College of Industrial Technology

King Mongkut's University of Technology North Bangkok

เลขที่นั่งสอบ

Final Examination of Semester 1 **Year:** 2017

Subject: 392131 Physics I **Section:** 15-18

Date: 29 November 2017 **Time:** 10:00-12:00

Name:_____ ID:_____ Class:_____

No.	SCORE
1	
2	
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Total	

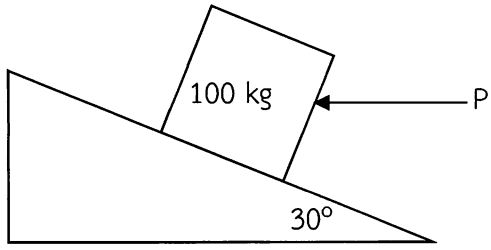
Instructions:

1. The examination has 8 pages (including this page) and a total score of 65 points.
2. Write all your solutions and answers on this examination sheet.
3. This is a closed book examination.
4. You are not allowed to leave the exam room during the first 1 hour after the beginning of the exam.
5. You are not allowed to open the exam papers or start to answer before the proctor's permission.
6. You are not allowed to use the restroom during the exam except in case of an emergency.
7. No documents are allowed to be taken out of the examination room.
8. Calculators are **NOT** allowed in the examination.
9. Electronic communication devices are **NOT** allowed in the examination room.
10. If not specified otherwise, used these values: g = 10 m/s^2, π = 3.14.

1. A 50 kg box sits on an incline of 37^0 The coefficient of kinetic friction between box and incline is 0.1. Find the acceleration of the box down the incline. (3 marks)

2. How much tension must a rope withstand if it is used to accelerate an object 1,200 kg vertically upward at 2 m/s^2 (3 points)

3. From the figure in below, find magnitude and direction of friction force act on the mass 100 kg when P = $400\sqrt{3}$ N Given the coefficient of static friction is 0.2 and the coefficient of kinetic friction is 0.15 (6 marks)



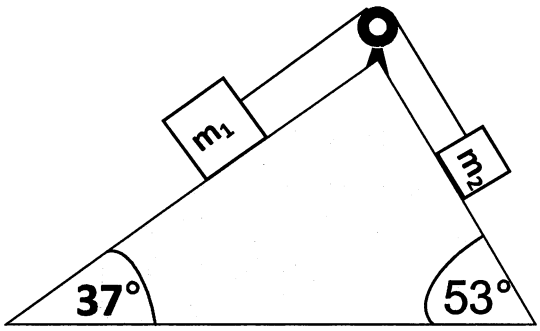
4. Two boxes are connected via a cord of negligible mass. The pulley is frictionless and has negligible mass. If m_1 = 3 kg and m_2 = 2 kg, find a solution of these following questions.

a) Draw a free-body diagram (FBD) if a system remains stationary. (2 marks)

b) Find a magnitude of static friction force of each surface. (3 marks)

c) Find an acceleration of the system if both surfaces are frictionless surface. (2 marks)

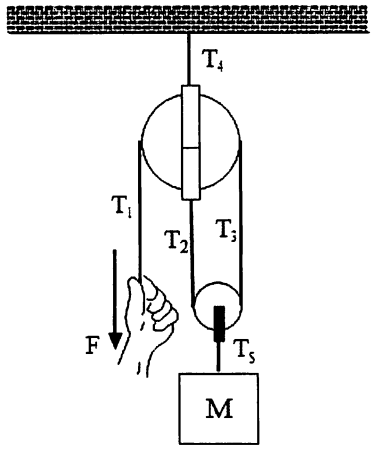
d) If a = 0.2 m/s^2, find a coefficient of kinetic friction force of each surface. (3 marks)



5. A mass M = 20 kg is held in place by an applied force F and a pulley system as shown in Figure below. The pulleys are massless and frictionless. Find

a) the tension in each section of rope, T_1, T_2, T_3, T_4, and T_5 (5 marks)

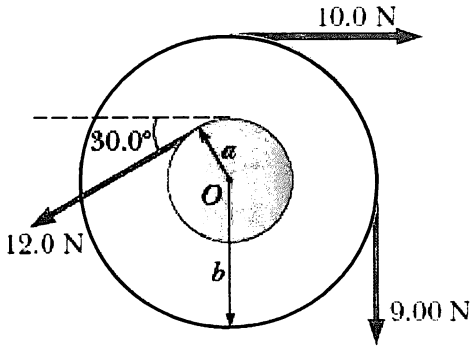
b) the magnitude of F (1 marks)



6. If the acceleration of gravity near the surface of earth is g_E. **Show that** the acceleration of gravity (g_H) at a distance H far from the surface of the earth is $g_H = \left(\frac{R_E}{R_E + H}\right) g_E$.

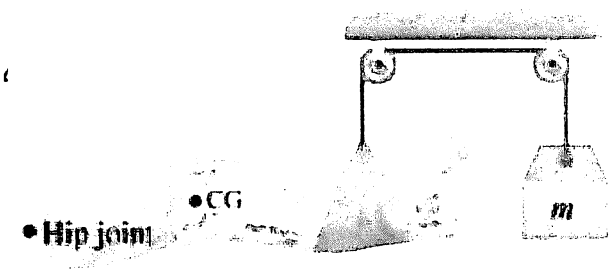
Given the radius of the earth is R_E. (4 marks)

7. Find the net torque on the wheel in Figure about the axle through O perpendicular to the page, taking a = 10.0 cm and b = 20.0 cm (3 marks)



8. What are the two conditions of static equilibrium? (2 marks)

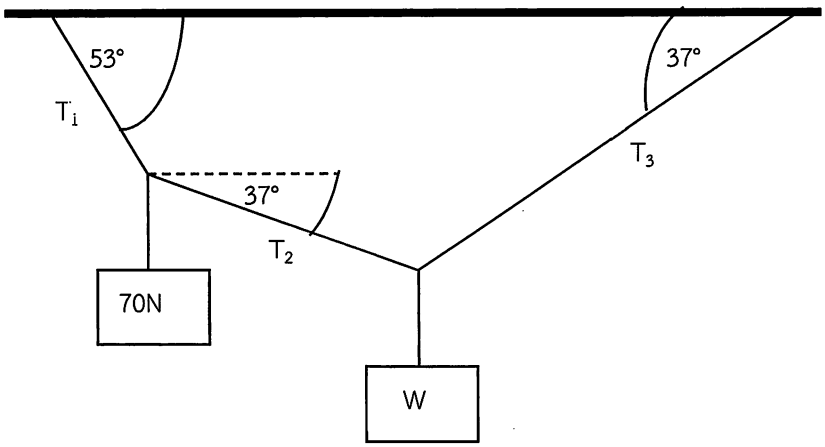
9. Calculate the mass *m* needed in order to suspend the leg shown in the figure. Assume the leg (with cast) has a mass of 15.0 kg, and its CG is 40.0 cm from the hip joint: the sling is 80 cm from the hip joint. (3 marks)



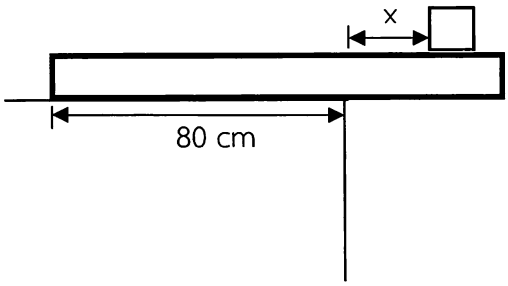
10. From figure below, Find

a) T_1 and T_2 (4 marks)

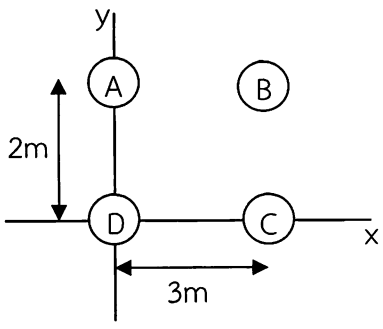
b) T_3 and W (4 marks)



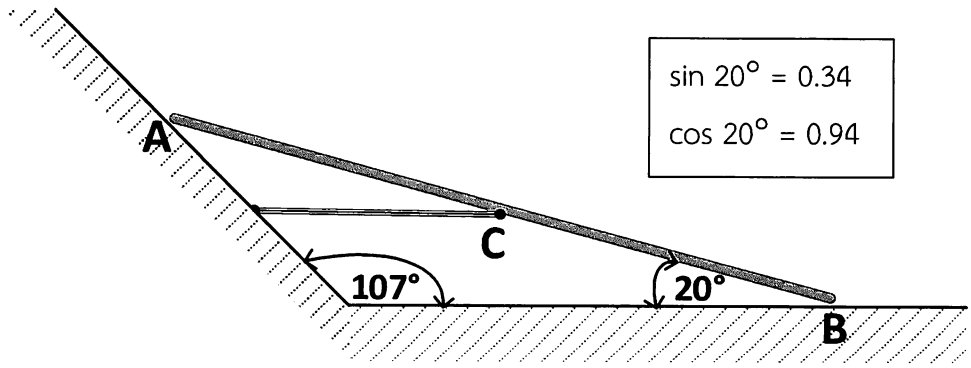
11. Uniform wood plate is mass 10 kg and length 1 m Place on the smooth table show in the figure. What is the maximum distance from the table can place mass 30 kg on the uniform wood by wood plate do not fall from the table? (3 marks)



12. Fours mass A, B, C and D are 1, 2, 3, and 4 kg respectively. Place in x-y axis shown in the figure. Find the coordinate of the center of mass of this system. (4 marks)



13. From figure as shown below, if the breaking strength of the horizontal cable attached at C is 15 kN Uniform bar lengths 2.4 m and AC=CB The end of the bar touches the wall at point A and the floor at point B as shown. If both surfaces are frictionless surface, find the



solution as following questions.

a) Draw a free-body diagram (FBD) of the bar, which is balanced by the cable. (3 marks)

b) The reaction force of the wall exerts on the bar at point A. (2 marks)

c) The reaction force of the floor exerts on the bar at point B. (2 marks)

d) The weight of the heaviest uniform bar that can be supported in the position as shown in the figure. (3 marks)

Instructor team

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