

Physics 1301, Exam 2 Review

The following is a list of things you should *definitely* know for the exam, however, the list *is not* exhaustive. You are responsible for all the material covered in the assigned readings, lectures, and homework assignments. Note we did not talk about springs, so you are not responsible for that topic for this exam.

- Determine the total force acting on an object.
- Apply Newton's laws of motion to determine the acceleration of an object.
- Solve basic problems concerning objects undergoing centripetal acceleration.
- Determine the work done by a force acting on an object.
- Solve basic problems using conservation of energy.
- Solve basic problems concerning impulse and impulsive forces.
- Solve 1-D momentum conservation problems in cases where an object splits in two, or where the collision is elastic or completely inelastic.
- Solve basic rotational kinematic problems.
- Determine the moment of inertia for a collection of point masses.
- Solve basic problems concerning rotational kinetic energy.

Exam 1 Multiple Choice Problems

Sample

Dr. Andersen

On the scantron sheet provided, *write* and *bubble in* your name. In the *identification number* field, write and bubble in the 7 digits from your student id number from your black cougar 1 card, or from your fee bill (do not try to fill the first two characters, which are letters.) Each of the following multiple choice questions is worth seven points. Mark the correct answer on the scantron sheet provided.

1. A book of mass 2.6 kg is pushed along a smooth surface with a force of 7.8 N. The acceleration of the book is:
 - (a) 0.33 m/s^2 .
 - (b) 3.0 m/s^2 .
 - (c) 6.8 m/s^2 .
 - (d) 9.8 m/s^2 .
 - (e) $20. \text{ m/s}^2$.
2. A ball of mass 0.40 kg attached to a string of length 0.75 m is swung in a circle at a constant speed of 5.0 m/s. The centripetal acceleration of the ball is:
 - (a) 0 m/s^2 .
 - (b) 0.11 m/s^2 .
 - (c) 0.15 m/s^2 .
 - (d) 6.7 m/s^2 .
 - (e) 33 m/s^2 .

3. A book of mass 3.00 kg falls off a table of height 0.800 m, when it reaches the floor, the change in its gravitational potential energy will be:
- (a) $-23.5 J$.
 - (b) $-2.40 J$.
 - (c) $2.40 J$.
 - (d) $23.5 J$.
 - (e) $0 J$.
4. A hockey puck of mass 0.16 kg that is initially at rest is struck, and leaves the hockey stick with a speed of $40.0 m/s$, after spending a time of $0.0023 s$ in contact with the stick. The magnitude of the impulse delivered to the puck was:
- (a) $6.4 N/s$.
 - (b) $0.00037 N/s$.
 - (c) $0.092 N/s$.
 - (d) $2800 N/s$.
 - (e) $17000 N/s$.
5. A roller coaster car crests a 9.0 m tall hill with a speed of 12 m/s, what will speed of the car be at the bottom of the hill?
- (a) $12 m/s$.
 - (b) $13 m/s$.
 - (c) $18 m/s$.
 - (d) $22 m/s$.
 - (e) $25 m/s$.
6. A 1.0 kg mass is at an x position of $x = -2.0 m$, a 2.0 kg mass is at $x = -1.0 m$, and a 3.0 kg mass is at $x = 3.0 m$. What is the x position of the center of mass for this system?
- (a) $0.83 m$.
 - (b) $0.0 m$.
 - (c) $5.0 m$.
 - (d) $-2.0 m$.
 - (e) $1.2 m$.

7. A box being drug along a surface travels a distance of 3 meters, and has a total amount of work done it by all forces acting on it of +28.5 Joules. The box:
- (a) will have slowed down in traveling the three meters.
 - (b) will have moved at constant speed over the three meters.
 - (c) will have sped up over the three meters.
 - (d) will have come to rest upon traveling the three meters.
 - (e) how the box's speed changed cannot be determined from the information given.
8. A monkey pushes a broom across the floor with a force of $6.00N$, such that the handle of the broom makes an angle of 42.0° with the floor. How much work is done by the monkey in pushing the broom $3.00m$?
- (a) $6.00 J$.
 - (b) $18.0 J$.
 - (c) $13.4 J$.
 - (d) $12.0 J$.
 - (e) $16.2 J$.
9. A person whose mass is 68.0 kg stands on a scale in an elevator. If the elevator is accelerating upward at 2.19 m/s^2 , the scale would read:
- (a) 68.0 N .
 - (b) 149 N .
 - (c) 518 N .
 - (d) 667 N .
 - (e) 816 N .

10. Two blocks with masses m_1 and m_2 are released from rest at the top of two frictionless inclined planes of the same height making 30° and 60° angles with the horizontal direction, respectively. Which of the blocks is going faster when it reaches the bottom of its respective incline?
- (a) We must know the actual masses of the blocks to answer.
 - (b) Both blocks will have the same speed at the bottom.
 - (c) Block 1 will be faster at the bottom.
 - (d) Block 2 will be faster at the bottom.
 - (e) There is not enough information to answer the question.

Exam 1 Worked Problems

Sample

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Both problems are worth 15 points, and will be graded in a manner similar to the assigned homework problems in the book; up to 6 points possible for the description of your solution method, up to 6 points for your algebra and other work (*available only if you receive the full 6 points for the description*), and three points for the correct answer (*available only if you receive the full 6 points for your work*), including units.

1.) A hoop rolls without slipping up a ramp inclined at an angle of 27° to the horizontal. If the speed of the center of mass of the hoop is 3.5 m/s at the bottom of the ramp, what height will the hoop reach?

2.) A 5.0 kg monkey traveling from left to right at a speed of 6.5 m/s collides head on with a 7.5 kg gibbon traveling from right to left a speed of 4.5 m/s. If the collision is elastic, what are the final velocities of the monkey and gibbon?