EXAM-2

PHYS 201 (Spring 2008), 03/24/08

Name:

Lab-Sect. no.:

Signature:

Duration: 50 minutes
Show all your work for full/partial credit!
Include the correct units in your final answers for full credit!
Unless otherwise stated, quote your results in SI units!

1.) *Multiple Choice* *(25 pts.)*

For each statement below, circle the correct answer (TRUE or FALSE, no reasoning required).

(a) If a car takes a turn on a road without sliding, the static friction force between tires and road acts as a centripetal force.
TRUE FALSE

(b) Since work depends on force and displacement, it is a vector quantity.
TRUE FALSE

(c) The normal force is a nonconservative force.
TRUE FALSE

(d) The acceleration of an object in simple harmonic motion is largest when the object's speed is zero.
TRUE FALSE

(e) When a tennis ball is thrown at a wall and bounces back with the same speed, the impulse on that ball by the wall is zero.
TRUE FALSE

No.	Points
1	
2	
3	
4	
5	
Sum	

2.) *Circular Motion* *(15 pts.)*

Assume the Moon (mass M_M=$7.35 \cdot 10^{22} kg$) to be in a circular orbit around Earth (mass M_E=$6 \cdot 10^{24} kg$) at a distance of $384000 km$. Calculate the period of the Moon's revolution around Earth (in days).

3.) *Mechanical Energy and Nonconservative Work* *(20 pts.)*

A skier starts from the top of a 8 m high hill. With an initial speed of $1.5m/s$ he glides down the frictionless slope to the bottom.

(a) What is the skier's speed at the bottom?

(b) At the bottom, he encounters a rough horizontal ice patch of length $12m$. The kinetic friction coefficient between the rough ice and the skies is 0.25. What is the speed of the skier after passing the ice patch?

4.) *Gravitation and Simple Harmonic Motion* *(20 pts.)*

Consider a simple pendulum on the Moon's surface. The Moon's radius and mass are R_M=1740km M_M=7.35$\cdot 10^{22} kg$.

(a) Using Newton's Law of gravitation, calculate the acceleration due to gravity, g_M, on the Moon's surface.

(b) What should be the length of a simple pendulum which has a period of 1s on the Moon's surface?

5.) *2-D Inelastic Collision* *(20 pts.)*

An incoming bowling ball (m_1=$5kg$, v_{i1}=$4m/s$ due East) collides with a billiard ball (m_2=$0.8kg$) initially at rest. After the collision, the bowling ball is deflected by 6 *degrees* North of East, with a final speed of $3.7m/s$. Calculate the speed and direction of motion (the angle South of East) of the billiard ball after the collision.