



Prince Sultan University
Department of Mathematics & Physics
PHY 105- General Physics 1
Second Exam
First Semester, Term 151
Tuesday 24/11/2015
Examination Time : 60 minutes

Name

Student I.D.

Section:

Use $g = -9.8 \text{ m/s}^2$

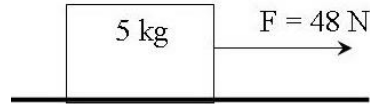
Important Instructions:

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 **2 parts**. **Part 1** has **9 multiple choice questions**, each question worth **1 point**. **Part 2** has **two workout problems** each problem worth **3 points**.

Make sure your paper has all the questions and problems.

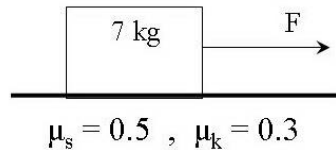
Part 1: 9 Multiple Choice Questions (1 mark each)

1- A 5 kg block is moving on a rough horizontal surface under the effect of a 48 N horizontal force as shown. If the block started to move from rest and covered 27 m in the first 3 seconds, find the force of friction acting on the block.



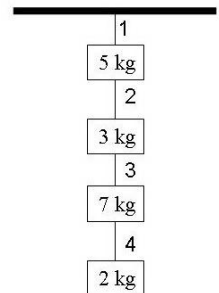
- a) 18 N b) 8 N c) 28 N d) 38 N

2- The 7 kg block shown was initially at rest when a force $F = 28.53 \text{ N}$ started to push on it, what is the force of friction acting on the block?



- a) 34.3 N b) 20.58 N c) 28.53 N d) 54.88 N

3- Four objects are hanged as shown. What is the tension in string 3?



- a) 88.2 N b) 166.6 N c) 19.6 N d) 117.6 N

4- Two identical objects attract each other with a force of 4×10^{-5} N when they are 5 m apart. What is the mass of each? ($G = 6.67 \times 10^{-11}$ N.m²/kg²)

- a) 2323 kg b) 3872 kg c) 6195 kg d) 7744 kg

5- 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 5 kg object. What is the resulting acceleration (in m/s²) of the object?

- a) $3\hat{x}+6\hat{y}$ b) $5\hat{x}+10\hat{y}$ c) $6\hat{x}+12\hat{y}$ d) $15\hat{x}+30\hat{y}$

6- Which of the following statements is **NOT** true:

- a) The coefficient of static friction is always larger than the coefficient of kinetic friction.
- b) For every action there is a reaction equal in magnitude but opposite in direction.
- c) The action and reaction forces act on two different objects.
- d) The mass of an object on the earth is different than its mass on the moon.

7- A 5 kg block is pulled 8 m over a horizontal surface by a horizontal force. If the coefficient of kinetic friction between the block and the surface is 0.5, how much work is done by friction during this motion?

- a) -196 J
- b) -156.8 J
- c) -39.2 J
- d) -78.4 J

8- Which of the following statements is **NOT** true?

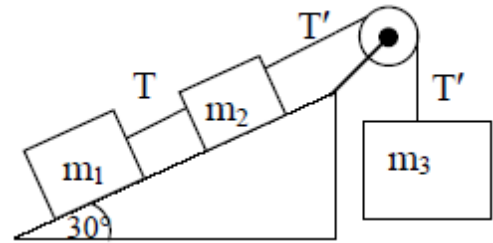
- a) Work may be a positive quantity or a negative quantity.
- b) Work is a vector quantity.
- c) The work done by gravity is not always zero.
- d) Work is measured in Joule.

9) How much power is required to increase the speed of a 1400 kg car from 8 m/s to 19 m/s in 5 seconds?

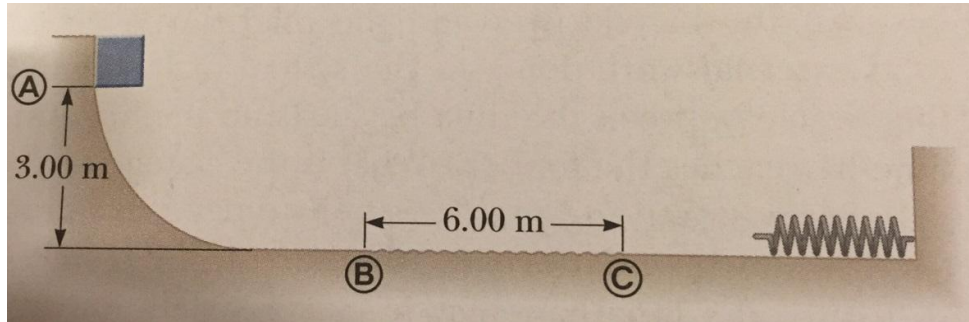
- a) 41580 Watt
- b) 1540 Watt
- c) 83160 Watt
- d) 20790 Watt

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

Problem 1: A system of three blocks is connected by massless strings as shown in the figure. If $m_1 = 6$ kg, $m_2 = 4$ kg, $m_3 = 10$ kg and the coefficient of kinetic friction between the incline and blocks (m_1 and m_2) is 0.3, find the acceleration of the system and the tension in the string connecting m_1 and m_2 . (the pulley is massless and frictionless)



Problem 2: A 10 kg block is released from rest at point A in the figure. The track is frictionless except for the portion between point B and point C, which has a length of 6 m. The block travels down the track, hits a spring of force constant 2250 N/m, and compresses it by 0.3 m from its equilibrium position before coming to rest momentarily. Determine the coefficient of kinetic friction between the block and the rough surface between points B and C.



Scratch paper