Prince Sultan University

Department of Mathematics and General Sciences

Physics I (PHY105)

Second Major Exam

Term 142

Date: Saturday 25/4/2015

Name:

Student ID #:

Section # or time: (indicate)

139 (Sun/Tues/Thurs 8-9)	**136** (Sun/Tues/Thurs 9-10)	**138** (Mon/Wedn 8-9:15)

Instructor's name: Dr. Hazem

Instructions:

1. Examination time: **60 minutes**
2. Write your name and indicate your section before starting with the questions.
3. **Turn off your phone** and put any books and notes away.
4. Check that you have **5 pages** in total.
5. You may use a calculator but you may not borrow one.
6. Assume the acceleration of gravity $\boldsymbol{g = 9.8\ m/s^2}$.

Good luck!

	Mark
Part 1	
Part 2	
Total	

Part 1 (10 points total):

Indicate the answer choice that best completes the statement or answers the question

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Q1. You ride on an elevator that is moving with a downward acceleration while standing on a bathroom scale. The reading of the scale is

a) less than your actual weight
b) more than your actual weight
c) equal to your actual weight
d) it depends on the direction of the velocity

Q2. If we know an object is moving at constant velocity, we may assume:

a) the net force acting on the object is zero
b) there is no friction acting on the object
c) the object is accelerating
d) the object is moving in a closed path

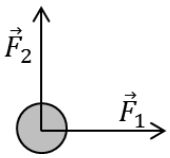
Q3. Which of the following is a vector quantity?

a) work
b) kinetic energy
c) position
d) all of the above

Q4. As a player kicks a ball it starts to move as a projectile with an initial speed of 30 m/s. If its speed at the maximum height of its path is 24 m/s, what is the maximum height it reaches? (Ignore air resistance)

a) 16.5 m
b) 98 m
c) 20 m
d) 25.5 m

Q5. Two perpendicular equal forces $F_1 = F_2 = 2$ N act on rock in free space, as shown. What is the magnitude of the net force on rock?



a) $2\sqrt{3}$ N
b) $6\sqrt{2}$ N
c) $3\sqrt{2}$ N
d) $2\sqrt{2}$ N

Q6. Which of the following is a unit of energy?

a) N.s
b) kg.m^2/s^2
c) J/s
d) kg/m.s

Q7. As a 5 kg bucket is being lowered into a deep well, the tension in the used rope is 34 N. The acceleration of the bucket will be:

a) 15 m/s^2
b) 6 m/s^2
c) 5 m/s^2
d) 3 m/s^2

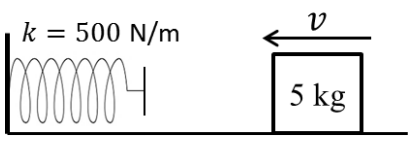
Q8. The speed of a 2 kg object is decreased from 10 m/s to 9 m/s. What is the net work done on the object?

a) -19 J
b) -96 J
c) 16 J
d) 48 J

Q9. A 20 kg suitcase is pulled on a level floor by a 25 N force at an angle of $60°$ above the horizontal. What is the magnitude of the normal force acting on the suitcase?

a) 183 N
b) 147 N
c) 196 N
d) 174 N

Q10. A 5 kg block is moving at $v = 3$ m/s along a frictionless, horizontal surface toward a spring with force constant of $k = 500$ N/m attached to a wall, as in the figure. What is the maximum compression of the spring?



a) 0.4 m
b) 0.1 m
c) 0.3 m
d) 0.6 m

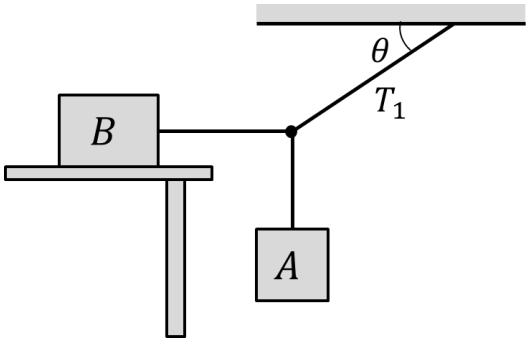
Part 2 (5 points total):

Solve the following two problems in the provided space. **Show your solution** in detail and include units.

Q1. (2 pts) Block B is placed on a rough table and attached to block A as shown the figure. The two blocks are in equilibrium but block B is about to slide. The mass of block A is $m_A = 2$ kg, the mass of block B is $m_B = 5$ kg, and the angle $\theta = 30°$. Calculate:

a) The tension T_1 in the upper string

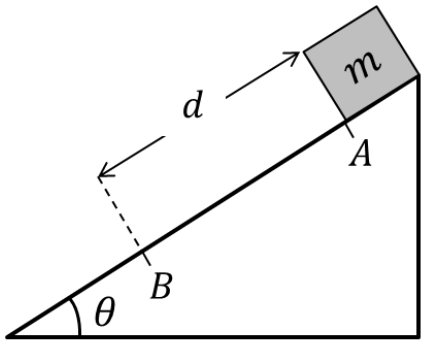
b) The coefficient of static friction between block B and the table.



Q2. (3 pts) A block of mass $\mathrm{m} = 2$ kg starts at point A from rest to slide down a rough surface inclined at $\theta = 53°$, as shown. It reaches point B with a speed of 3 m/s after traveling a distance $\mathrm{d} = 1.5$ m on the incline. Using the mechanical energy, calculate:

a) The work done by friction on the block

b) The coefficient of kinetic friction between the block and the surface



Scratch sheet

Name: