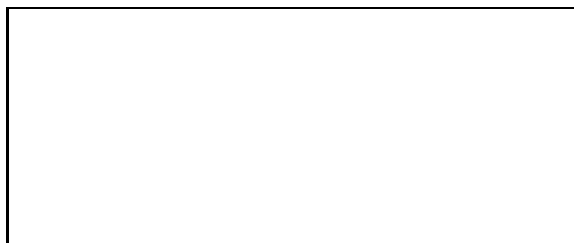


Physics 203– Second Hourly Exam  
November 2, 2006  
Prof. George Horton

Your name sticker  
with exam code

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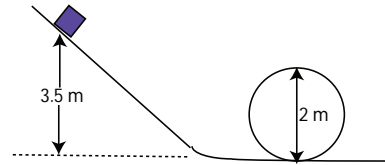


1. The exam will last from 9:40 to 11:00 p.m. Use a #2 pencil to make entries on the answer sheet. Enter the following id information now, before the exam starts.
2. In the section labelled **NAME** (Last, First, M.I.) enter your last name, then fill in the empty circle for a blank, then enter your first name, another blank, and finally your middle initial.
3. Under STUDENT # enter your 9-digit **RUID Number**..
4. Enter 203 under COURSE, and your section number under SEC.
5. Under **CODE** enter the exam code given above.
6. You may bring an 8 1/2" x 11" sheet of paper with notes of your choice and a standard hand calculator.
7. The exam consists of 15 multiple choice questions. For each multiple choice 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. Always select the best answer to each question.
8. Before starting 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. Answers and results will be posted on the 203 website on 11/3/2006.
10. A proctor will check your name sticker and your student ID sometime during the exam. Please have them ready.
11. Please hand in only the cover sheet.
12. If you have questions about the hourly or the grading contact Rafael Greenblatt.

1. A 0.60 kg toy car moving with an initial velocity of 0.15 m/s due East collides with a 0.80 kg toy truck moving with an initial velocity of 0.25 m/s due North. The collision is perfectly inelastic, so that the two toys stick together. What is their final speed.
  - a) 0.16 m/s
  - b) 0.44 m/s
  - c) 0.29 m/s
  - d) 0.22 m/s
  - e) 0.12 m/s
  
2. A roller coaster cart with a mass of 200 kg is at the top of a 30 m hill and is moving with a velocity of 4.0 m/s. The cart dives into a valley whose deepest point is at a height of 10 m and then climbs to the top of a 20 m hill. At the top of the 20 m hill, the cart has a velocity of 10 m/s. How much mechanical energy has been lost to heat?
  - a)  $4.9 \times 10^4$  J
  - b)  $2.0 \times 10^4$  J
  - c)  $2.0 \times 10^3$  J
  - d)  $1.1 \times 10^4$  J
  - e)  $6.0 \times 10^4$  J
  
3. A billiard ball whose mass is 0.38 kg moves at 5.00 m/s in the positive x-direction. It strikes a stationary ball of the same mass. After the collision, the x-component of the first ball's velocity is 3.75 m/s, and the y-component of its velocity is 2.16 m/s. What is the magnitude of the velocity of the struck ball after the collision? (Neglect friction and rotational motion.)
  - a) 1.2 m/s
  - b) 2.2 m/s
  - c) 2.5 m/s
  - d) 5.0 m/s
  - e) 4.3 m/s
  
4. How much torque is required to bring a disk from rest up to the speed of 10 radians/s in 2.0 s? The moment of inertia of the disk is 0.060 kg-m<sup>2</sup>.
  - a) 0.30 N-m
  - b) 0.60 N-m
  - c) 2.0 N-m
  - d) 1.0 N-m
  - e) none of these

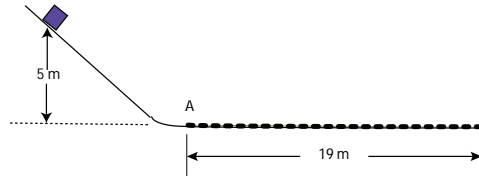
5. A block of mass 5.0 kg slides without friction around a loop-the-loop. If the block is released from rest from a height of 3.5 m, what is its speed at the top of the loop-the-loop which is 2 m high?

- 5.4 m/s
- 29 m/s
- 8.3 m/s
- 73 m/s
- 6.3 m/s



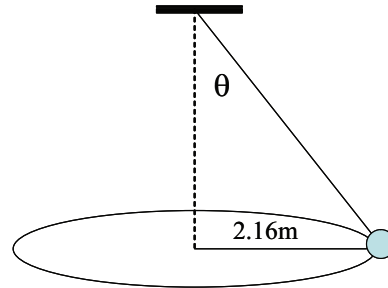
6. A 9.0-kg box of oranges slides from rest down a frictionless incline from a height of 5.0 m (see figure). A constant frictional force, introduced at point A, brings the block to rest at point B, 19 m to the right of point A. What is the coefficient of kinetic friction,  $\mu_k$ , of the surface from A to B?

- 0.11
- 0.33
- 0.52
- 0.26
- 0.47



7. A conical pendulum (see figure) is set in horizontal circular motion about the vertical axis with a constant speed of 6.05 m/s. The radius of the circle is 2.16 m. The angle that the string makes with the vertical axis is:

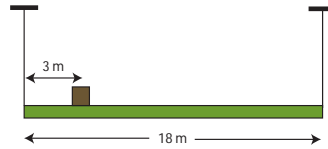
- $48^\circ$
- $80^\circ$
- $71^\circ$
- $75^\circ$
- $60^\circ$



8. A man, with his arms at his sides, is spinning on a light frictionless turntable. When he extends his arms:
- his angular velocity remains the same
  - his moment of inertia decreases
  - his angular velocity increases
  - his angular velocity decreases
  - his rotational kinetic energy increases

9. A 200 N uniform scaffold is held up by a wire at each end. The scaffold is 18 m long. A 650 N box sits 3.0 m from the left end as shown. What is the tension in each wire?

- a. Left wire = 520 N; right wire = 130 N
- b. Left wire = 642 N; right wire = 208 N
- c. Left wire = 195 N; right wire = 975 N
- d. Left wire = 295 N; right wire = 1000 N
- e. Left wire = 395 N; right wire = 800 N



10. Which statement is correct?
- a) In an elastic collision, momentum is conserved but some heat may be produced.
  - b) In an inelastic collision, the total energy is conserved but momentum is not.
  - c) In an elastic collision momentum and mechanical energy are conserved.
  - d) In an inelastic collision, momentum and mechanical energy are conserved.
  - e) In an elastic collision, the total energy is conserved but momentum is not.
11. If a turntable slows from 10 rev/s to 2 rev/s in 20 seconds at constant acceleration, how many revolutions are done during this time?
- a) 120
  - b) 150
  - c) 60
  - d) 100
  - e) 80
12. A solid sphere ( $I = \frac{2}{5}mr^2$ ), a solid disk ( $I = \frac{1}{2}mr^2$ ) and a hoop ( $I = mr^2$ ) are released simultaneously from the top of a frictionless inclined plane. Which answer is the best answer?
- a) The sphere arrives first
  - b) All three arrive at the same time
  - c) The hoop arrives first
  - d) the disk arrives first
  - e) The sphere arrives first but the disk is a close second

13. A mass  $M$  is located at the origin and a second mass  $m$  ( $< M$ ) is located at  $x = 2$ . The center of mass of the two particle system is located
- a) at  $1 < x < 2$
  - b) at  $0 < x < 1$
  - c) along the negative  $x$ -axis
  - d) at  $2 < x < 3$
  - e) at the origin
14. A 1 kg block slides along a horizontal frictionless surface at 2 m/s. It is brought to rest by compressing a long spring of spring constant 200 N/m. The maximum spring compression is:
- a) 0.20 m
  - b) 0.01 m
  - c) 0.03 m
  - d) 0.05 m
  - e) 0.14 m
15. In simple harmonic motion
- a) the amplitude is maximum when the velocity is maximum
  - b) the displacement is minimum when the acceleration is maximum
  - c) the velocity and the acceleration are always in the opposite direction
  - d) the acceleration is minimum when the displacement is minimum
  - e) the force is proportional to the square of the displacement