Mock Exam #2 Answer Sheet

Please write all responses (and show all work) on this answer sheet. Nothing you write on the exam itself will be graded.

Multiple Choice Problems are worth 4 points each.

1. a b c d

2. a b c d

3. a b c d e

4. a b c d e

5. a b c d e

Short Answer questions are worth 5 points. Please show all of your work, and clearly designate your answer. Partial credit may be given.

6:

7:

8:

9:

Long Answer Problem is worth 10 points. Please show your work, and clearly designate your answer. Partial credit may be given.

10:

PHYSICS 2010 Mock Exam #2

Professor Chisholm

Real Exam #2 on Thursday, Oct. 7th

- You are allowed the use of **one** 3"x5" note card with inscriptions of his choosing.
- You are allowed the use of a free-standing calculator.
- Clearly designate all answers on the **answer sheet.** You may write on the back, but if your answer(s) appear(s) there, please indicate that.
- You may write on this exam copy, but nothing on it will be graded.
- All books, notes, cell phones, cameras, and other such devices are to be securely stowed away.
- Exam is out of 50 points, and there are 50 minutes for the exam. Pace appropriately.

Magnitude of acceleration due to gravity: g=9.80 m/s^2
Standard Density of air: ρ=1.22 kg/m^3

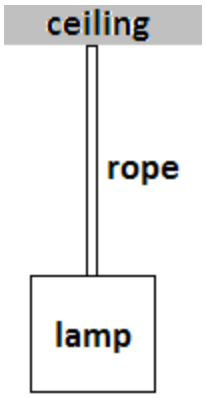
Multiple Choice Problems are worth 4 points each. Clearly designate your answers on the **answer sheet.** Don't circle it here -- it won't be graded.

1. You throw an object straight upward. If you do not neglect air resistance, which of the following is true of the object's acceleration (a_y) while it is in the air? (take up to be the positive direction)

- **a.** a_y<0 throughout, but has different values on the way up compared with the way down.
- **b.** a_y <0 and constant.
- **c.** a_y >0 on the way up and a_y<0 on the way down.
- **d.** a_y =0 at the top of the trajectory.

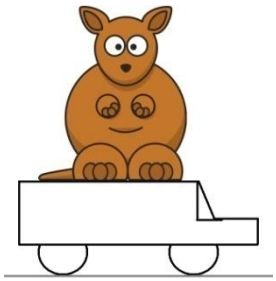
2. In the figure below, the rope has a mass of 500 g and the lamp has a mass of 2 kg. Which of the following is true of the magnitudes of the forces involved?

- **a.** The force on the rope from the ceiling is less than the force on the lamp from the rope.
- **b.** The force on the rope from the ceiling is greater than the force on the lamp from the rope.
- **c.** The force on the rope from the ceiling is equal to the force on the lamp from the rope.
- **d.** Cannot compare those forces without knowing the mass of the ceiling.



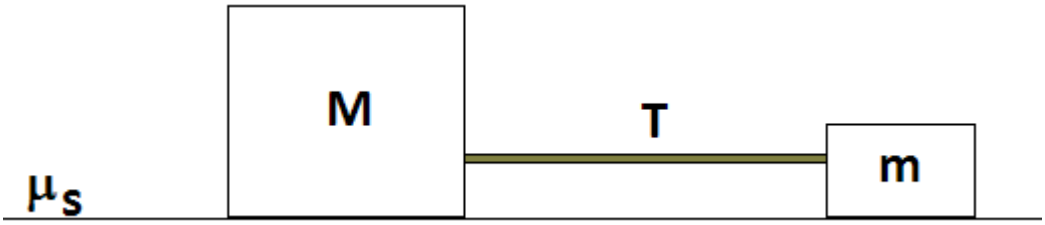
3. A kangaroo stands on top of the flat roof of a car. Which of the following do not form a Newton's 3rd Law pair?

- **a.** The weight of the kangaroo and the force of the kangaroo on the Earth.
- **b.** The normal force on the kangaroo from the car and the force on the car from the kangaroo.
- **c.** The normal force on the car from the ground and the force on the ground from the car.
- **d.** The normal force on the car from the ground and the force on the car from the kangaroo.
- **e.** All of these are Newton's 3rd Law pairs.



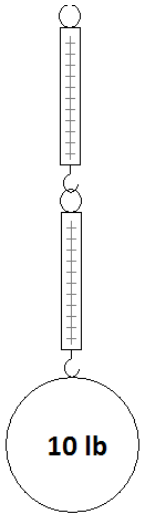
4. Two unequal mass blocks (M>m) rest on a rough horizontal surface (coefficient of static friction μ_S) and are connected by a taut (and massless, inextendible) rope. The maximum tension that the rope can have (before either of the blocks slip) is equal in magnitude to

- **a.** μ_S (m+M)g
- **b.** μ_S Mg
- **c.** μ_S mg
- **d.** μ_S (m+M)g/2
- **e.** zero.



5. In the figure, a 10 lb weight is suspended from two spring scales, each of which has negligible weight. Thus

- **a.** Each scale will read 5 lb.
- **b.** The top scale will read zero, the bottom scale will read 10 lb.
- **c.** The bottom scale will read zero, the top scale will read 10 lb.
- **d.** Each scale will show a reading between 1 and 10 lb, such that the sum of the two readings is 10 lb. However, exact readings cannot be determined without more information.
- **e.** None of these is true.



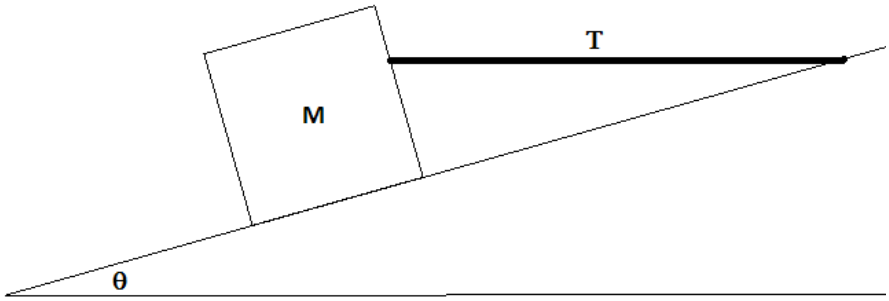
Short Answer questions are worth 5 points. Please show all of your work and clearly designate your answer on his answer sheet. **Partial credit may be given.**

6. What thrust does a 200. g model rocket need in order to have a vertical acceleration of 10.0 m/s^2?

7. A 1500 kg car is traveling along a straight road at 20 m/s. Two seconds later its speed is 21 m/s. What is the magnitude of the net force acting on the car during this time?

8. Your weight is the force of gravity on you from the Earth. From Newton's 3rd Law, you exert a force on the Earth as well. If you are free falling (neglect air resistance, assume your mass is 60. kg; the Earth's mass is 6.0×10^{24} kg), what is the magnitude of the Earth's acceleration?

9. The diagram below shows a block of mass M=19. kg resting on a frictionless ramp (inclined at an angle of θ=17° above the horizontal) being held in place by a horizontal rope. What is the tension T in the rope?



Long Answer Question is worth 10 points. Please show all of your work and clearly designate your answer **on the answer sheet**. Partial credit may be given.

10. Two wooden blocks are connected by a (massless, inextendible) string over a pulley as shown in the diagram. The first block (m_1=100.kg) rests on a horizontal wooden surface (μ_S = 0.50, μ_K = 0.20), while the second block (m_2=2.00 kg) is hanging vertically off of the side of the surface.
    a. Draw Free-Body Diagrams for each of the blocks, indicating any Newton's 3rd Law pairs.
    b. What is the magnitude of the normal force on block **1** from the surface?
    c. What is the magnitude of the tension in the rope?
    d. What is the acceleration (magnitude and direction) of block **1**?
    e. What is the acceleration (magnitude and direction) of block **2**?