Prince Sultan University

Department of Mathematics & Physics

PHY 105- General Physics 1

Second Exam

First Semester, Term 171

Monday 11/December/2017

Examination Time : 60 minutes

Name: .....

Student I.D. .....

Circle your Section

279	282	285	654
8 – 9:15	9 – 9:50	1 – 2:15	10 – 10:50
Dr. Muaffaq Nofal	Dr. Muaffaq Nofal	Dr. Muaffaq Nofal	Dr. Hazim abu Farsakh

Use the magnitude of the acceleration of gravity = 9.8 m/s^2

Important Instructions:

1. You can use a scientific calculator that does not have programming or graphing capabilities.
*2. You may **NOT** borrow a **calculator** from anyone.*
*3. Do not use **RED pen**.*
*4. This is a closed books and notes exam. Do **NOT** use notes or textbooks.*
*5. There should be **NO** talking during the examination.*
*6. Your will be **expelled** immediately from the exam if your mobile phone is seen or heard.*
*7. Any signs of **cheating** may cause you being expelled from the exam.*
*8. This examination has **3 parts**. **Part 1** has **6 multiple choice questions**, each question worth **0.5 point**. **Part 2** has **4 multiple choice questions**, each question worth **1 point. Part3** has **two workout problems** each problem worth **4 points**.*

Make sure your paper has all the questions and problems.

Part 1: 6 Multiple Choice Questions (0.5 mark each)

1) Which of Newton's laws best explains why drivers should use the seat belt?

a) The first law. b) The second law.
c) The third law. d) The law of gravitation.

2) A huge heavy truck hits a small car in an accident and causes a large damage to the small car. During the accident,

a) the force on the truck is greater than the force on the car.
b) the force on the truck is equal to the force on the car.
c) the force on the truck is smaller than the force on the car.
d) the truck did not slow down during the collision.

3) Mass and weight

a) both measure the same thing. b) are exactly equal in value.
c) are two different quantities. d) are both measured in kilograms.

4) A block of mass m slides down a frictionless plane inclined at an angle θ with the horizontal. The normal force exerted by the plane on the block is

a) mg. b) mg sin θ. c) mg cos θ. d) zero.

5) A 90 kg cyclist goes round a circular track of radius 12 m at a constant speed of 8 m/s. What is the net force acting on the cyclist?

a) 28 N b) 168 N c) 5.33 N d) 480 N

6) Suppose that the radius of curvature of a given racing road is 60 m. If the road is frictionless and banked such that a car with maximum speed of 13 m/s can make the turn without sliding out, what is the banking angle of this curve?

a) 1.5^o b) 25.3^o c) 1.2^o d) 16^o

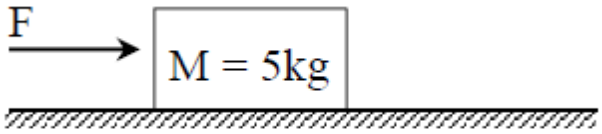
Part 2: 4 Multiple Choice Questions (1 mark each)

1) The actual weight of a man is 1000 N. If his apparent weight while standing in a moving elevator is 800 N. What is the magnitude and direction of the elevator's acceleration?

a) 1.96 m/s^2 upward b) 1.96 m/s^2 downward

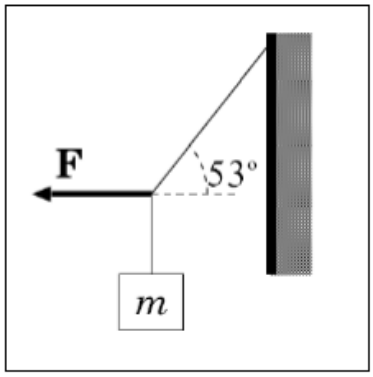
c) 2.94 m/s^2 upward d) 2.94 m/s^2 downward

2) In the shown figure, the horizontal surface on which the object slides is rough and the coefficient of kinetic friction between the object and the surface is 0.3. If the object is moving to the right with constant acceleration of 2 m/s^2, determine the pushing force F.



a) 29.6 N b) 9.6 N c) 4.7 N d) 24.7 N

3) For the system shown in the figure, m = 4 kg. If the system is in equilibrium, find the magnitude of the horizontal force F .



a) 91.0 N

b) 51.7 N

c) 29.5 N

d) 52 N

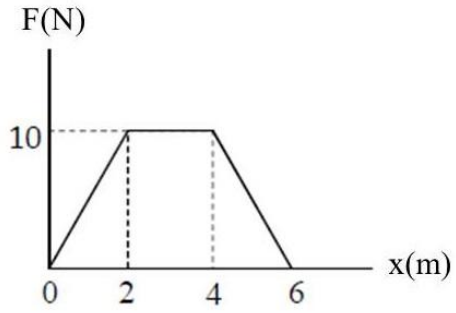
4) A particle moving horizontally along the x-axis is acted upon by a horizontal force F of magnitude varying with position as shown in the figure. If the particle travels from x=0 to x=4 during 5 seconds, what is the average power of the force during this time?

a) 6 watt

b) 8 watt

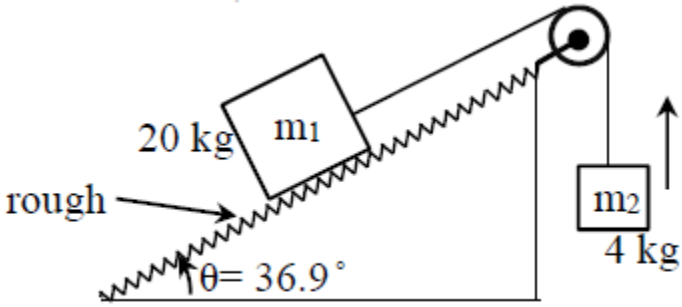
c) 1.5 watt

d) 2 watt



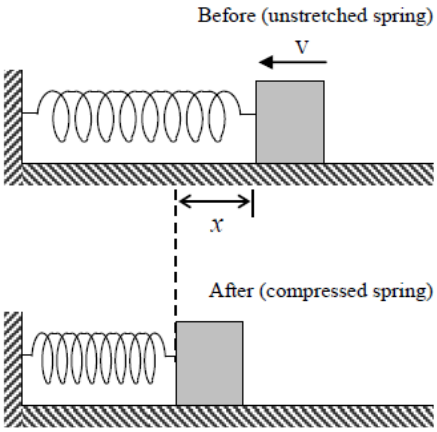
Part 3: Solve the following two problems in the space provided in between showing all your steps (4 marks each)

Problem 1: (4 marks) Two masses of 20 kg and 4 kg are attached to a light rope passing over a frictionless, massless pulley, as shown in the figure. The coefficient of kinetic friction between the 20 kg mass and the incline is 0.2 and $\theta=36.9^\circ$. If the two masses are released from rest, find the acceleration of the two masses and the tension in the connecting rope. (The direction of motion is indicated by the arrow on the graph)



Problem 2: A 4 kg block attached to a spring and resting on a **rough** surface is given an initial velocity of 3 m/s. The spring constant k = 150 N/m and the spring is initially not stretched. The maximum compression of the spring is x = 0.4 m.

a) (1 mark) How much total work is done on the block during this 0.4 m compression?



b) (1 mark) How much work is done by the spring on the block during this 0.4 m compression?

c) (1 mark) How much work is done by gravity on the block during this 0.4 m compression?

d) (1 mark) What is the coefficient of kinetic friction between the block and the surface?

Scratch paper