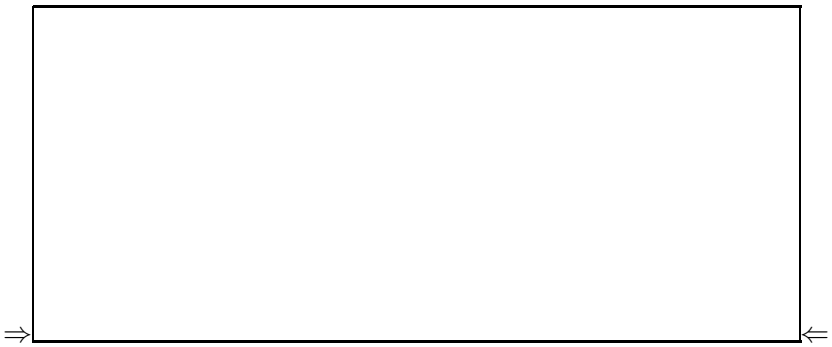
Physics 123 - Analytical Physics
SECOND COMMON HOUR EXAM
Monday, November 8, 2010
Professor R.A. Bartynski



Your name sticker with **exam code. SIGN HERE:**

1. The exam will last from 9:40 - 11:00 p.m. Use a #2 pencil to make entries on the answer sheet. Enter the following ID information now, before the exam starts..
2. In the section labeled NAME (Last, First, M.I.) enter your last name, then fill in the empty circle for a blank, then enter your first name, another blank, and finally your middle initial.
3. Under STUDENT # enter your 9-digit RUID Number.
4. Enter 123 under COURSE, and your section number (see label above) under SEC.
5. Under CODE enter the exam code given above.
6. During the exam, you may use pencils, a calculator, and one 8.5 x 11 inch sheet (both sides) with formulas and notes.
7. There are 15 multiple-choice questions on the exam. For each question, mark only one answer on the answer sheet. There is no deduction of points for an incorrect answer, so even if you cannot work out the answer to a question, you should make an educated guess. **At the end of the exam, hand in the answer sheet and the cover page.** Retain this question paper for future reference and study.
8. When you are asked to open the exam, make sure that your copy contains all 15 questions. Raise your hand if this is not the case, and a proctor will help you. Also raise your hand during the exam if you have a question.
9. Please SIGN the cover sheet under your name sticker and have your student ID ready to show to the proctor during the exam.
10. If needed, the acceleration due to gravity on earth may be take as g = 9.81 m/s^2.

1. A grinding wheel 0.500 m in diameter rotates at a rate of 8.00×10^2 revolutions per minute. Find the magnitude of the acceleration of a speck of metal caught in the outer edge of the wheel.

   a) 3510 m/s^2
   b) 20.9 m/s^2
   c) 8.00×10^2 m/s^2
   d) 1580 m/s^2
   e) 1750 m/s^2

2. A highway curve has a radius of 140 m and is unbanked. A car weighing 12,000 N goes around the curve at a speed of 24 m/s without slipping. What is the magnitude of the horizontal force of the road on the car?

   a) 12,000 N
   b) 17,000 N
   c) 13,000 N
   d) 5,000 N
   e) 49,000 N

3. A 5.0 kg object is suspended by a string(with negligible mass) from the ceiling of an elevator that is accelerating upward at 2.6 m/s^2. What is the tension in the string?

   a) 49 N b) 36 N c) 62 N d) 13 N e) 52 N

4. A boy on the edge of a vertical cliff 20 m high throws a stone horizontally outwards with a speed of 20 m/s. It strikes the ground at what horizontal distance from the foot of the cliff.

   a) 10 m
   b) 40 m
   c) 50 m
   d) 1.1×10^2 m
   e) none of these

5. A mass M = 5.6 kg on a horizontal table is pulled by a horizontal string(with negligible mass) that passes over a frictionless pulley(with negligible mass) to a free-hanging mass m = 3.4 kg. The coefficient of friction between M and the table is 0.28. The acceleration of M is

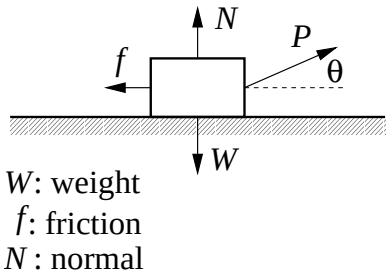
   a) 3.7 m/s^2
   b) 2.0 m/s^2
   c) 2.2 m/s^2
   d) 0.20 m/s^2
   e) 0.49 m/s^2

6. Two forces are applied to a 5.0-kg object, one is 6.0 N to the north and the other is 8.0 N to the west. The magnitude of the acceleration of the object is:

   a) 0.50 m/s^2
   b) 2.0 m/s^2
   c) 2.8 m/s^2
   d) 10 m/s^2
   e) 50 m/s^2

7. A boy pulls a wooden box along a rough horizontal floor at constant speed by means of a force P as shown. Which of the following must be true (f is the magnitude of the force of friction, N is the magnitude of the normal force, and W is the magnitude of the weight):

   a) $P = f$ and $N = W$
   b) $P = f$ and $N > W$
   c) $P > f$ and $N < W$
   d) $P > f$ and $N = W$
   e) none of these



8. A boy on a skate board skates off a horizontal bench at a velocity of 10 m/s. One tenth of a second after he leaves the bench to two significant figures the magnitudes of his velocity and acceleration are(neglect air friction):

a) 10 m/s; 9.8 m/s^2
b) 9.0 m/s; 9.8 m/s^2
c) 9.0 m/s; 9.0 m/s^2
d) 1.0 m/s; 9.0 m/s^2
e) 1.0 m/s; 9.8 m/s^2

9. In order for you to jump off the floor, the floor must exert a force on you

a) in the direction of and equal to your weight.
b) opposite to and equal to your weight.
c) in the direction of and less than your weight.
d) opposite to and less than your weight.
e) opposite to and greater than your weight.

10. A 0.20-kg object attached to the end of a string swings in a vertical circle (radius = 80 cm). At the top of the circle the tension in the string drops to zero instantaneously, but the object continues to travel in a circle. What is the speed of the object at this position?

a) 0.95 m/s
b) 3.6 m/s
c) 2.8 m/s
d) 2.3 m/s
e) 1.7 m/s

11. A 2.5-kg object falls vertically downward in a viscous medium at a constant speed of 2.5 m/s. How much work is done by the viscous force on the object as it falls 80 cm?

a) +2.0 J b) +20 J c) −2.0 J d) −20 J
e) +40 J

12. How much work is done by a person lifting a 2.0-kg object from the bottom of a well at a constant speed of 2.0 m/s for 5.0 s?

a) 0.15 kJ b) 0.20 kJ c) 0.25 kJ d) 0.30 kJ
e) 0.35 kJ

13. Peter is driving east in the right lane of a highway at a speed of 31 m/s. George is in the left lane and driving west at 18 m/s. What is Peter's speed, in m/s, relative to George?

a) 49 West
b) 13 West
c) 49 East
d) 31 East
e) 13 East

14. When a car goes around a circular curve on a level road,

a) no frictional force is needed because the car simply follows the road.
b) the frictional force of the road on the car increases when the car's speed decreases.
c) the frictional force of the road on the car increases when the car's speed increases.
d) the frictional force of the road on the car increases when the car moves to the outside of the circular curve.
e) there is no net frictional force because the road and the car exert equal and opposite forces on each other.

15. A 2.0-kg block slides on a rough horizontal surface. A force (P = 6.0 N) is applied to the block as shown. The magnitude of the block's acceleration is 1.2 m/s^2 to the right. What is the magnitude of the force of friction acting on the block?

a) 2.0 N
b) 1.4 N
c) 1.6 N
d) 2.8 N
e) 3.4 N