Prince Sultan University

Deanship of Educational Services
Department of Mathematics
and General Sciences

جامعة الامير سلطان
PRINCE SULTAN
U N I V E R S I T Y
1998

COURSE DETAILS:

PHYSICS I	PHY105	MAJOR EXAM II
Semester:	Fall Semester --Term 181	
Date:	Monday, November 26, 2018	
Time Allowed:	60 minutes	

STUDENT DETAILS:

Student Name:	
Student ID Number:	
Section:	532, 535, 538, 541,
Instructor's Name:	Circle the name of your Instructor: Dr. Muaffaq Nofal, Dr. Hazem Abu-Farsakh, Dr. Asif zaidi

INSTRUCTIONS:

- You may use a scientific calculator that does not have programming or graphing capabilities. NO borrowing calculators.
- NO talking or looking around during the examination.
- NO mobile phones. If your mobile is seen or heard, your exam will be taken immediately.
- Show all your work and be organized.
- You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.

GRADING:

	Page 1	Page 2	Page 3	Total
Questions				
Marks	9	3	3	15

Use |g|=9.8 m/s^2: Please read each question carefully then please circle◯ the correct answer.

1) Three boxes of equal mass, m, are connected to one another by strings as shown in the figure. They are pulled across a frictionless surface by tension T_1. Which one of the three boxes has the highest net force?

|		
a) Box1	b) Box2	c) Box3

d) all the same
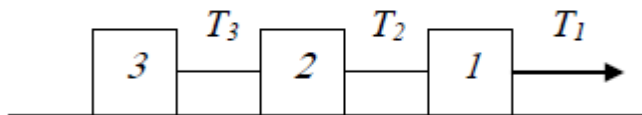
2) A 2 kg block is placed on a rough inclined plane ($\theta = 20°$) with friction coefficients $\mu_s = 0.6$ and $\mu_k = 0.3$. Find the frictional force (in N) acting on the block.
a) 16.57 N   b) 10.05 N   c) 6.70 N   d) 11.04 N

3) A 0.7 kg ball is hanged from the ceiling and held at an angle $\theta = 63.4°$ from the vertical by a horizontal force F as shown. What is the magnitude of the force F?
a) 17.6 N
b) 4.4 N
c) 13.7 N
d) 3.4 N
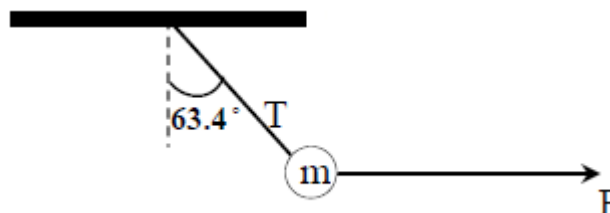
4) Two forces $\vec{F_1} = 22\hat{x} + 67\hat{y}$ N and $\vec{F_2} = 8\hat{x} - 7\hat{y}$ N are acting on a 12 kg object. What is the magnitude of the resulting acceleration of the object?
a) 13.4 m/s^2 b) 5.6 m/s^2 c) 18.0 m/s^2 d) 7.5 m/s^2

5) A force F_1 is used to stretch a spring of spring constant 12000 N/m by 2 cm. Then another force F_2 is used to stretch the spring by additional 5 cm. What amount of work is done by F_2 ?
a) 18 J   b) 3.6 J   c) 5.4 J   d) 27 J

6) The apparent weight of a 65 kg man in an elevator with a downward acceleration of 3.8 m/s^2 is:
a) 637 N   b) 390 N   c) 884 N   d) 2420.6 N

7) A player stops a ball of mass 0.4 kg moving initially at 20 m/s. The work done by player in stopping the ball is,
a) -80 J   b) 80 J   c) -270 J   d) 270 J

8) A particle moving horizontally along the x-axis is acted upon by a variable horizontal force F of magnitude varying with position as shown in the figure. If the particle travels from x=3m to x=6m during 2.5 seconds, what is the average power of the force during this time?

a) 2.5 watt   b) 6 watt

c) 1.5 watt   d) 8 watt
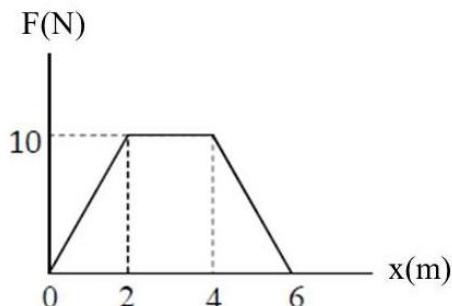
9) Which of the following statements is **TRUE**:
a) The work done by gravity is always zero.
b) The action and reaction forces act on the same objects.
c) For every action there is a reaction equal in magnitude but opposite in direction.
d) The mass of an object on the earth is different than its mass on the moon.

Part 2: Solve the following two problems in the space provided in between showing all your steps (3 marks each)

Problem 1: Block A of mass 12 kg and block B of mass 3 kg are placed on two different inclined planes and connected by a rope that pass through a frictionless pulley as shown. Both rope and pulley have negligible mass and both surfaces are frictionless.
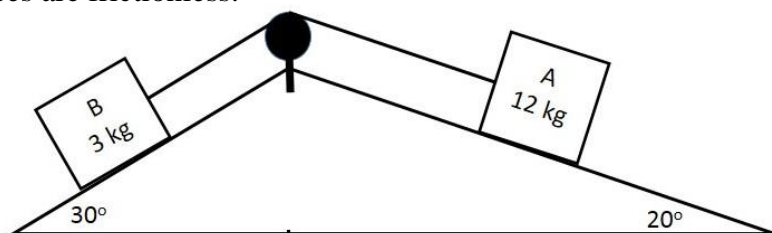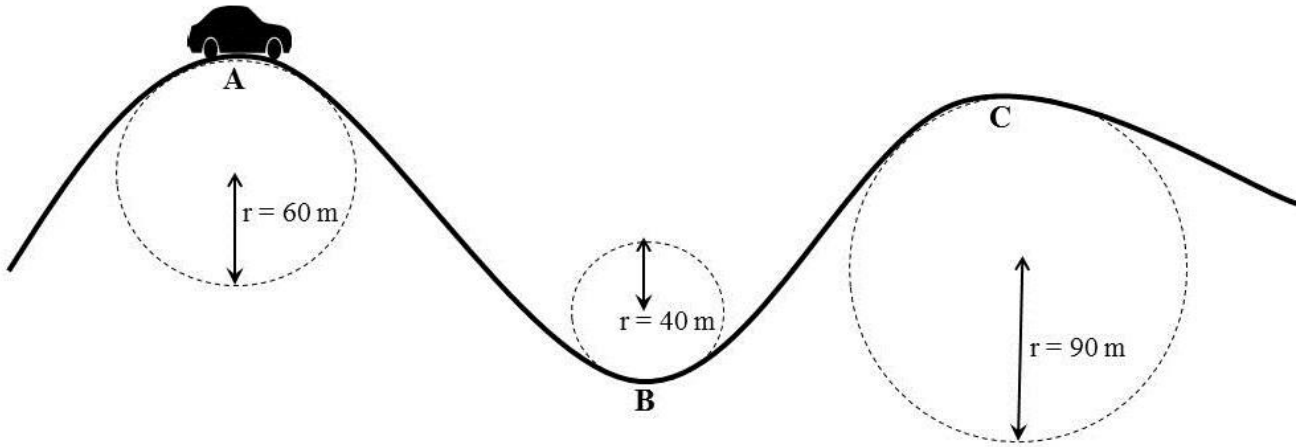

a) (1 mark) What is the normal force acting on object A?

b) (1 mark) What is the acceleration of object B?

c) (1 mark) What is the tension in the connecting rope?

Problem 2: A 1300 kg car is moving along the shown road.

a) (1 mark) What is the speed of the car at point A if the road provides the car with a normal support force of 9000 N at that point?

b) (1 mark) If the car is moving at a speed of 22 m/s at point B, what is the normal support force on the car at that point?

c) (1 mark) Determine the maximum speed that the car can have while moving over point C without losing contact with the road.

Scratch paper