12 Degree]



Prob. (1)



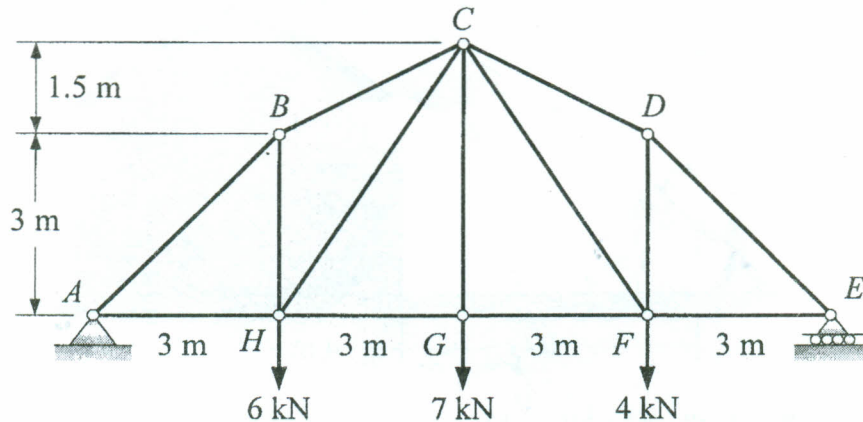
Prob.(2)

- 2] Determine the range of values which the mass  $m_0$  may have so that the 100-kg block shown in the figure will remain in equilibrium (neither start moving up the plane nor slip down the plane). The coefficient of static friction for the contact surfaces is 0.30.

[12 Degree]

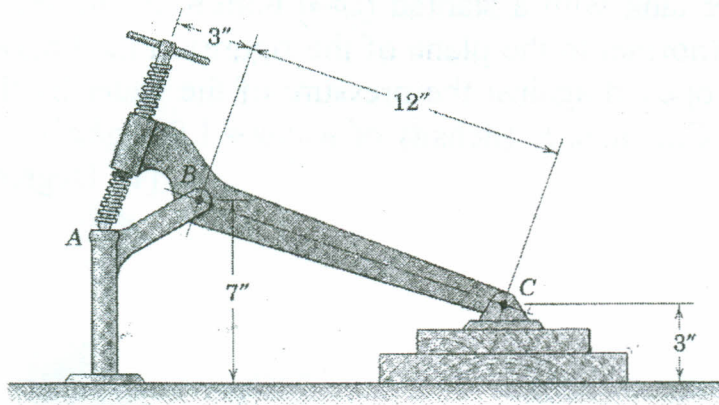
- 3] Determine the force in members  $HC$ ,  $BC$ , and  $GF$  of the truss and state if the members are in tension or compression.

[12 Degree]

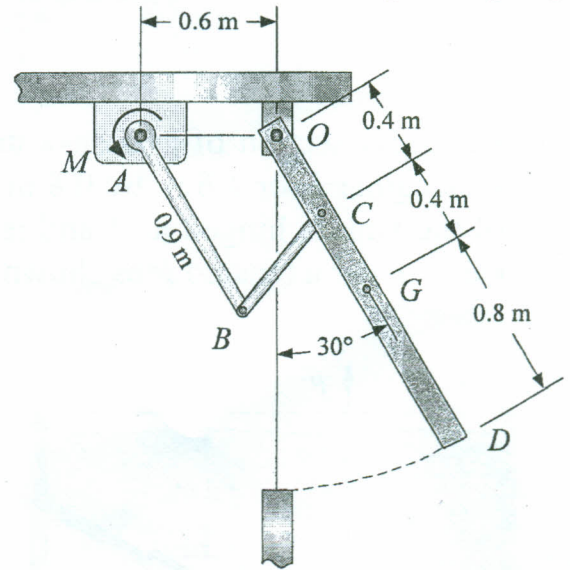


----- أقلب الورقة من فضلك -----

- 4] The bench hold-down clamp is being used to clamp two boards (لوحين خشب) together while they are being glued (مطالين بمادة لاصقة "غراء"). What torque  $M$  must be applied to the screw in order to produce a 200-lb compression between the boards?. The  $\frac{1}{2}$  inch diameter single-thread screw has a pitch of  $\frac{1}{12}$  inch, and the coefficient of friction in the threads may be taken to be 0.20. Neglect any friction in the small ball contact at  $A$  and assume that the contact force at  $A$  is directed along the axis of the screw. What torque  $M'$  is required to loosen the clamp? [12 Degree]

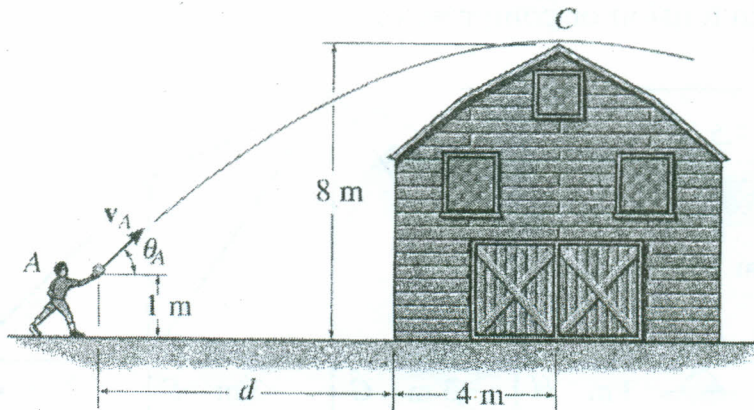


Prob. (4)



Prob.(5)

- 5] The 80-kg ventilation (تهوية) door  $OD$  with mass center at  $G$  is held in the open position shown by means of a moment  $M$  applied at  $A$  to the opening linkage. Member  $AB$  is parallel to the door for the  $30^\circ$  position shown, determine  $M$ . [12 Degree]
- 6] The boy at  $A$  attempts to throw a ball over the roof of a barn (حظيرة) such that it is launched at an angle  $\theta_A = 40^\circ$ . Determine the minimum speed  $v_A$  at which he must throw the ball so that it reaches its maximum height at  $C$ . Also, find the distance  $d$  where the boy must stand so that he can make the throw. [12 Degree]



مع أطيب الأمنيات بالنجاح والتوفيق،